비교문화연구 제63집 (2021.6) pp.1~36

On the Prepositional Alternation in 'Verb *in*/*at* V-*ing*' Patterns in English*

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Abstract

This study deals with the prepositional alternations of *in* and *at* in the 'Verb *in*/*at* V-*ing*' constructions, with the purpose of identifying their syntactic and semantic characteristics as well as investigating the linguistic factors that distinguish between two constructions. For doing these works, this study adopts two different methodologies focusing on the data extracted from COCA; collostructional analysis and semantic-functional analysis. As the results, this study proposes the constructional meanings of each construction: the *in* V-*ing* construction conveys the meaning of carrying out the event as its basic sense whereas the *at* V-*ing* pattern expresses the aim relation with the purpose of attempting to do something with its goal. The evidence can be provided by the results from raw frequency as well as collostructional analysis that *succeed* occupies the top position as a collexeme most strongly attracted to the *in* V-*ing* construction and that the verb *aim* occupies the top position as a collexeme most strongly attracted to the *at* V-*ing* construction. From the second analysis, this study could identify the four linguistic characteristics of these two patterns. These results support the claim that there must be some collocational restrictions in syntactic and semantic aspects of each construction.

Key Words : prepositional alternation, *in* V-*ing* construction, *at* V-*ing* construction, collostructional analysis, collocational restriction

* This work was supported by the Ministry of Education of the Republic of Korea and the National Research Foundation of Korea (NRF-2019S1A5B5A07087141).

Ⅰ. Introduction

The issues on the distribution and meaning of the complement clauses that a verb can combine have long been focused on by countless researchers (Dixon 2005; Duffley 2000, 2004, 2006; Fanego 1997; Givón 1995; Langacker 1999; Mair 2002, 2003; Noonan 2007; Rohdenburg 1996, 1999, 2003; Rudanko 1984, 1989, 1996, 1998, 2000, 2003; Verspoor 1997, 1998, 2000; Wierzbicka 2006). One of these issues is involved in the relationship between the forms of the complements that the verbs take and their meanings, as illustrated in (1). Specifically, the meanings of complement that the verb takes are highly correlated with certain types of forms. The verb *regret* can, for instance, combine with the two different complement forms V-*ing* or *to* infinitive, yielding the different meanings of the phrases, as in (1a) and (1b). The verbs in (1c) and (1d) need to take a finite clause form of complement, whereas the verb *see* in (1d) has a bare infinitive form of complement.

(1) a. I am sure he **regretted** letting me inside. (COCA FIC 1993)
b. They **regretted** to inform me that there had been an accident. (COCA SPOK 2004)
c. Economists **predict** that GNP growth will sputter over the next few quarters. (COCA 1991 MAG)
d. I'm always **wondering** if this is the right path for me. (COCA 2012 BLOG)
e. He had **seen** the plane land there many times. (COCA 1999 FIC)

The examples in (2) and (3), on the other hand, have a particular preposition between the main verb and its complement clause, thus

forming *Verb in V-ing* or *Verb at V-ing* patterns. One of the prominent properties different from those of the examples in (1) lies in that these prepositions cannot be predictable from the main verb, even though the verb still has certain element(s) to combine with in order to form a complete clause.

(2) a. Dr. Frankenstein succeeds in bringing his inanimate creature to life, but, as Mr. Holmes writes, his soul is irreparably damaged. (COCA 2012 NEWS)
b. All authors participated in revising the manuscript, and read and approved the final manuscript. (COCA 2012 WEB)
c. I believe in giving customers a choice. (COCA 2014 NEWS)

(3) a. I am aiming at living the life of a monk in China. (COCA 2002 FIC)
b. Hanoi has balked at signing a trade agreement with the United States. (COCA 2000 NEWS)
c. She usually excelled at remembering names and faces. (COCA 2012 FIC)

In addition, the examples in (4) show that these two patterns create the alternation of prepositions *at* and *in* V-*ing* patterns. The main verb *started* can have either an *in* V-*ing* or an *at* V-*ing* pattern, as in (4a) and (4b). The same phenomenon is also found in the main verb *struggle*, as illustrated in (4c) and (4d).

(4) a. I flicked my pocket knife open and **started** in trimming a hangnail. (COCA 2001 FIC)
b. He **started** at studying architecture and then he switched, then he switched to math. (COCA 2016 SPOK)
c. I was **struggling** at making change. (COCA 2012 BLOG)

d. If students **struggle** in recording an intended musical line due to insufficient keyboard/ instrumental skills, they may want to record themselves singing the part in synchronization with the click track and video. (COCA 2015 ACAD)

These examples above raise some questions: what is the grammatical function of the prepositions *in* or *at* in each construction, which can be a crucial factor distinguishing the two patterns from each other? Specifically, how do these prepositions contribute to the meaning of each sentence? Do these two patterns form an alternating construction?

As mentioned at the beginning of this section, predicate complementation has long been one of the topics intensively addressed by a lot of researchers, but there is still much that is unexplored. Some of the work put its attention to the complement clauses that are combined with the prepositions *into, to, from, with, at, on*, *of* under the corpus-based perspective (Leech 1968; Rudanko 2000; Hunston & Francis 2000; Gries & Stefanowitsch 2003). They have been trying to explain the grammatical function of these prepositions in each construction by making a clear distinction of their role as a complement or an adjunct. However, there has never been an issue on the possibilities of the alternation between these prepositions.

The major goal of this study is to identify the syntactic and semantic characteristics of the two constructional patterns, *Verb in* V-*ing* and *Verb at* V-*ing* patterns, along with checking why and how the two patterns show an alternation. This can be subdivided into two aspects: the first is to investigate the grammatical properties of each pattern, thus clarifying the meaning of each pattern and the second is to examine how and why the two patterns form an alternation by looking into the correlation between the two patterns as well as what grammatical factors may involve in

distinguishing between these variational patterns. This paper is organized as follows. Section 2 starts with a brief sketch of general characteristics of these two patterns as an introduction of the previous researches. In section 3, the data and methodological consideration, and methods applied are presented. Section 4 discusses the results and analyses. In section 5, this study addresses some grammatical properties of each construction as discussion points. Section 6 concludes the study.

II. Previous studies

As already stated in the previous section, previous literature on these prepositional complement clauses is sporadically found. This section presents a brief sketch of the general characteristics of complement clauses starting with a particular preposition. First, the major prepositions that are likely to form these complement clauses can be listed as *on, in, at, to, of, with, into, from*, most of which are as illustrated in (5) (Leech 1968; Rudanko 2000; Hunston & Francis 2000; Gries & Stefanowitsch 2003).

(5) a. I said that we should forget the past and **concentrate** on building a better future for all. (COCA 1995 MAG)
b. Everyone had to pledge to **cooperate** in creating a nonviolent and sustainable community. (COCA 1994 TV)
c. I can only smile and **laugh** at remembering the episode. (COCA 2002 FIC)
d. I don't like to **reduce** us to being part of the seattle sound. (COCA 1992 MOV)
e. She built her own robots and **dreamed** of going to MIT. (COCA 2018 NEWS)

Second, the main issues to be raised from the previous researches can be divided into two different parts (Leech 1968; Rudanko 1991, 1995, 2000; Hunston & Francis 2000; Gries & Stefanowitsch 2003). The researchers, first of all, attempt to identify the syntactic properties of the main verbs selecting a particular type of complement clause. More specifically, they try to identify what kind of main verb is allowed to occur with these types of complement clause, and to classify them in terms of their meanings, thus categorizing their semantic functions such as manner, means, etc. in each sentence. In another part, they explain the grammatical functions of a nonfinite clause containing a preposition as a complement clause, thus distinguishing between the complement clauses and adverbial clauses. Rudanko (1991, 1995), for instance, propose that the syntactic structure of the examples (6) should be depicted as the internal structure in (7). This structure indicates that the V-*ing* clause is more closely linked to the main verb rather than to the preposition followed by, which requires a particular preposition and V-*ing* clause as its argument to combine with.

(6) a. John delights in frustrating his opponents. (Rudanko 1991)
b. John balked at extending the deadline. (Rudanko 1995)
(7) $[[\text{John}]_{NP}\ [\text{balked}]_{Verb}\ [\text{at}]_{Prep}\ [[\text{PRO extending the deadline}]_{VP}\ ]_{S2}\ ]_{S1}$

This V-*ing* clause also needs to be treated as an adverbial clause in the sense that it is possible for the preposition *in* to introduce adverbial clauses denoting time or instrument, even though it is quite similar in appearance to the complement clauses, as shown in (8). It implies that the main verbs *stammer* and *stumble* in (8) are used as intransitive verbs as well as the V-*ing* verbs are less closely connected to each main verb. Rudanko (1991, 1995) attempt to demonstrate the validity of taking the

syntactic structure of (7) in terms of the constituent tests such as pseudo-cleft and question-answer pair, as in (9). Sentence (6a) could be a response to the question of (9a), and not to the question of (9b), thus implying that the V-*ing* clause functions as a complement and not as an adjunct in the sentence. In addition, the pseudo-cleft sentences in (9c) and (9d) also show the same result.

(8) a. John stammered in pronouncing the name. (Rudanko 1991)
b. John stumbled in climbing the stairs.

(9) a. What did John delight in?
b. *How did John delight?
c. What John delighted in was frustrating his opponents.
d. *When/how did John delight was in frustrating his opponents.

The issues on the complement clauses including a particular preposition can comprehensively be summarized into two aspects. A lot of researchers have tried to explain the syntactic properties of the main verbs selecting a particular preposition plus V-*ing* clause pattern. In addition to this, the grammatical functions of the nonfinite clause have also been focused on: it can take a role of complement or adjunct. Nevertheless, the grammatical functions of these prepositions have never been mentioned in any previous literature, thus implying that they have not yet received any attention. Their functions in each sentence need to be considered as an important factor, in the sense that they can be a trigger to create an alternation of two patterns '*in* V-*ing*' and '*at* V-*ing*', which will be called a prepositional alternation in this study.

Ⅲ. Data and Methodology

1. Data collection

The data this study collected come from the Corpus of Contemporary American English (COCA). First, this study extracted 1,000 samples per construction, 1,000 sentences of '*in* V-*ing*' and 1,000 sentences of '*at* V-*ing*' respectively, and the following sentences in (10) were excluded from these samples, resulting in a data set of 870 sentences from '*in* V-*ing*' and a data set of 944 sentences from '*at* V-*ing*'. Sentence (10a) has an adverbial expression beginning a preposition *in*, inside of which the expression *coming* functions as a modifier, whereas the verb *follow* in (10b) is used as a relative clause, necessarily having an empty object and the verb *justified* in (10c) is used as a passive verb, both of which contain an adverbial phrase starting with '*in* V-*ing*' phrases.

(10) a. The IMF believes it is only set to **increase in coming** years. (COCA 2012 BLOG)

b. But officials are given no guidelines to **follow in making** such decisions, and there's no centralized system they can consult to inform them of corporate wrongdoing. (COCA 2002 MAG)

c. Frankly, given Mr. Rivera's behavior since Ms. Stanley's review appeared, Ms. Stanley would have been **justified in assuming** brute force. (COCA 2005 SPOK)

2. Methodological consideration and methods applied

As stated in previous section, this research is basically two-fold. First,

it is to identify the meaning difference between two patterns by clarifying each constructional meaning. In order to investigate the semantic properties of these two patterns from a construction grammar perspective, this study conducts two different analyses of a corpus-based analysis and a collexeme analysis. The data used through this study are extracted from COCA. The collostrutional analysis is conducted in terms of Coll.analysis V3.2a by Stefanowitsch & Gries (2003).

Construction grammar, developed by many researchers such as Charles Fillmore, Paul Kay, George Lakoff, and Adele Goldberg, insists that the ultimate meaning of linguistic expressions is not simply determined in terms of their compositional properties but also the meaning additionally formed by constructions themselves, whose meaning is directly connected with a particular form. For instance, the English ditransitive sentence, illustrated by *Carlos bought me a mink hat*, has a construction frame [S V O_i O_d], which is assigned a construction meaning of transfer (specifically, the subject referent transfers the direct object to the indirect object). This constructional meaning is supported by the frequency of the data from a corpus, more specifically, the prototypical meaning from a construction frame is derived from the higher raw frequency of a verb occurred in a given frame. That is, the top-ranked verb in frequency is a verb *give* in English ditransitive sentence frame, thus resulting in the transfer meaning. Goldberg (2002) explains that a verb may appear in a given construction if its meaning is compatible with that of the construction, thus implying that the higher the frequency where a verb occurs in a given construction, the closer it is to the meaning of the construction.

Second, it is to check what kinds of grammatical factors can influence the prepositional alternation of the *in* V-*ing* and *at* V-*ing* constructions, the properties of which may lead these patterns to a type of variation

by prepositions. The issue on the alternating pairs has normally been focused on the similarities and differences in formal, functional, and semantic aspects between two alternating members. First, the early generative grammar starts from the issue on which of the two alternating patterns is basic and which is derived from this basic one, focusing on the formal relationship between two alternating members. Specifically, this relationship is typically depicted by derivational mechanism which associates two members of a pair with the same underlying source of syntactic structure. Therefore, the two alternating constructions are regarded as syntactic alternatives equivalent semantically and functionally.

On the other hand, on the functional aspect the analysis has been performed under the semantic-functional approaches, which have tried to identify the functional differences between two alternating members through the different ways of packaging the information flow. They maintain the stance that there are precedence principles between the notions such as topicality, animacy, givenness, or thematicity, which are considered as the primary factors determining the choice between two constructions, and under these principles of information structure, speakers can select one variant member of this alternating pair, allowing them to package the information structure that they would like to deliver.

Modern generative grammar has paid more attention to the semantic considerations of the formal properties of these alternating constructions, mainly raising the question of which member of a pair can be a basic argument structure of a given verb, and which semantic factor can determine whether a given verb can change its argument structure. Especially construction-based approaches have tried to identify any primary factors determining these alternating constructions in terms of this semantic aspect. For instance, Thompson & Koide (1987) explains

the alternation of ditransitive and dative patterns in ditransitive constructions in terms of the distance of the argument roles, by providing the distance as a factor determining the iconic word order. Under the situation where the distance between agent and recipient is large, the *to*-dative pattern is used, whereas the ditransitive pattern is used in the case where the distance is small.

Recent construction-based approaches basically assert that the grammatical units consist of a pair of form and meaning, thus implying that different linguistic forms should yield each different linguistic meaning. Under these approaches, each member of an alternating pair must have a construction of its own. Goldberg (2002) explains that a verb used in a given construction shares more semantic properties with other verbs in the same type of construction than with the same verb used in other type of construction corresponding to the other member of the alternating pair. As an instance, let us consider the constructions where a verb *buy* is used, illustrated in (11b) and (11c). The meaning of the verb *buy* in (b) is much more similar to that of the verb *gave* in (11a) than that of *buy* in (11c).

(11) a. She **gave** Dave the best gift she could come up with.
(COCA 2015 SPOK)
b. He consoled me by saying she would **buy** us bus tickets home.
(COCA 2015 NEWS)
c. I am saving up to **buy** a car. (COCA 2004 TV)

Stefanowitsch & Gries (2003) mentions that this constructional approach focusing on the semantics, however, does not explain the meaning difference(s) that may exist between the members of an alternating pair as well as the reason why one member of the alternating pair is preferred over the other one. More specifically, we need to explain the distributional

tendency where a linguistic expression can appear freely in both alternating constructions and the expression shows strong biases towards one member of them. In addition, the simple rank-ordering of collocates by the frequency cannot take into consideration the overall distribution of the data and complexity. This overall distribution of all expressions can be computed by a measure of association strength of relationship between a linguistic expression and its collocates. They point out that corpus linguistics take an analysis of emphasizing the linguistic context of a given expression in the process of identifying the syntactic and semantic properties, and one way to keep track of a word's contexts is to extract its collocates, ultimately resulting in neglecting its syntactic structure. They propose an alternative analysis which focuses more on the relationship between lexical words and individual constructions, which is called collostructional analysis, thereby paying closer attention to the syntactic structures. This analysis uses Fisher-Yates Exact test as a statistical test to evaluate their frequencies. This test provides the p-value as a measure of collocation strength corresponding to a word's strength of attraction or repulsion to a given construction.

Let us go back again to the alternating constructions of ditransitive and *to*-dative constructions as an instance. There are a lot of verbs to be allowed to appear in both of these constructions, which both of these constructions are likely to be semantically equivalent. Along with these properties, the collostructional analysis adds what would be differences between these two constructions in terms of the semantic restrictions they put on the verbs and their arguments to occur in them. The result shows that the most distinctive collexeme in a ditransitive pattern is a verb *give*, encoding a direct contact between the entities of agent and patient, whereas a verb *bring* in the *to*-dative is the most distinctive one,

corresponding perfectly to the constructional meaning, encoding a distance between them. In the case of alternating pairs of construction, the verbs *send, write, lend*, and *get* show the free alternation of the ditransitive and *to*-dative constructions, which means that when they are used in the ditransitive, they denote the transfer meaning while when used in *to*-dative, they denote the caused motion meaning related to the *to*-dative.

Ⅳ. Analyses and Results

As mentioned in the previous sections, this study conducts three different analyses in order to identify the syntactic and semantic properties of the two constructions as well as to investigate how and why these constructions show the prepositional alternation: (1) the distributional properties of two constructions in terms of raw frequency, (2) the distributional properties of two constructions by collostructional analysis, (3) the semantic-functional analysis.

1. Distributional properties by raw frequency

According to Goldberg (2002), Construction grammar insists that a linguistic expression may occur in a specific construction if its meaning is compatible with the given construction. We can infer from this assumption that the higher the raw frequency of a verb appearing in a construction, the closer it is to the (prototypical) meaning of that given construction. In light of this implication, this study attempts to figure out the distributional properties of 'V *in* V-*ing*' and 'V *at* V-*ing*' constructions in terms of each raw frequency and the results are as follows.

Table 1. Frequencies of V slot in 'V *in* V–*ing*' pattern

No.	Lexical items	Frequency of each item	Totals
1	succeed	200	200
2	be	74	74
3	believe	64	64
4	say	38	38
5	come	34	34
6	specialize	32	32
7	help	27	27
8	engage	26	26
9	lies	25	25
10	persist	21	21
11	assist, participate, result	14 x 3	42
12	delight	13	13
13	go	12	12
14	walk	10	10
15	aid, invest	9 x 2	18
16	do	8	8
17	consist, correct, think	7 x 3	21
18	discover, err, join	6 x 3	18
19	delay, employ, excel, find, learn, rejoice, revel	4 x 7	28
20	certify, collaborate, insist, lay, log, lose, play, see, stay, support, work, write,	3 x 12	36
21	agree, apply, arise, change, dabble, dress, end, explain, get, hesitate, hope, live, major, move, need, realize, remain, require, run, sign, struggle, survive	2 x 22	44
22	absorb, accuse, aim, allude, barge, base, begin, bring, break, caught, charge, clash, compete, consider, constrain, continue, converge, cut, darken, depict, describe, design, differ, discuss, encounter, engross, exult, fail, fatigue, flounce, glide, hack, hamper, happen, implicate, imply, improve, increase, indicate, influence, joke, look, march, occur, operate, persevere, plant, proceed, proclaim, recognize, recount, refer, rein, relax, remark, remind, respond, rule, rush, saunter, send, set, shine, single, smile, spare, spend, squeeze, state, steep, stumble, suggest, surrender, threw, trudge, tuck, tune, wait, weigh	1 x 79	79
			870

Table 1 above shows that the top-ranked verbs are *succeed, be, believe, say, come, specialize, help*, etc., which are predominantly occupied in the verb slot in 'V *in* V-*ing*' pattern. Almost 20 verbs out of 79 verbs make up 81.7 percent of the total frequency, thus implying that there would be a particular kind of verb groups that entirely occupy this construction. The noticeable thing in this result is that the verb *succeed* accounts for 22 percent of the total number of occurrences, implying it is the most typically used verb and the verb *be* is followed by it, amounting to 8.5 percent of it. This result, therefore, implies that the meaning of the top-ranked verb *succeed* is quite likely to be the basic meaning of a 'Verb *in* V-*ing*' construction.

Table 2 below displays the frequencies of a verb slot in 'Verb *at* V-*ing*' pattern. The top-ranked verbs are *aim, look, work, balk, excel*, etc. Similarly, about 24 verbs out of 105 verbs occupy 89.5 percent of the total frequency. This also means that there might be a particular group of verbs predominantly consisting of this type of construction. The distinctive thing to pay more attention to here is that the verb *aim* makes up 43 percent of the total number of occurrences, which means that the verb *aim* is the most typically used verb in this type of construction. In a similar way to the '*in* V-*ing*' pattern, the result implies that the meaning of the verb *aim* is quite likely to be the basic meaning of the *at* V-*ing* construction.

Table 2. Frequencies of V slot in 'V *at* V-*ing*' pattern

No.	Lexical items	Frequency of each item	Totals
1	aim	403	403
2	look	166	166
3	work	49	49
4	balk	48	48
5	excel	34	34
6	fail	19	19
7	suck	17	17
8	succeed	15	15
9	play	14	14
10	direct	12	12
11	be	11	11
12	practice	9	9
13	hints, stop	7 x 2	14
14	frustrate	5	5
15	experienced, wince	4 x 2	8
16	bristle, come, cringe, feel, gear, laugh, shoot	3 x 7	21
17	accomplish, beam, chafe, devastate, dismay, go, hesitate, labor, marvel, perform, salivate, scoff, sit, start, struggle, target, tremble, win	2 x 18	36
18	excel, blink, blush, boggle, bridle, capture, carry, compete, cower, darken, deplete, despair, dizzy, employ, end, flare, flinch, frown, furrow, geek, grin, grumble, happen, license, insist, insult, lay, live, occur, originate, work, overflow, pain, plant, pout, press, publish, race, rebel, rejoice, seethe, sell, serve, shine, shudder, smile, sneer, sniff, sell, speak, spot, station, stem, stink, stumble, sulk, task, trouble, vex, wave, go, whale, whimper	1 x 63	63
			944

2. Construction–verb interaction: collostructional analysis (collexeme analysis)

Stefanowitsch & Gries (2003) explains that the strong collexemes of a given construction are a good pointer of its constructional meaning, implying that the stronger its collostructional strength with a given construction, the more likely a given verb is to be regarded as being a prototypical meaning. In terms of measuring collostructional strength in the collexeme analysis, we can quantify how much the words in a given slot of construction are attracted to the construction. This analysis computes any association measure for the two by two table, yielding the p-value of a Fisher-Yeats Exact test and highly correlated with, G2 (the log-likelihood ratio)

Table 3 below shows the ranks of the collostructional strength, the degree to which the verbs are strongly attracted by the 'V *in* V-*ing*' construction. It displays the 40 verbs most strongly attracted to the V slot in the 'V *in* V-*ing*' construction. The right-hand columns indicate the collocation strength and the left-hand columns list the collexemes. The result demonstrates that the verb *succeed* ranks the highest in collostruction strength, whose value is infinite and which is the most closely associated verb with the 'V *in* V-*ing*' construction. The lexical items followed by are *specialize, believe, persist, engage, delight*, etc. The conspicuous feature here is that the result in Table 3 is the same as that in Table 1.

Table 3. Collexemes most strongly attracted to the [V *in* V*ing*] construction

	Collexeme (n)	coll.strength		Collexeme (n)	coll.strength
1	succeed	Inf	21	salivate	5.0338
2	specialize	70.9537	22	dismay	4.6776
3	believe	60.4678	23	chafe	4.6124
4	persist	43.7851	24	scoff	3.7022
5	engage	36.0161	25	labor	3.3621
6	delight	30.9014	26	marvel	3.3533
7	be	29.5769	27	beam	3.1717
8	lie	27.7314	28	devastate	3.0183
9	assist	20.7767	29	hesitate	2.4564
10	participate	17.5031	30	say	2.0749
11	result	16.3003	31	go	1.7893
12	aid	15.6697	32	target	1.7608
13	help	14.3685	33	accomplish	1.7251
14	do	13.2660	34	laugh	1.4963
15	invest	10.8820	35	struggle	1.3781
16	correct	9.6554	36	think	1.2147
17	consist	8.5864	37	shoot	1.2021
18	come	7.8169	38	perform	0.9277
19	discover	6.2433	39	sit	0.2408
20	walk	5.2794	40	start	0.5042

Table 4 below lists the 40 most strongly attracted collexemes in 'V *at* V-*ing*' pattern. The verb *aim* ranks the highest in collostructional strength, whose value is infinite. Looking at the collexemes ranking fairly high, yet less so than *aim*, the verbs in V slot are *balk, look, be, excel, work*, etc. The result indicates that the strongest collocate aim is the most closely associated verb with the form and meaning of the 'V *at* V-*ing*' construction.

Table 4. Collexemes most strongly attracted to the [V *at* V*ing*] construction

	lexemes	coll.strength		lexemes	coll.strength
1	aim	Inf	21	dismay	4.4851
2	balk	144.2101	22	chafe	4.4199
3	look	141.1883	23	scoff	3.5107
4	be	105.9342	24	come	3.2729
5	excel	81.0065	25	labor	3.1713
6	work	26.9980	26	marvel	3.1626
7	suck	24.1469	27	beam	2.9815
8	succeed	20.2394	28	devastate	2.8285
9	fail	17.9568	29	experience	2.3999
10	direct	13.1056	30	hesitate	2.2696
11	hint	12.4934	31	stop	1.6158
12	practice	12.3122	32	target	1.5819
13	go	8.3454	33	accomplish	1.5468
14	wince	7.7281	34	laugh	1.2596
15	frustrate	7.4454	35	struggle	1.2076
16	bristle	6.1770	36	shot	0.9815
17	cringe	5.5543	37	perform	0.7747
18	salivate	4.8412	38	start	0.7391
19	gear	4.8318	39	feel	0.7026
20	play	4.5504	40	sit	0.2458

3. Semantic-functional analysis

The semantic-functional analysis provides an insight into what kind of linguistic factor can control the alternation of the *in* V-*ing* and the *at* V-*ing* patterns. As stated in previous sections, we can immediately figure out that there is at least one obvious difference in preposition used between these two constructions, which might be a potential factor to distinguish the grammatical properties of the two constructions. It is widely well known that a preposition has selectional restrictions on its object. In addition, Beavers (2002) explains the distributional properties of prepositions in terms of this selectional restrictions and the aspectual class in the Vendler sense, as exemplified in (12).

(12) a. Tatyana, who has coached skaters to/*into 31 gold medals in Olympics, world and European championships, works out of Marlboro, Mass.
b. Tatyana, who has coached skaters into/*to the record books in Olympics, world and European championships, works out of Marlboro, Mass.
c. Mr. Horme was charmed into/*to accepting the challenge. (Beavers 2002)

The *to*-prepositional phrase is acceptable in (12a) but not in (12b) and (12c), whereas the *into* is acceptable in (12b) and (12c) but not in (12a). This implies that the preposition *to* is assigned different selectional restrictions with the preposition *into*. In a similar way, the examples in (13) tell us that there must be at least a difference in selectional restrictions between the preposition *in* and *at*, commonly with the salient meanings on physical and spatial terms. Specifically, the phrase *in the Harvard Bookstore* denotes a spot included within the bookstore, while the phrase *at the Harvard Bookstore* signifies the bookstore as a whole location. Beavers (2002) explains that the sentence *John is at the Harvard Bookstore* does not entail the sentence *John is inside the Harvard Bookstore*.

(13) a. Tatyana has coached skaters **at/ to/ *in/ *into** 31 gold medals in Olympics.
b. Tatyana has coached skaters **in/ into/ *at/ *to** the record books in Olympics
c. I marched myself **to/into** the Harvard Bookstore.
d. I was **in/at** the Harvard Bookstore. (Beavers 2002)

In addition, prepositions are known to contribute to the event structure

such as aspectual properties of a sentence (Jackendoff 1996; Zwarts 2005; Beavers 2002, etc.). The verb *swim* in (14a), for instance, has an atelic aspect, thereby taking a preposition *for* instead of a preposition *in* with durative measure phrases in (14a).

(14) a. He rises at 6 A.M. and **swims** for/*in/*at 40 minutes every day. (COCA 1998 NEWS)
b. Gronbach's plane is scheduled to **arrive** in/*for/*at one hour. (COCA 2011 TV)

Taking the properties from these lexical aspects of prepositions into consideration, this study attempts to investigate the factors that can be derived from the lexical aspect of the matrix verbs as the variables that affect the choice of the two alternants, because these verbs have to combine with these prepositions. This also would help to identify the grammatical characteristics of the matrix verbs. For doing them, this study sets the four factors as the variables such as durativity, endpoint, change of state and direction. In addition, this study conducts the statistical test by using Fisher Yeats Exact test (two-tailed test) to determine whether or not there is any statistically significant association between two categorical variables. The results can be seen in the following four figures.

Figure 1 below shows the tendency of durativity in each construction, demonstrating that the number of the main verbs with durative aspect is much higher in '*in* V-*ing*' pattern than '*at* V-*ing*' pattern. This implies that the main verbs with the lexical property of duration tend to combine with the '*in* V-*ing*' pattern, which would be one of the features of this construction. This result is fairly consistent with our intuitive linguistic knowledge that the durative verbs take the items with the same lexical

property as their complement. This study has also performed the Fisher exact test to statistically evaluate whether these results (two classification) are significant and the test gives the result of p-value = 1.03471e-26, indicating that the difference in durativity between two patterns is statistically significant.

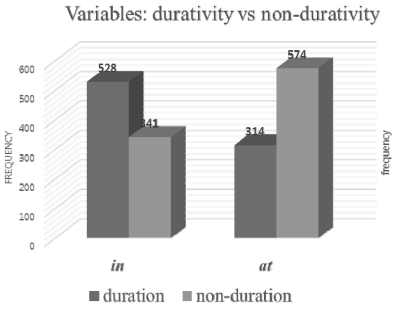

Figure 1. Tendency of durativity in each construction

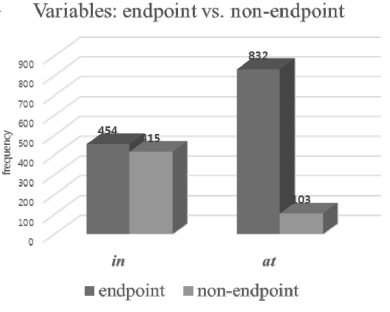

Figure 2. Tendency of endpoint in each construction

Figure 2 above displays that the number of the main verbs with endpoint aspect is far greater in '*at* V-*ing*' pattern than '*in* V-*ing*' pattern. The conspicuous point in this result is that the '*in* V-*ing*' pattern may combine with the main verbs with telic or those with atelic, whereas the '*at* V-*ing*' pattern is allowed rather strictly to combine with telic verbs, which will be one of the prominent characteristics of '*at* V-*ing*' pattern. For this variable, the test returns a very small value such as p-value = 1.49254e-69, thus indicating the difference in endpoint aspect is quite remarkable.

Figure 3 below tells us that the number of the main verbs with dynamic aspect is much higher in *at* V-*ing* pattern than *in* V-*ing* pattern. This suggests that the verbs in both patterns tend more strongly to

combine with dynamic verbs, and not state verbs and that this tendency is much stronger in *at* V-*ing* pattern. The result of the test is p-value = 1.13122e-66.

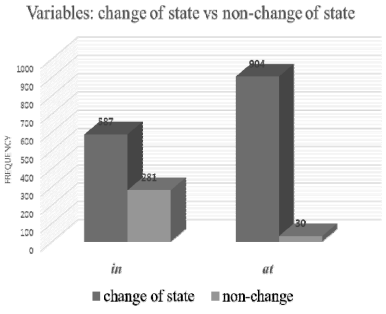

Figure 3. Tendency of change of state in each construction

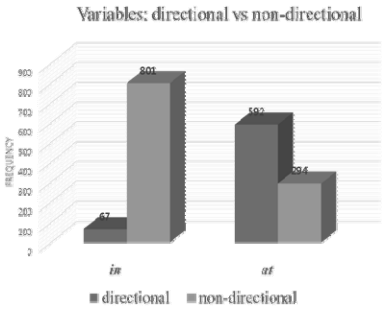

Figure 4. Tendency of directionality in each construction

Figure 4 above shows that the number of the main verbs with directional meaning is much higher in *at* V-*ing* pattern than *in* V-*ing* pattern. More specifically, the verbs with nondirectional meaning tend more strongly to combine with *in* V-*ing* pattern while the ones with directional meaning strictly take *at* V-*ing* pattern as their complement. The statistical significance test gives the p-value = 4.81569e-159, thus indicating that there is a strong association between two variables.

To sum up, the main verbs of '*in* V-*ing*' pattern tend to be more durative in aspectual property than in *at* V-*ing*' pattern. Many more verbs of '*at* V-*ing*' pattern have a change of state property and tend more frequently to provide definite endpoint than those of '*in* V-*ing'* one. The verbs in '*at* V-*ing*' pattern had more directional properties than those in '*in* V-*ing*' pattern.

From these results, this study can identify the four linguistic characteristics

of these two patterns. First, the *in* V-*ing* pattern has a tendency to have a durative verb which is combined with *in* V-*ing* phrase, compared to *at* V-*ing* pattern that tends to have a non-durative verb. Next, the *at* V-*ing* pattern rather strictly requires to take telic verbs. Thirdly, the *at* V-*ing* pattern is strongly inclined to have an activity (atelic) verb. In addition, the *in* V-*ing* pattern has a verb that is less sensitive to the directional meaning, compared to the *at* V-*ing* pattern which is highly sensitive to directional meanings.

Ⅴ. Discussion

This study got started with the goals of identifying the syntactic and semantic characteristics of the two constructional patterns, 'Verb *in* V-*ing*' and 'Verb *at* V-*ing*' patterns, along with checking if the two patterns show an alternation. Focusing on the results derived from the three analyses, this study suggests the basic meaning of each construction as well as its syntactic properties in this section.

1. 'Verb *in* V-*ing*' construction

As the semantic properties of this construction, this study provides the collocational restrictions as well as its constructional meaning. This construction consists of a verb, a preposition *in*, and nonfinite verb form of V-*ing*, as represented in (15). In these combinations, the elements occupied in the verb position are allowed basically to have an aspect of duration as its lexical property. This restriction on the verb causes the element followed to combine with a preposition *in*, and not others.

Specifically, the verb with a durative aspect has a restriction that it should combine with the preposition *in* denoting the duration. This is supported by the result from the previous section that the *in* V-*ing* pattern has a dominant tendency to have a durative verb which is combined with *in* V-*ing* phrase.

(15) Basic meaning description of 'Verb *in* V-*ing*' pattern
(manage to do something)
V (result/manner) + *in* (process) + V-*ing*

In addition, this study tries to establish the basic constructional meaning of this pattern, focusing on the results from the previous sections. More specifically, this pattern denotes the succeed relation as a result of carrying out something difficult. From this interpretation, the verb contributes to the meaning of a succeed relation. Along with this meaning, the preposition *in* implies that there must be some period of performing the event that follows. The evidence can be provided by the results from raw frequency as well as collostructional analysis that *succeed* occupies the top position as a collexeme most strongly attracted to the *in* V-*ing* construction. The main verbs in (16), for instance, can occur in the *in* V-*ing* construction, because they are compatible with the *succeed, achieve*, or *perform* meaning of the construction.

(16) a. Dr. Frankenstein succeeds in bringing his inanimate creature to life, but, as Mr. Holmes writes, his soul is irreparably damaged. (COCA 2012 NEWS)
b. All authors participated in revising the manuscript, and read and approved the final manuscript. (COCA 2012 WEB)
c. I believe in giving customers a choice. (COCA 2014 NEWS)

Summing up, this study could find the semantic idiosyncrasies of the *in* V-*ing* construction that are worth noting. Specifically, this construction conveys the meaning of carrying out the event as its basic sense. Goldberg (1995: 144) explains that the basic meaning of one construction can be metaphorically extended. Likewise, this construction can express extended meanings so that the verbs are allowed to have various types of meaning such as the result or manner of performing the event that follows. This construction normally occurs with verbs such as *succeed, specialize, believe, persist, engage, be, lie*. Besides this basic sense, this construction metaphorically denotes the results or manner, which appear with verbs such as *participate, result, aid, help, invest, walk*.

Keeping the collocational restrictions and the constructional meaning of this construction in mind, this study can assure that the *in* V-*ing* pattern must form a construction of its own in the sense that this pattern does not obey the principle of compositionality, including unpredictability of the preposition followed.

As for the syntactic properties, this construction shows two characteristics as follows. First, the preposition *in* inserted between a main verb and nonfinite verb V-*ing* can be optional, as illustrated in (17). The verb *succeed* takes two constituents *in* and V-*ing,* or one constituent V-*ing* alone without any change of meaning. The same thing happens in the verb *believe*, as in (7c) and (7d).

(17) a. Researchers succeeded in using intersecting laser beams to hold atoms in place to create two- and three-dimensional optical crystals. (COCA 1993 MAG)
b. Former Attorney General Jim Mattox have succeeded using varying styles of populism. (COCA 1992 NEWS)

c. We missed out on the opportunity to have a leader that actually believed in reducing the size of our government and strengthening our economy. (COCA 2011 BLOG)
d. I believe reducing our dependence on foreign energy. (COCA 2011 SPOK)

Next, the nonfinite verb V-*ing* in this construction can be allowed to have the perfective verb form of '*having* V-*en*', as exemplified in (18). This implies that the preposition *in* naturally allows the verb with a perfective aspect to occur in the position immediately followed, because this preposition also holds the durative property.

(18) a. Although I firmly believe in having done everything you prescribe to your athletes, I later regretted that decision when I woke up the following morning. (COCA 2012 BLOG)
b. Owners came in having suffered substantial losses and feeling the system wasn't working fairly across all teams. (COCA 2011 NEWS)
c. The privilege lies in having encountered other minds, in person or in books, in a world where class distinctions, though they existed, did not matter, to wit, a classless world. (COCA 2011 GB)

2. 'Verb *at* V-*ing*' construction

This construction consists of a verb, a preposition *at*, and nonfinite verb form of V-*ing*, as represented in (19). In these combinations, the elements occupied in the verb position normally do not have a lexical aspect of duration. This lexical property leads to the collocational restriction that is available to combine with the preposition *at* signifying

the non-durative (or punctual) property. This is sustained by the results that the *at* V-*ing* pattern tends to have a non-durative verb, rather strictly requires to take telic verbs, and is highly sensitive to directional meanings.

(19) Basic meaning description of 'Verb *at* V-*ing*' pattern
(it is intended to achieve it)
V (manner/means) + *at* (target) + V-*ing*

This pattern, moreover, expresses the aim relation for the purpose of attempting to do something with its goal. As part of this interpretation, the verb contributes to the meaning of an aim (or target) relation. The preposition *at* indicates that there must be a punctual moment of intending to perform the event that follows. These can be proved by the results from raw frequency as well as collostructional analysis that the verb *aim* occupies the top position as a collexeme most strongly attracted to the *at* V-*ing* construction. The main verbs in (20), for example, can occur in the *at* V-*ing* construction, because they are compatible with the *aim, intend*, or *plan* meaning of the construction.

(20) a. I am aiming at living the life of a monk in China.
(COCA 2002 FIC)
b. Hanoi has balked at signing a trade agreement with the United States. (COCA 2000 NEWS)
c. We were looking at trying to become successful.
(COCA 2012 MAG)

To sum up what we have said so far, this study could detect the semantic idiosyncrasies of the *at* V-*ing* construction to note. First of all,

this construction conveys the meaning of intending to achieve the event as its basic sense. As the metaphorically extended meaning, this construction designates the meanings of the manner or means of planning to achieve the event that follows. This construction conventionally appears with verbs such as *aim, look, excel, work, direct*. Apart from this prototypical meaning, this construction metaphorically signifies the manner or means, which occur with verb such as *balk, fail, frustrate, practice, wince, scoff*.

Regarding the syntactic characteristics, this construction also shows two syntactic features as follows. First, the preposition *at* can be optional, as illustrated in (21).

(21) a. My instructors said not to aim using the sights, but to point using the weapon like your finger. (COCA 2012 BLOG)
b. The insurer, MetLife, balked saying the case was an unsolved homicide. (COCA 2014 SPOK)
c. He excels running the floor for a Kings team that likes to play at pace. (COCA 2019 MAG)

Second, this construction does not take perfective verb form '*having* V-*en*' in the position of V-*ing*, as in (22). This naturally arises from the result that the verb in this pattern presupposes a future oriented act.

(22) a. *My instructors said not to aim at having used the sights, but to point using the weapon like your finger.
b. *The insurer, MetLife, balked at having said the case was an unsolved homicide.

Ⅵ. Conclusion

This study discusses the prepositional alternations of *in* and *at* in 'Verb *in/at* V-*ing*' constructions, with the purpose of identifying their syntactic and semantic characteristics as well as investigating the linguistic factors that distinguish between two constructions. For doing these works, this study adopts two different methodologies focusing on the data extracted from COCA; collostructional analysis and semantic-functional analysis. The source of the collostructional analysis is Coll.analysis V3.2a by Stefanowitsch & Gries (2003). The semantic-functional analysis is conducted in terms of the Fisher-exact (two-tailed) test. This study picked out durativity, endpoint, change of states, and direction as the variables of this analysis.

First of all, this study proposes the constructional meanings of each construction. Specifically, the *in* V-*ing* construction conveys the meaning of carrying out the event as its basic sense whereas the *at* V-*ing* pattern expresses the aim relation with the purpose of attempting to do something with its goal. The evidence can be provided by the results from raw frequency as well as collostructional analysis that *succeed* occupies the top position as a collexeme most strongly attracted to the *in* V-*ing* construction and that the verb *aim* occupies the top position as a collexeme most strongly attracted to the *at* V-*ing* construction. In other words, the results from the collostructional analysis demonstrate that the strongest collocate is the verb *succeed*, implying that this is the most closely associated verb with the constructional form and meaning of the *in* V-*ing* pattern and the strongest collocate is the verb *aim*, indicating that this is the most closely associated verb with those of the *at* V-*ing* pattern.

From the second analysis, this study could identify the four linguistic characteristics of these two patterns. First, the *in* V-*ing* pattern has a tendency to have a durative verb which is combined with *in* V-*ing* phrase, compared to *at* V-*ing* pattern that tends to have a non-durative verb. Next, the *at* V-*ing* pattern rather strictly requires to take telic verbs. Thirdly, the *at* V-*ing* pattern is strongly inclined to have an activity verb. In addition, the *in* V-*ing* pattern has a verb that is less sensitive to the directional meaning, compared to the *at* V-*ing* pattern which is highly sensitive to directional meanings. These results provide the collocational restrictions of each construction in syntactic and semantic aspects.

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국문초록

영어의 '동사 *in*/*at* V-*ing*' 구문의 전치사 교체 연구

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본 연구는 '동사 *in*/*at* V-*ing*' 구문에서 전치사 *in*과 *at*의 교체현상에 대해 살펴보고자 한다. 특히 두 구문의 통사 및 의미적인 특징을 규명하고 또한 두 구문을 구분하는 데 결정적인 역할을 하는 언어적인 요소를 살펴보는 것을 연구목표로 한다. 이를 위해 본 연구에서는 COCA에서 추출한 영어자료를 바탕으로 두 가지 방법론을 채택하여 사용한다: 공구문적 분석과 의미기능적 분석. 분석 결과를 통해 본 연구는 두 구문이 표출하고 있는 구문적인 의미를 제시한다. 구체적으로 보면, '*in* V-*ing*' 구문은 기본적 의미로 '사건을 수행하고자 한다'는 의미를 소유하고 있는 반면, '*at* V-*ing*' 구문은 어떤 것을 수행하려는 목적을 가지고 있다는 목표의 의미를 표현한다. 이들 의미는 말뭉치 자료의 빈도수와 공구조적 분석에서 얻은 결과에 그 근거를 둔다. '*in* V-*ing*' 구문에서는 동사 *succeed*가 가장 강력한 공구문 어휘소의 위치를 차지한 반면, '*at* V-*ing*' 구문에서는 동사 *aim*이 가장 높은 빈도수와 가장 강력한 공구문 어휘소의 위치를 차지하였다. 이 결과에 근거해, 두 구문은 각자 고유한 구문이 보유하고 있는 통사 및 의미적인 측면에서의 공구문적 제약이 있음을 확인할 수 있다.

주제어 : 전치사 교체현상, '*in* V-*ing*' 구문, '*at* V-*ing*' 구문, 공구문적 분석, 공구문 제약

▌논문접수일 : 2021. 05. 10
▌심사완료일 : 2021. 06. 01
▌게재확정일 : 2021. 06. 02