Transitivity Profiling as Indicators of Students' Experiential Metafunction Development

: Statistical Comparisons of Elementary, Middle, and High School Students

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I. Introduction

Why is the language of students important to Korean language education? If we only think of language as a "form," the answer to this question may come with ease. If we consider language as a "functional resource," then students' language is not a subject of assessments (i.e., "good" or "bad"), but of observation—as an indicator of the learners' cognition. This is because the use of language as a resource refers not only to what word is employed, but also how it is employed, that is, what other word is associated with it and the resulting meaning realized through its use in a particular context (Seah et al., 2011, p. 853).

In this regard, we take a systemic functional linguistics perspective on language development (Halliday, 1975; 1993; Hasan, 1992). Halliday (1975) argues that language development is a process of generalizing one's functional system into three metafunctions, namely, textual, ideational, and interpersonal. At the same time, children's language is not erroneous but a variant (Joo, 2009, p. 193-194; Min et al., 2020, p. 267-268). Thus, one's language is constantly changed during their lifetime, including adults, who experience various transition or milestones, such as graduation, employment, marriage, re-employment, unemployment, and retirement (Yi, 2018, p. 134), and each of these periods presents its own idiosyncratic developmental

difficulties (Cho, 2019, p. 174). At this point, development cannot be distinguished from change. Language development is thus a dynamic system that adapts to the different social and cultural needs required for each stage of life —from immaturity to maturity (Joo et al., 2020, p. 111).

Drawing on the perspectives of systemic functional linguistics, we analyze the instantiation aspects of the experiential metafunction of students' writings, which would be a useful tool for understanding students' language and its implications for language development.

The framework for understanding the development of experiential metafunction is illustrated through transitivity profiling. Transitivity profiling is a quantitative method; it examines how the frequency of occurrence of transitivity choices made in students' writing is related to the development of students' genre competence (Shanshan & Libo, 2008, p. 853). Transitivity profiling has been applied in relation to language development in the literature. Shanshan and Libo (2008), for instance, analyzed primary and secondary school students in Singapore, while Rohmat et al. (2018) chose high school students in Indonesia as subjects.

In this study, we follow a series of previous Korean studies: Lee and Shin (2020) provide a framework of process types of Korean language. Joo et al. (2020) and Lee et al. (2021) profile the transitivity of elementary students' writings. Jeong et al. (2022) apply transitivity profiling to elementary and middle school students' writings.

In line with the literature, we widen the participants' age group, and then compare and examine a small corpus of expository, opinion, and emotional writings of elementary school (5th grade, 10–11 years), middle school (2nd grade, 13–14 years), and high school (2nd grade, 16–17 years) students to address following research questions:

1. In each expository, opinion, and emotional writing, are there significant differences in the frequency of process types used between elementary, middle, and high school students?

2. In each expository, opinion, and emotional writing, are there significant differences in the frequency of participant pattern used between elementary, middle, and high school students?

II. Theoretical Framework

In systemic functional linguistics (Halliday & Matthiessen, 2014, p. 30), language provides a theory of human experience. Certain lexicogrammatical resources of every language are dedicated to this function, namely, the ideational metafunctions. Ideational metafunction has two components: experiential and logical. Experiential metafunction, in particular, constructs the model of experience, and is also called the "clause as representation." In systemic functional linguistics (ibid., p. 213), "the experience is that it consists of a flow of events, or 'goings-on' and this flow of events is chunked into quanta of change by the grammar of the clause: each quantum of change is modelled as a figure—a figure of happening, doing, sensing, saying, being or having."

The lexicogrammatical resources for construing a quantum of change in the flow of events as a figure provides the system of *transitivity*—that is, a configuration of elements centered on a process (ibid., p. 213). A figure consists, in principle, of three components: a process unfolding through time, the participants involved in the process, and circumstances associated with the process (ibid., p. 220). Of these components, our concern is the "process" and "participant".

1. Korean process type

Lee and Shin (2020) suggest a manageable set of process types of Korean language (see Table 1).[1]

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1   Lee and Shin (2020) conducted the latest study that attempted to classify Korean

Table 1. Process type for the Korean Language (Lee & Shin, 2020, p. 87, edited)

Process type		Representative
Primary	Secondary	
Material process	(a) Happening	Happening to animate/inanimate noun
	(b) Doing	Animate/inanimate noun's doing
	(c) Saying	Human's saying
Mental process	(d) Cognitive	Human's thinking
	(e) Perceptive	Animate noun's perceptual sensing
	(f) Emotive	Human's emotion
Relational process	(g) Attributive	Entity's attribute
	(h) Identifying	Entity's identity
Material process	(i) Existing	Entity's existence

The following examples of secondary process type from (a) to (i) are taken from students' writing.

(1) a. 모래가 많이 **생기고**, [E-OP1348]
　　morae-ga / man-i / **saeng-gi**-go,
　　sand / a lot / **formed**
　　Sand **formed** a lot,

　b. 내야수들은 땅볼을 많이 **잡는다**. [E-EX0582]
　　naeyasu-deur-eun / ttangbor-eul / man-i / **jam-neun-da**.
　　The infielders / ground balls / a lot / **catch**
　　The infielders **catch** ground balls a lot.

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process types after carefully reviewing theoretical issues of process type in system functional linguistics. This study referred to Lee and Shin (2020) because they prove the validity of their classification through empirical case study(delphi method). 8 SFL experts participated the case study and identified process type of identical data. After that Lee and Shin (2020) calculated a level of "consistency" agreement among experts using a formula suggested by Gwilliams and Fontaine's (2015, p. 10).

c. 사망한 사람들은 없다고 어떤 한 신문에서 **발표하였다**. [E-EX0822]
samanghan saram-deur-eun / eobs-dago / eotteon han sinmun-eseo
/ **balpyoha-yeoss-da**.
fatalities / there were no / One newspaper / **reported**
One newspaper **reported** there were no fatalities.

d. 지금도 가끔 나는 그때를 **생각하며** [H-EM9024]
jigeum-do / gakkeum / na-neun / geu-ttae-reul / **saenggaka**-myeo
now / sometimes / I / about that time / **think**
Now, sometimes, I **think** about that time

e. 나는 그 소식을 **듣고** [H-EM9178]
na-neun / geu / sosig-eul / **deut**-go
I / that / news, / **heard**
I **heard** that news,

f. 하지만 나는 나를 **믿어서** [M-EM정4862]
hajiman / na-neun / na-reul / **mid**-eo-seo
But / I / in myself / **believe**
But I **believe** in myself

g. 게임에서 질 확률이 **높습니다**. [H-EX8013]
geim-eseo / jil / hwangnyur-i / **nop-seum-ni-da.**
the game / of losing/ Possibility / **is high.**
Possibility of losing the game **is high.**

h. 엘사의 성우는 이디나 멘젤**이고** [E-EX0383]
elsa-ui / seongu-neun / idina menjel/ -**i**-go
Elsa's / voice actor / Edina Menzel/ **is**
Elsa's voice actor **is** Edina Menzel,

i. 수많은 부작용들이 **존재한다**. [H-OP8384]
suman-eun / bujagyong-deur-i **jonjaeha-n-da.**
numerous / side effects / **exist**
there **exist** numerous side effects

Lee and Shin (2020, pp. 104-106) argue that process types are fuzzy categories, but distinguish primary processes—viz. *material, mental,* and *relational*—from secondary processes—viz. *happening, doing, saying, cognitive, perceptive, emotive, attributive, identifying,* and *existing*.[2] They then compare primary processes to "primary colors" that cannot be further decomposed into other colors, and secondary processes to a combination of primary colors that can be decomposed back into primary colors. Notice that, in Table 1, *saying, attributive*, and *existing* are included as two different primary types.

The secondary processes concern transitivity profiling. A noticeable characteristic of Lee and Shin's (2020) classification in Table 1 is the subdivision of *material process* and *mental process. Material* is subdivided into *doing* and *happening*, while *mental* is divided into *cognitive, perspective*, and *emotive*. In general, material and mental processes are more typical categories; however, in terms of language development, we assume that the subdivision can describe students' language use more precisely, which is an advantage.

2. Korean participants type

Each process type constitutes a distinct model or schema for construing a particular domain of experience as a figure (Halliday & Matthiessen, 2014, p. 213). The type of participant in Korean was classified for each process, respectively. Table 2 provides an overview of the main process types and the participants associated with them.[3]

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2   In his earlier studies, Halliday (1967a, 1967b, 1968) also set out three types of processes: *material, mental*, and *relational*. Later, In *An Introduction to Functional Grammar* in 1985, Halliday introduced three secondary processes, besides the primary processes: *behavioral, verbal,* and *existential* (Davidse, 2017, p. 81). Lee and Shin (2020) include the *behavioral process as material or mental* processes depending on the context of its use. *Verbal and existential* processes correspond with *saying* and *existing*, respectively.

3   In Table 2, the classification frame for participant—"core 1," "core 2," "other," and "causative"—depends on Thompson's (2014, p. 131, Table 5.1) study.

Table 2. Overview of process types and associated participants

Process	Participant			
	Core 1	Core 2	Other	Causative
Doing	Actor	Goal/Scope	Recipient/Client	Initiator
Happening	Happened	-	Recipient/Client	-
Saying	Sayer	Verbiage/projection	Receiver, Target	Initiator
Cognitive	Thinker	ideation/projection	Attribute	Inducer
Perceptive	Senser	Phenomenon/projection	Attribute	Inducer
Emotive	Feeler	Phenomenon/projection	Attribute	Inducer
Attributive	Carrier	Attribute	-	Attributor
Identifying	Value	Token	-	Assigner
Existing	Existent	-	-	-

III. Methods

1. Participants

Participants were gathered by nonprobability convenient sampling in three age groups: elementary school students (5th grade, ages 10-11), middle school students (2nd grade, ages 13-14), and high school students (2nd grade, ages 16-17). Table 3 presents the participants' demographic information and Table 4 presents the number of clauses produced by each group.

Table 3. Students' demographic information

School		Number of persons		Number of persons			Total
		Men	Women	Expository	Opinion	Emotional	
Elementary	P	21	11	12	8	12	32
	C	39	49	30	28	30	88
	Total	60	60	42	36	42	120

School		Number of persons		Number of persons			Total
		Men	Women	Expository	Opinion	Emotional	
Middle	D	25	33	21	17	20	58
	H	41	34	28	27	20	75
	Total	66	67	49	44	40	133
High	K	-	60	20	20	20	60
	O	62	-	23	19	20	62
	Total	62	60	43	39	40	122
Total		178 (50.1%)	177 (49.9%)	134 (35.7%)	122 (32.5%)	119 (31.7%)	375 (100%)

Table 4. Number of clauses produced by each group

School		Number of clauses		Number of clauses			Total
		Men	Women	Expository	Opinion	Emotional	
Elementary	P	371	240	240	107	264	611
	C	698	1,184	583	433	866	1,882
	Total	1,069	1,424	823	540	1,130	2,493
Middle	D	864	1,440	773	612	919	2,304
	H	669	834	633	512	358	1,503
	Total	1,533	2,274	1,406	1,124	1,277	3,807
High	K	-	1,249	256	361	632	1,249
	O	2,054	-	787	492	775	2,054
	Total	2,054	1,249	1,043	853	1,407	3,303
Total		4,656 (48.5%)	4,947 (51.5%)	3,272 (34.1%)	2,517 (26.2%)	3,814 (39.7%)	9,603 (100%)

2. Data collection

In one school level, each of the two teachers participated in gathering students' writing. Before data collection, researchers held an information session with teachers to help them understand the aims and methodology of the study as well as the data collection procedure. Data were collected in class after receiving the approval of students and their legal representatives in written form.

Teachers first introduced a writing task to the students, who then hand-wrote the text on the printed paper. Table 5 shows the guidelines provided to students.

Table 5. Writing task guidelines provided to students

Genre	Guidelines
Expository writing	✍ Choose one subject that you know well and write a text introducing its appearance, characteristics, and functions so that readers can understand it well. • Example 1. a piece of writing introducing people, things, places, etc. that you are interested in or think of as meaningful • Example 2. a piece of writing explaining how to do or use something that you are familiar with
Opinion writing	✍ Choose one problem that should be solved in school or society and write a text that gives an opinion based on reasonable grounds so the readers can be convinced. • Example 1. persuasive/assertive/argumentative writing on problems founded in daily life or school life • Example 2. Proposals suggesting solutions to problems or disagreements inside and outside the school
Emotional writing	✍ Choose an impressive experience what you've experienced recently, and write a text that your thoughts and feelings well revealed so that can be shared with readers • Example 1. A diary of impressive experience, a journal that shares thoughts and feelings about a event that happened to you. • Example 2. A review or essay about meaningful experiences in daily life or school life

According to the Korean National Curriculum (2015 revised version), students learn all three genres—expository, opinion, and emotional—after finishing their elementary 5th grade course.[4] Next, the

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4   The name of each genre in Table 5 is from the Korean National Curriculum. Each does not strictly fit the notion of "genre" used in an academic context as a technical term, because it is a reconceptualized version of genre in the context of education. Because this study's participants are students, we had to use the genre of Korean National Curriculum that they can understand and be familiar with.
Discussions on genre categories in the Korean language education are still controversial. The issue of how to accept the genre in Korean language education appears in various way from Je (2015), who follows Knapp and Watkins' genre view, to Jo (2018), who follows Martin's genre view.

first survey on elementary school students is conducted in December when the full curriculum has been completed.

3. Data analysis

To help illustrate the developmental implications of experiential metafunction, we analyze not only process types but also the pattern of students' language among the students, as per Thompson's (2014, p. 133-139) transitivity profiling approach. At first, we separate each sentence in the students' writing into clauses, and then identify and classify the clauses based on the nine types of processes (see Table 1).

Thereafter, we identified the participant of each clause and group them together to form a pattern. In the excerpts below, (2) shows some participant patterning examples in the doing process.[5] If there was a participant ellipsis in a clause, we place the participant in brackets with a minus mark (-) to represent it. The element of circumstance is written in italics and process is in bold.

(2) a. 초등학생들은$_{Actor}$ *모두 책상에* **앉아서** [E-OP1074]
chodeunghaksaeng-deur-eun / modu / chaeksang-e / **anj**-a-seo
elementary school students / all / at their desks / are **sit**ting
All elementary school students are sitting at their desks
➡ **Pattern: + Actor**

Fundamentally, genre is a dynamic notion with a fuzzy boundary. We explain and argue something even when we write a diary, and express our emotion to suggest something. Accordingly, even if a small section of a text, such as a sentence or paragraph, has a different goal, such as expressing emotion to suggest something, from the goal of the whole text, we can still call the text 'opinion writing'.

5   The serial numbers beside the examples consist of "school level," "type of writing," and "number" assigned to each clause (from No. 0001 to No. 9603) in order. As for the school level, elementary schools were marked "E," middle schools as "M," and high schools as "H." As for the types of writing, expository writings were marked "EX," opinion writings as "OP," and emotional writings as "EM." The serial number was used in the same way in (1).

b. (나는)$_{Actor}$ *아침 일찍* **일어나** [E-EM2338]

   (na-neun) / achim / iljjik / **ir-eo-na**

   (I) / in the morning / early/ **woke up**

   (I) woke up early in the morning

   ➡ **Pattern: - Actor**

c. 인간은$_{Actor}$ 같은 실수를$_{Goal}$ **반복한다**. [M-OP5189]

   ingan-eun gat-eun silsu-reul **banboka**-n-da

   Humans / the same / mistakes / **repeat**

   Humans repeat the same mistakes

   ➡ **Pattern: +Actor+Goal**

d. (학생들이)$_{Actor}$ *횡단보도를*$_{Scope}$ *한번 그냥* **건너고 나면** [M-OP5181]

   (haksaeng-deur-i) / hoengdanbodo-reul / hanbeon / geunyang /

   geonneo-go na-myeon

   (students) / the crosswalk / just / **cross** Once

   Once students just cross the crosswalk

   ➡ **Pattern: -Actor+Scope**

e. 내 친구는$_{Actor}$ 자기가 좋아하는 배우분께$_{Recipient}$ 선물을$_{Goal:good}$ **전달하고**
   [H-EM7387]

   nae / chingu-neun / jagi-ga / joaha-neun / baeu-bun-kke / seon-

   mur-eul / **jeondalha**-go

   My / friend / his / favorite / actor to / a gift / **gave**

   My friend gave a gift to his favorite actor

   ➡ **Pattern: +Actor++Recipient+Goal**

f. (나는)$_{Actor}$ 1주차 때 열심히 한 나에게$_{Client}$ 휴식을$_{Goal:service}$ **주고자 한다**.
   [H-EM9229]

   (na-neun) / 1-ju-cha / ttae / yeolsimhi / han / na-ege / hyusig-eul

   /ju-goja ha-n-da

   (I) / the first week / in / hard / studying / myself / a break / want

   to give

   I want to give myself a break after studying hard in the first week

   ➡ **Pattern: -Actor+Client+Goal**

Consequently, 157 participant patterns were identified in the entire dataset: 49 *doing*, 17 *happening*, 21 *saying*, 21 *cognitive*, 14 *emotive*, 16 *perceptive*, 13 *attributive processes*, 5 *identifying*, and 1 *Existing*.

We then apply a normality test to determine if the variables are normally distributed. The normality assumption was not satisfied owing to large difference between the minimum and maximum values, given the nature of the research data. To verify whether there exists a significant difference in the use of process types and participant patterns in students writing, the nonparametric statistic— the Kruskal-Wallis test— is implemented using SPSS 27.0.[67] If the difference between groups is statistically significant, a post-hoc test is implemented using the Bonferroni correction.

IV. Results

1. Process

To test the first research question—that is, "In each expository, opinion, and emotional writing, are there significant differences in the frequency of process types used between elementary, middle, and high school students?"—we use the Kruskal-Wallis test and Bonferroni correction post-hoc test, with the frequency of process as a dependent variable, in each genre of students' writing. Table 6 shows the results.

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6   The midrank represents the average values of rank. In the Kruskal Wallis test, each value is given a numerical ranking, which are arranged in order of small to large values. If the same value occurs multiple times in in the sample, the same ranking is given. In this way, the midrank allow us to understand "the frequency of process types and of participant patterns," although the normal distribution of a group cannot be assumed. The higher the midrank, the more frequently it is used.

7   In the Kruskal–Wallis test (Table 6) the value of N (the number of samples) corresponds with the number of persons in each group (cf. Table 3).

Table 6. Significant differences in the frequency of process

Dependent variable (process)	school level	Expository writing				Opinion writing				Emotional writing			
		Mid rank	H	p	Bon ferroni	Mid rank	H	p	Bon ferroni	Mid-rank	H	p	Bon ferroni
Doing	E	58.99				45.22				60.70			
	M	76.93	5.098	0.078	–	70.35	10.750**	0.005	E < H* E < M**	60.65	0.136	0.934	
	H	65.07				61.96				63.19			
Happening	E	59.61				57.15				52.99			
	M	65.99	4.563	0.102	–	63.94	0.958	0.619	–	71.56	5.923	0.052	
	H	76.93				58.18				60.38			
Saying	E	59.81				57.86				59.49			
	M	72.60	2.994	0.224	–	57.83	1.435	0.488	–	61.43	0.354	0.838	
	H	69.20				64.42				63.69			
Cognitive	E	56.49				41.79				44.79			
	M	71.86	6.030*	0.049	E < M* E < H*	61.42	18.304***	0.000	E < M* E < H***	72.89	15.584***	0.000	E < H** E < M***
	H	73.29				75.21				67.66			
Perceptive	E	61.35				52.67				56.04			
	M	72.60	2.857	0.240	–	64.53	3.401	0.183	–	64.41	1.782	0.410	
	H	67.70				61.65				64.33			
Emotive	E	62.10				51.08				46.37			
	M	77.44	6.179*	0.046	E < M* H < M*	78.11	22.891***	0.000	H < M** E < M***	70.63	12.006**	0.002	E < H** E < M**
	H	61.45				47.79				68.26			
Attributive	E	58.05				41.35				58.29			
	M	83.33	12.932**	0.002	E < M** H < M**	69.65	15.460***	0.000	E < H** E < M***	52.10	8.483*	0.014	M < H** E < H*
	H	58.70				66.33				74.28			
Identifying	E	75.46				58.15				61.23			
	M	59.93	4.434	0.109	–	50.53	12.320**	0.002	M < H** E < H*	51.65	9.790**	0.007	M < H**
	H	68.35				72.38				71.64			
existing	E	60.26				54.72				54.93			
	M	69.23	2.394	0.302	–	65.36	2.096	0.351	–	64.04	2.530	0.282	
	H	72.59				58.82				65.86			

E: Elementary; M: middle; H:high school   *$p<.05$, **$p<.01$, ***$p<.001$

Based on the school level, there are significant differences in the process type frequency (highlighted in gray in Table 6), as shown by the Kruskal-Wallis test.[8]

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8   As per the Bonferroni correction test, one group uses certain processes more or less than the other two. The cells in Table 6 relating to this test are marked by color, with

In the case of expository writings, we find significant differences in three types of processes: *cognitive* (*H*=6.030, *p*<0.05) and *emotive* (*H*=6.179, *p*<0.05), and *attributive* (*H*=12.932, *p*<0.01) in each school level.

In the case of opinion writing, we find significant differences in five types of processes: *doing* (*H*=10.750, *p*<0.05), *cognitive* (*H*=18.304, *p*<0.001), *emotive* (*H*=22.891, *p*<0.001), *attributive* (*H*=15.460, *p*<0.001), and *identifying* (*H*=12.320, *p*<0.01).

In the case of emotional writing, we find significant differences in four types of processes: *cognitive* (*H*=15.584, *p*<0.001), *emotive* (*H*=12.006, *p*<0.01), *attributive* (*H*=8.483, *p*<0.05), and *identifying* (*H*=9.790, *p*<0.01).

In the process types, *doing* reveals a significant difference in only one genre, expository writing, while *identifying* shows a significant difference in two genres, opinion and emotional. Significant differences are observed in all genres of *cognitive, emotional*, and *attributive*, but there are no significant differences in all genres of *happening, saying*, and *existing*.

The differences between elementary, middle, and high school students are further elaborated through the Bonferroni test. The description of the results by genre focuses on the case wherein one group's frequency is higher or lower than the other two groups. For example, if the result shows E<H and M<H (see Table 6), we consider that case to be "H's frequency is higher than other two."[9]

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each color representative of a group: red for elementary, green for middle, and blue for high. When one group uses certain processes more (not less) than other one group, we use the same color, but in a lighter shade. The remaining tables, Table 7 to 11, also use this color code.

9   Note that the Bonferroni test is a post-hoc test for nonparametric statistics. It compares each group separately through multiple comparisons: "elementary vs. middle," "elementary vs. high," and "middle vs. high." Therefore, from 1 to 3, significant differences are respectively found. Although, we state that "one group is higher or lower than the other two groups," this does not mean that the two groups are homogeneous. Thus, if the result shows two significant differences, that is, "elementary < mid-

In expository writing, we find significant differences in three types of processes: *cognitive, emotive*, and *attribute*. Middle school students use *emotive* and *attribute* processes more than the others, and elementary school students show lower frequency than the others in the use of *cognitive*.

In opinion writing, we find significant differences in five types of processes: *doing, cognitive, emotive, attribute*, and *identifying*. Middle school students use *emotive* most, and high school students use *identifying* the most. Elementary school students show lower frequency than the others in the use of *doing, cognitive*, and *attribute*.

In emotional writing, we find significant differences in four types of processes: *cognitive, emotive, attribute*, and *identifying*. High school students use *attributive* and *identifying* the most, and elementary school students show lower frequency than the others in the use of *cognitive* and *emotive*.

Notably, middle school students show dominant use of *emotive processes*, while high school students use relational processes, namely, *attributive* and *identifying*, more. Middle school students tend to have a personal preference for expository and opinion writing; in opinion writing, they predominantly use desiderative processes, such as "-면 좋겠다" (*myeon joh-gess-da*, meaning "want to"), when suggesting or claiming something.

The significant differences in the frequency of process types described above can be interpreted in more detail through a statistical analysis of the participant patterns of the corresponding processes.

2. Participant pattern

To test the second research question—"In each expository, opinion, and emotional writing, are there significant differences in the

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dle" and "middle < high," this result cannot be interpreted to mean that "elementary <middle <high school."

frequency of participant pattern used between elementary, middle, and high school students?"—we use the same methodology applied above—the Kruskal-Wallis and Bonferroni correction pose-hoc tests—in each genre of students' writing.

1) Expository writing

In expository writing, 16 participant patterns out of 106 show a significant difference according to school level (see Table 7). Interestingly, in expository writing, most patterns showing significant differences are used by high school students more than the other one or two groups. Among all patterns, *doing, saying, perceptive*, and *emotive* are used most by high school students, who also use some patterns including *happening* and *cognitive* processes more the other groups (i.e., "-Happened," "+Thinker+Phenomenon," and "-Thinker+Phenomenon.").

Table 7. Significant differences in the frequency of participant pattern in expository writing

Process	No.	Participant pattern	Midrank			H	p	Bonferroni	
			E	M	H				
Doing	1	−Actor	67.75	55.51	80.92	13.650**	0.001	M	< H***
	2	−Actor+Goal	66.32	54.29	83.71	13.564**	0.001	E M	< H* < H***
	3	−Actor+Scope	56.25	64.24	82.20	11.186**	0.004	E M	< H** < H*
	4	+Actor−Scope	63.50	66.23	72.85	7.801*	0.020	E M	< H** < H*
	5	−Actor−Scope	68.05	59.10	76.53	8.729*	0.013	M	< H**
Happening	6	+Happened	60.01	59.56	83.86	12.491**	0.002	E M	< H** < H**
	7	−Happened	74.44	59.38	69.98	7.103*	0.029	M	< E*
Saying	8	−Sayer+Projection	61.00	66.43	75.07	10.815**	0.004	E M	< H** < H*
Cognitive	9	+Thinker+ideation	61.08	67.64	73.60	7.002*	0.030	E	< H**
	10	−Thinker+ideation	58.94	67.00	76.43	6.799*	0.033	E	< H**

Process	No.	Participant pattern	Midrank			H	p	Bonferroni	
			E	M	H				
	11	−Thinker+Projection	54.58	77.08	69.20	13.849**	0.001	E < M*** E < H*	
Perceptive	12	−Senser	66.00	66.00	70.67	6.445*	0.040	E < H* M < H*	
	13	+Feeler+Phenomenon	66.19	62.65	74.30	7.126*	0.028	M < H*	
Emotive	14	−Feeler	59.79	58.11	85.73	31.377***	0.000	E < H*** M < H***	
	15	−Feeler+Phenomenon	60.82	60.93	81.51	13.662**	0.001	E < H** M < H**	
Attributive	16	+Value+Token	80.76	64.93	57.48	10.579**	0.005	M < E* H < E**	

E: Elementary(n=42); M: middle(n=49); H:high school(n=43) *p<.05, **p<.01, ***p<.001

Consequently, in 13 patterns out of 16, the high school student group shows greater average frequency of use. Considering that there are few significant differences between elementary and middle school students, it is reasonable to assume that participant composition patterns in expository writing develop at the high-school level.

No significant pattern appears in the middle school student group, which seems to be a unique characteristic. Elementary students show a higher (in "+Token+Value") and lower (in "-cognitive + [projection]") frequency than the others. In the "-Happened" pattern, elementary school students show a higher frequency only in comparison to middle school students.

2) Opinion writing

In opinion writing, 19 participant patterns out of 117 show significant differences by school level (Table 8). The middle school student group shows greater average frequency of use. In all patterns, *saying* and *existing* are used most by middle school students, who also use patterns including *doing* and *emotive* processes more than the others (i.e., "-Actor," "+Actor+Goal," "-Feeler+Phenomenon," "-Feeler-Phenomenon," "-Actor+Scope," "+Thinker+Ideation," "-Thinker," and "+Senser+Phenomenon") middle school students show higher fre-

quency of use than one other group. In 10 of the 19 patterns, we find significant differences in opinion writing, with the middle school student group showing a higher average frequency of use than one or two other groups.

Table 8. Significant differences in the frequency of participant pattern in opinion writing

Process	No.	Participant pattern	Midrank			H	p	Bonferroni	
			E	M	H				
Doing	17	−Actor	50.43	71.23	56.17	10.190**	0.006	E	< M**
								H	< M*
	18	+Actor+Goal	52.81	71.44	53.73	9.534**	0.009	E	< M**
								H	< M*
	19	−Actor+Goal	39.60	65.23	72.94	19.433***	0.000	E	< M**
								E	< H***
	20	−Actor+Scope	46.99	71.95	58.53	11.142**	0.004	E	< M**
	21	−Actor−Goal	47.14	59.97	71.91	11.907**	0.003	E	< H**
	22	−Actor+Goal−Client	56.28	57.16	66.64	8.582*	0.014	E	< H*
								M	< H*
Saying	23	−Sayer+Projection	53.82	67.94	56.74	9.459**	0.009	E	< M**
								H	< M*
Cognitive	24	+Thinker+Ideation	55.00	64.42	59.63	6.415*	0.040	E	< M*
	25	+Thinker+Projection	70.44	61.76	48.37	13.988**	0.001	H	< E***
								H	< M*
	26	−Thinker	57.00	63.77	58.51	6.062*	0.048	E	< M*
Perceptive	27	+Senser+Phenomenon	55.11	65.81	57.96	7.196*	0.027	E	< M*
Emotive	28	+Feeler+Phenomenon	50.00	66.18	62.26	10.918**	0.004	E	< M**
								E	< H*
	29	−Feeler+Phenomenon	46.03	73.51	57.65	21.782***	0.000	E	< M**
								H	< M**
	30	−Feeler−Phenomenon	50.00	74.18	53.23	28.254***	0.000	E	< M***
								H	< M***
	31	−Feeler+Projection	58.72	50.91	71.44	13.175**	0.001	E	< H*
								M	< H***
	32	+Carrier+Attribute	35.49	73.20	67.73	28.322***	0.000	E	< M***
								E	< H***

Process	No.	Participant pattern	Midrank			H	p	Bonferroni
			E	M	H			
Attributive	33	−Carrier	49.49	58.48	71.42	11.099**	0.004	E < H** M < H*
	34	−Carrier+Attribute	41.54	74.30	60.91	19.842***	0.000	E < M*** E < H*
Identifying	35	+Value+Token	53.86	70.00	54.38	8.713*	0.013	E < M* H < M*

E: Elementary(n=36); M: middle(n=44); H:high school(n=39) *p<.05, **p<.01, ***p<.001

In some patterns, the high school student group shows higher average frequency of use (i.e., "-Actor+Goal," "-Actor-Goal," "-Feeler+Projection," and "-Carrier"). However, high school students use the pattern "+Thinker+Projection" far less than the others. Elementary students have lower average frequency of use than the others for "-Actor+Goal," "+Feeler+Phenomenon," "+Carrier+Attribute," and "-Carrier+Attribute."

We thus assume that the patterns of the participants that show significant differences in the opinion article generally increase from elementary- to middle-school level, and then decrease from the middle- to high-school level.

3) Emotional writing

In emotional writing, 17 participant patterns out of 114 show significant differences by school level (Table 9). The middle school student group shows greater average frequency of use as well. In 9 of the 17 patterns, we find significant differences in opinion writing; the middle school student group shows a higher average frequency of use than one or two other groups (i.e., "+Actor+Goal," "-Actor+Goal+Client," "+Sayer+Verbiage," "-Sayer+Verbiage," "+Thinker+Projection," "-Feeler," "-Feeler-Phenomenon," "+Carrier+Attribute," and "+Value+Token"). The high school student group shows higher average frequency of using "-Thinker+Projection," "-Senser," and "-Feeler+Projection," and lower average frequency of using "+Value+Token."

Table 9. Significant differences in the frequency of participant pattern in emotional writing

Process	No.	Participant pattern	Midrank			H	p	Bonferroni	
			E	M	H				
Doing	36	+Actor+Goal	49.80	77.99	57.30	16.276***	0.000	E H	< M*** < M**
	37	−Actor−Goal	71.20	60.44	52.38	7.065*	0.029	H	< E**
	38	−Actor−Scope	70.92	52.46	60.65	7.129*	0.028	M	< E**
	39	−Actor+Goal+Client	58.00	67.15	59.53	9.597**	0.008	E H	< M** < M*
Saying	40	+Sayer+Verbiage	58.44	69.21	57.00	13.967**	0.001	E H	< M** < M**
	41	−Sayer+Verbiage	54.93	70.40	59.50	12.002**	0.002	E H	< M** < M*
Cognitive	42	+Thinker+Projection	56.50	67.13	61.13	8.213*	0.016	E	< M**
	43	−Thinker+Projection	47.43	60.43	77.35	18.915***	0.000	E M	< H*** < H*
Perceptive	44	−Senser	59.50	59.50	65.60	8.407*	0.015	E M	< H* < H*
Emotive	45	+Feeler	66.26	59.00	59.00	6.312*	0.043	M H	< E* < E*
	46	−Feeler	71.48	39.71	72.81	30.077***	0.000	M M	< E*** < H***
	47	−Feeler−Phenomenon	56.45	71.89	56.41	17.909***	0.000	E H	< M*** < M***
	48	−Feeler+Projection	55.73	57.19	71.88	11.131**	0.004	E M	< H** < H**
Attributive	49	+Carrier	44.51	77.65	63.19	19.094***	0.000	E E	< M*** < H*
	50	+Carrier+Attribute	61.30	73.22	49.99	9.172*	0.010	H	< M**
Identifying	51	+Value+Token	61.05	75.58	47.90	19.330***	0.000	E H H	< M* < M*** < E*
Existing	52	+Existent	45.75	75.64	63.90	15.881***	0.000	E E	< M*** < H*

E: Elementary(n=42); M: middle(n=40); H:high school(n=40)   *p<.05, **p<.01, ***p<.001

The elementary school students group shows various patterns in emotional writing compared with the other genres. They show higher average frequency of use for "-Actor-Goal," "-Actor-Scope," and "+Feeler," but lesser use of "+Carrier' and "+Existent' than the others.

In this group, compared with other school levels, the students were able to easily write in the "diary" or "journal" format than the other genres. Table 4 shows the number of clauses produced by elementary school students: 823 clauses (33%) for expository, 540 clauses (22%) for opinion, and 1,130 clauses (45%) for emotional. This result confirms that elementary school students are familiar with emotional writing.

V. Discussion

We now examine the overlapping foci that emerged from results of data analysis and contextualize these results to present three implications for language development. First, aspects of language developmental among students differs by genre. Table 10 summarizes these significant differences by school level (cf. Tables 7-9).

By considering an elementary students' group as a datum point, we can set two phases of language developmental aspects: "from elementary to middle" and "from middle to high." In the first phase, the average frequency of participant composition patterns increases significantly in opinion and emotional writing, but not expository writing. In the second phase, the average frequency increases for expository, but high school students still show an increase in the average frequency in opinion and emotional writing.

Thus, middle school students' language developmental tasks are primarily focused on opinion and emotional writing, while high school students' tasks focus on expository writing. Given emotional writing appears intensively in elementary school students' develop

Table 10. Comparison of participant pattern (Bonferroni)

Elementary school

Genre	Participant pattern	Bonferroni
EX	−Happened	M < E*
EX	−Thinker+Project.	E < M*** / E < H*
EX	+Value+Token	M < E* / H < E**
OP	−Actor+Goal	E < M** / E < H***
OP	+Feeler+Phenom.	E < M** / E < H*
OP	+Carrier+Attr.	E < M** / E < H***
OP	−Carrier+Attr.	E < M*** / E < H*
EM	−Actor−Goal	H < E**
EM	−Actor−Scope	M < E**
EM	+Feeler	M < E* / H < E*
EM	+Carrier	E < M*** / E < H*
EM	+Existent	E < M*** / E < H*

Higher/lower than other two
Higher that other one

Middle school

Genre	Participant pattern	Bonferroni
OP	−Actor	E < M* / H < M*
OP	+Actor+Goal	E < M** / H < M**
OP	−Actor+Scope	E < M*
OP	−Sayer+Project.	E < M* / H < M*
OP	+Thinker+Ideation	E < M*
OP	−Thinker	E < M*
OP	+Senser+Phenom.	E < M*
EM	−Feeler+Phenom.	E < M*** / H < M**
EM	−Feeler−Phenom.	E < M** / H < M**
EM	+Value+Token	E < M* / H < M*
EM	+Actor+Goal	E < M*** / H < M**
EM	−Actor+Goal +Client	E < M* / H < M*
EM	+Sayer+Verbiage	E < M** / H < M**
EM	−Sayer+Verbiage	E < M** / H < M*
EM	+Thinker+Project.	E < M**
EM	−Feeler	M < E*** / M < H***
EM	−Feeler−Phenom.	E < M*** / H < M***
EM	+Carrier+Attr.	H < M**
EM	+Value+Token	E < M* / H < M**

Higher/lower than other two
Higher that other one

High school

Genre	Participant pattern	Bonferroni
EX	−Actor	M < H***
EX	−Actor+Goal	E < H* / M < H***
EX	−Actor+Scope	E < H* / M < H*
EX	+Actor−Scope	E < H** / M < H*
EX	−Actor−Scope	M < H**
EX	+Happened	E < H* / M < H*
EX	−Sayer+Project.	E < H* / M < H*
EX	+Thinker+Idea.	E < H**
EX	−Thinker+Idea.	E < H**
EX	−Senser	E < H* / M < H*
EX	+Feeler+Phenom.	M < H**
EX	−Feeler	E < H** / M < H***
EX	−Feeler+Phenom.	E < H** / M < H**
OP	−Actor−Goal	E < H**
OP	−Actor+Goal −Client	E < H* / M < H*
OP	+Thinker+Project.	H < E*** / H < M*
OP	−Thinker+Project.	E < H* / M < H***
OP	−Carrier	E < H** / M < H*
EM	−Thinker+Project.	E < H** / M < H*
EM	−Senser	E < H* / M < H*
EM	−Feeler+Project.	E < H** / M < H**
EM	+Value+Token	H < M*** / H < E*

Higher/lower than other two
Higher that other one

E: Elementary school group
M: Middle school group
H: High school group

EP: Expository writing
OP: Opinion writing
EM: Emotional writing

same pattern in between E&M   same pattern in between M&H

*p<.05, **p<.01, ***p<.001

mental tasks, we can say that their tasks broaden to opinion writing once they enter middle school.

Our analyses also capture some interesting points: In the comparison of "elementary to middle" and "middle to high," there exist no same patterns of significantly higher average frequency of use in the same genre. In other words, patterns that middle school students used with significantly higher frequency in opinion writing were not maintained in high school students' opinion writing.

While the same patterns appeared in different genres, the patterns that have significantly higher use in middle school students' opinion writings also appeared in high school students' expository writings (see yellow highlights in Table 10): "-Actor," "-Actor+Scope," "-Sayer+Projection," "+Thinker+Phenomenon," and "-Feeler+Phenomenon." The aspect of the construction of the figure that appears in the middle school students' opinion writing shifts to the expository writing of high school students. That is, the opinion writing patterns of middle school students decreases and adjusts to a normal level in high school, while some still increase to a significant level in expository writing.

Only one overlapping pattern was found between elementary and middle school students: "+Value+Token" shows significantly higher frequency of use in elementary school-level expository writings and in middle school-level emotional writings (orange highlights in Table 10). Thus, the heterogeneity between both these groups is greater than that of the middle and high school students' groups.

Second, we find a significant difference in patterns of participants by school level in the combination of "core participant 1" and "core participant 2." Out of 52 participant patterns that show significant differences by school level in each genre, 13 patterns consist of only one participant (±core participant 1) and 37 patterns consist of two participants (±core participants 1±core participants 2). Except for the two patterns that include "other participant," which is *Client*, the remaining patterns comprise core participants only. Therefore, we confirm

that "core participants" and "other participants" were not responsible for any significant differences in patterns for each school level.

Previous language development studies (Ahn & Kim, 2010; Kim & Kim, 2011; Kim, 2015) on learners (over 10 years old) in Korea report that, as learners age, their language productivity (average length of sentences), syntax complexity (number of conjunctive clause and embedded clauses), diversity of vocabulary, and accuracy continues to increase. Therefore, it is expected that, as students get older, they tend to use more "other participants" or "cause participants." However, it is the core participants that actually show significant differences.

For this reason, focusing only on the forms of students' writing has its limitations. They use a short sentence on functional purpose. To illustrate this, consider the following scenario: A baby may only speak one word at a time or short sentences, but later develops the ability to speak longer sentences. Here, the forms of language—productivity, complexity, and accuracy—could be an important developmental indicator. However, language development that occurs in adolescence is difficult to examine and capture only based on the forms of language.

In systemic functional linguistics, grammatical choice "assumes functional motivation–at the level of the speaker who engages in goal-directed activity when s/he talks and in terms of the grammar s/he uses, since it assumes that languages are functionally adapted to meet communicative demands speakers-in-contexts make" (Asp, 2013, p. 163). This makes systemic functional linguistics a useful tool for providing a means of understanding the unity of social subjects' meaning-making and their grammatical selections, and, thus, the developmental implications of this unity (Ferreira, 2020, pp. 50-51; Halliday, 1993; Hasan, 1992; Wells, 1994; Williams, 2004). This, in turn, allows us to capture more dynamic aspects of students' language development.

Third, as the school level increases, the ellipsis of core participants increases significantly. Table 11 summarizes the data of Tables

Table 11. Ellipsis of core participant

Process	Genre	Participant pattern	Ellipsis core 1	Ellipsis core 2	other	Bonferroni
Do.	OP	−Actor+Goal	○	−		E < M**, E < H***
	EM	−Actor−Goal	●	●	−	H < E**
	EM	−Actor−Scope	●	●	−	M < E**
	OP	−Actor	●	−	−	E < M**, H < M*
	OP	+Actor+Goal				E < M**, H < M*
	OP	−Actor+Scope	●		−	E < M**
	EM	+Actor+Goal			−	E < M***, H < M**
	EM	−Actor+Goal +Client	●			E < M**, H < M*
	EX	−Actor	●	−	−	M < H***
	EX	−Actor+Goal	●			E < H*, M < H***
	EX	−Actor+Scope	●		−	E < H**, M < H*
	EX	+Actor−Scope		●		E < H**, M < H*
	EX	−Actor−Scope	●	●	−	M < H**
	OP	−Actor−Goal	●	●		E < H*, M < H*
	OP	−Actor+Goal −Client	●		●	E < H*, M < H*
Say.	OP	−Sayer+Project.	●			E < M**, H < M*
	EM	+Sayer+Verbiage		−		E < M**, H < M**
	EM	−Sayer+Verbiage	●		−	E < M*, H < M*
	EX	−Sayer+Project.	●		−	E < H**, M < H*
Cog.	EX	−Thinker+Project.	○		−	E < M***, E < H*
	OP	+Thinker+Idea.			−	E < M*
	OP	−Thinker	●	−	−	E < M*
	EM	+Thinker+Project.			−	E < M*
	EX	+Thinker+Idea.			−	E < H**
	EX	−Thinker+Idea.	●			E < H**
	OP	+Thinker+Project.			−	H < E***, H < M*
	EM	−Thinker+Project.	●		−	E < H**, M < H*

Process	Genre	Participant pattern	Ellipsis core 1	Ellipsis core 2	other	Bonferroni
Hap.	EX	−Happened	●	−	−	M < E*
	EX	+Happened		−	−	E < H**, M < H*
Per.	OP	+Senser+Phenom.			−	E < M*
	EX	−Senser	●	−	−	E < H*, M < H*
	EM	−Senser	●	−	−	E < H*, M < H*
Emo.	OP	+Feeler+Phenom.			−	E < M**, E < H*
	EM	+Feeler		−	−	M < E*, H < E*
	OP	−Feeler+Phenom.	●		−	E < M***, H < M**
	OP	−Feeler−Phenom.	●	●	−	E < M***, H < M***
	EM	−Feeler	●	−	−	M < E***, M < H***
	EM	−Feeler−Phenom.	●	●	−	E < M***, H < M***
	EX	+Feeler+Phenom.			−	M < H**
	EX	−Feeler	●	−	−	E < H***, M < H***
	EX	−Feeler+Phenom.	●		−	E < H*, M < H*
	OP	−Feeler+Project.	●		−	E < H*, M < H***
	EM	−Feeler+Project.	●		−	E < H**, M < H**
Att.	OP	+Carrier+Attr.			−	E < M***, E < H*
	OP	−Carrier+Attr.	○		−	E < M***, E < H*
	EM	+Carrier		−	−	E < M***, E < H*
	EM	+Carrier+Attr.			−	H < M**
	OP	−Carrier	●	−	−	E < H**, M < H*
Id.	EX	+Value+Token			−	M < E*, H < E**
	OP	+Value+Token			−	E < M*, H < M*
	EM	+Value+Token			−	E < M*, H < M***
	EM	+Value+Token			−	H < M***, H < E*
Exs.	EM	+Existent				E < M***, E < H*

●: Ellipsis, significantly more used
○: Ellipsis, but significantly less used
−: Does not appear

*p<.05, **p<.01, ***p<.001

7–9 by process type in order of school level, with content indicating whether the core participant was omitted or not. The composition of omitting key participants increases as the school level increases in Table 11. Especially, as students grow in age, the more "core participant 1" is omitted. Core 1 is the participant with only ellipses; in other words, there exists no pattern without Core 1.

In this context, the consistent increase by school level is prominent in the doing and emotive processes. Because Core 1 of doing and emotive processes generally corresponds with the writer, we interpret that the tendency of the writer to be omitted has increased. We thus confirm that the ellipsis of the writer is a major writing strategy (Shin, 2020; 2022, pp. 467-468), while the ellipsis of core participants can be treated as a highly meaningful change in education. We recommend a follow-up study to identify who the omitted participant is.

In this study, "core participants 2" did not show a relatively consistent increase by school level, but Core 2 can also be a writer of the text. The ellipsis of core participants can also be related to the logical process of constructing a clause because, when several clauses are combined, core participants are often be omitted.

VI. Conclusion

We adopt an empirical and quantitative methodology on the instantiation aspect of the experiential metafunction of students' writings. Our results carry several implications for language development.

Our methodology describes learners' individuality as a generality, in that it uses inferential statistics. However, this study is not an arrival point, but a departure point. Our findings cannot be generalized to all students. Caution must be exercised when subordinating the linguistic characteristics of learners as individuals under generality. This is because our study is a starting point for entering the language of specific and individual learners. When generality is described, we can broach

the interpretation of the specificity of individuals within a specific socio-cultural and situational context thereof.

Considering that systemic functional linguistics is a useful tool for understanding students' language (Lee, 2018) and its implications for language development, studies on learners' language development from this perspective should continue. We recommend a follow-up study on the omission pattern of participants described above, as noted earlier. It is necessary to discuss whether the developmental aspects of experiential metafunction system moves in a direction consistent within the genre as a social and cultural custom. We can achieve this in future by comparing students' writing to the texts written by skilled groups.

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ABSTRACT

Transitivity Profiling as Indicators of Students' Experiential Metafunction Development
: A Comparisons of Elementary, Middle, and High School Students

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This study analyzes the instantiation aspect of the experiential meta-function of students' writings in order to understand students' language and its implications for language development. The framework for understanding is transitivity profiling, a quantitative method examining the frequency of occurrence of transitivity choices made in students' writing. Evidently, in each expository, opinion, and emotional writing, we find significant differences in the frequency of process types and participant patterns used by elementary, middle, and high school students. Based on these result, we suggest that (1) students' language developmental aspect is different depending on the genre, (2) a significant difference in patterns of participants by school level is concentrated in a combination of core participants, and, (3) as the school level increases, the ellipsis of core participants increases significantly.

KEYWORDS   Experiential metafunction, Language development, Transitivity, Process, Participant, Systemic functional linguistics