Morphological Development in EAP Student Writing

Kim McDonough, Pakize Uludag, & Heike Neumann

Concordia University

Contact information:

Kim McDonough (corresponding author)

1455 de Maisonneuve Blvd W

Education Department, FG 6-151

Montreal, QC H3G 1M8 Canada

Phone: 514-848-2424, ext 5168

Email: kim.mcdonough@concordia.ca

Morphological Development in EAP Student Writing

Within the broader category of writing development, which has been operationalized as observable change over time in any aspect of writing (Polio, 2017), language development in L2 writing specifically refers to changes in accuracy, complexity, fluency, or the frequency and emergence of forms in written texts as applied to lexical, morphological, syntactic or formulaic aspects of language (Polio & Park, 2016). Distinct from the study of the relationship between language features and the assessment of text quality (e.g., what are the features of "good" essays?), language development in L2 writing examines changes in L2 writers' language use independent of whether those changes positively contribute to text quality. Situated within this framework, this study explores the morphological development of L2 writers enrolled in a one-semester EAP course with an instructional focus on morphology.

Despite receiving considerable exposure to morphological forms in the language environment, L2 learners often find morphology difficult to acquire (DeKeyser, 2005, 2016; Larsen-Freeman, 2010). Due to a processing tendency to prioritize meaning over form, L2 learners may rely on lexical forms to communicate information that is also conveyed by morphology (MacWhinney, 2012; VanPatten, 2004). Even advanced L2 learners may face difficulties with the accurate and appropriate use of morphological forms, particularly those that do not have perceptual salience, lack morphophonological regularity, or are semantically complex (Goldschneider & DeKeyser, 2001). In addition, students from all language backgrounds make grammatical errors involving morphology in writing, such as subject-verb agreement, verb tense and aspect, and possessive errors, which can be perceived by both academics and employers as "bothersome" (e.g., Boettiger & Emory Moore, 2018; Glew, Meyer, Sawyer, Schuhmann, & Wray, 2011).

Reflecting awareness of L2 learners' difficulties with morphology, researchers have analyzed the written production of verbal morphology including tense, aspect, modality, and voice features (e.g., Bardovi-Harlig, 1998; Ellis & Yuan, 2004; Verspoor, Schmid, & Xu, 2012) and calculated various measures of morphological complexity (Brezina & Pallotti, 2019; Horst & Collins, 2006; Yoon, 2017). Cross-sectional studies reported that the use of present tenses and verb form errors decreased across the A1 to B1 proficiency levels in the Common European Framework of Reference (CEFR) (Verspoor et al., 2012) and that verbal morphological complexity increased across A2 to B2 levels (Yoon, 2017). Longitudinal studies of L2 students enrolled in a semester-long EAP course (estimated B1 level) reported null findings for morphological accuracy (Yoon & Polio, 2017) and verb phrase errors (Polio & Shea, 2014). However, morphological complexity measured as the ratio of word types to word families showed significant increases for "beginning" ESL primary students in an intensive ESL course (Horst & Collins, 2006). Finally, English L2 writers at the B1-C1 CEFR levels demonstrated verb morphological complexity comparable to English L1 writers, which suggests a potential ceiling level after which variation in morphological complexity may not reflect linguistic ability (Brezina & Pallotti, 2019).

In light of the conflicting findings for morphological development in L2 writing, this brief report examines whether English L2 students enrolled in a one-semester EAP course show any change over time in their use of morphological forms. Whereas prior longitudinal studies with EAP students reported null findings for morphological accuracy (Polio & Shea, 2014; Yoon & Polio, 2017), they have not investigated morphological complexity. Cross-sectional studies that included morphological complexity (Yoon, 2017) and longitudinal studies with primary students (Horst & Collins, 2006) have reported increases with proficiency levels. Using data

collected as part of a larger study about the academic success of L2 English university students (Neumann, Padden, & McDonough, 2019), we explore whether the complexity and accuracy of EAP students' morpheme use changed over a one-semester EAP course.

Method

Participants & instructional context

The participants were 119 English L2 students (60 women, 59 men) who were taking the first of two required EAP courses at an English-medium university in Montreal. They were undergraduate students in the faculties of arts and science (35%), business (30%), engineering (27%) and fine arts (8%). They were adults with a mean age of 21.7 years ($SD = 4.7$) who had lived in Canada for a mean of 1.6 years ($SD = 1.7$) at the time of data collection. A variety of first languages (L1s) were spoken with Chinese (44%), Arabic (19%), and French (17%) the most frequent.

In terms of English proficiency, all students had met the university's requirement for admission, which was a TOEFL iBT score between 75 and 89 or equivalent; however, based on their performance on the university placement test, they were required to take the first of two EAP writing courses. The course focused on the development of general rather than discipline-specific academic language skills and targeted paragraph-level writing skills (e.g., topic sentences, supporting details, transition words) with a strong language focus. The course targeted vocabulary and grammatical structures useful for reading and writing academic materials. The target vocabulary included Academic Word List (Coxhead, 2000) word families with a variety of derivational morphemes, while the target grammatical structures included inflectional morphology on verbs (e.g., tense, aspect, passives, and agreement features) and nouns (e.g.,

possessive and plural). All of the writing tasks were theme-based and covered topics such as technology and socialization.

Design

The study adopted a within-groups design to identify whether the EAP students demonstrated any evidence of morphological development, which was operationalized in terms of change in the morphological complexity or accuracy of their texts from the initial to final exams. To reflect the instructional focus of the students' EAP course, which targeted both inflectional and derivational morphology, two complexity measures were used: the morphological complexity index of verbs and nouns (MCI, Pallotti, 2015; Brezina & Pallotti, 2019) and the types/family ratio (Horst & Collins, 2006). Whereas the MCI is a measure of the average inflectional diversity of verbs and nouns (measured separately), the types/family ratio is the number of morphologically different word forms divided by the number of word families, which includes both inflectional and derivational forms. Accuracy was operationalized as an error rate obtained by summing the number of errors involving noun, verb, and derivational forms separately and then dividing each sum by the number of words in the text. The within-groups variable was time, which was operationalized as the interval between the EAP students' initial and final exams (approximately 10 weeks).

Procedure

During the third week of the semester, research assistants visited the EAP classes to recruit student participants. The consent process recruited participation for two research activities, which were (a) allowing the researchers to analyze the students' timed-writing exams and (b) completing a background information and academic self-concept questionnaire. The EAP course had two, 3-hour exams that targeted grammar (fill in the blank, identify errors, sentence

combination), vocabulary (fill in the blank, word forms), reading comprehension (600-800 text with comprehension question and paraphrasing), and paragraph writing. Students allocated time to each section based on their personal preferences with most students taking from 30 to 60 minutes to write the paragraphs. They wrote their paragraphs by hand without access to any resources other than a paper-based monolingual English dictionary. There was an approximately 10 week interval between the initial and final exams. Both exams provided independent writing tasks with prompts that elicited opinion paragraphs about topics from the course materials. For the initial exam, the topic was technology and the students received one of two prompts that asked students to explain and support their opinion about whether people in technologically-advanced societies live healthy lives or whether people spend too much time using information technologies. For the final exam, the students explained and supported their opinions about whether people can succeed in a new place without strong social bonds or whether green energy sources are a good alternative to fossil fuels. At the end of the semester after the instructors had completed their grading, the researchers obtained the written exams of the students who had agreed to participate in the study.

 Data coding & analysis

The students' hand-written texts were typed and verified by research assistants. Each student's original formatting was maintained except for excluding crossed out words or phrases and correcting minor spelling errors involving lexical bases (e.g., *enviroment* was changed to *environment; *reash* was changed to *reach*) to allow for recognition in automated textual analysis programs. Spelling errors related to morphology were never corrected so that they could be included in the accuracy analysis. The typed texts were analyzed using the MCI tool available online (Brezina & Pallotti, 2015), which provides a measure of morphological complexity

calculated by considering the within-set and between-set diversity of sets of ten exponences (i.e., manipulations to lexical bases such as adding *-s* to a noun) from a text. Similar to a type-token ratio of lexical diversity, the MCI examines how many unique exponences occur in a text by considering diversity within each set of 10 exponences as well diversity between all sets of 10 exponences (for formula see Brezina & Polloti, 2019). Higher MCI values reflect greater diversity because it means more unique exponences are present. Because the MCI complexity tool is still under development, the MCI values were calculated manually by the first researcher for 10% of the texts to check coding accuracy. Average-measures mixed intraclass correlation coefficients for the automated and manual values were .962 for nouns and .961 for verbs. Having confirmed the accuracy of the automated program against manual coding, MCI values calculated from 100 randomized samples of 10 exponences were used for the analysis. The typed texts were also analyzed using the Vocab Profiler classic version (Cobb, n.d.) to obtain the ratio of word types per word family. A subset of the texts (10%) was also coded manually by the second researcher to verify the accuracy of the automated coding, and the intraclass coefficient value was .963.

For the accuracy analysis, the texts were hand-coded by the first researcher to identify errors in three categories: noun forms, verb forms, and derivational forms. Noun form errors included plurals (e.g., *make a lot of efforts*), possessives (e.g., *humans society*), and pronoun forms, which included pronoun-antecedent agreement (e.g., *our lives have been transformed and it will be changed*). Verb form errors included ungrammatical tense, aspect, voice, and agreement features (e.g., *spended*, *might lost*). Errors involving non-finite/tenseless verbs were also counted to maintain consistency with the MCI complexity measure, which includes them as verb exponences. Derivational forms included the use of the wrong part of speech (e.g.,

technology only can make our lives be unhealthy and <u>badly</u>), ungrammatical prefixes (e.g.,

delocating, *unvaluable*), and inappropriate suffixes (e.g., *pleasurement*). Examples of errors

coded in each category are provided in Table 1 with the correct form provided in parentheses.

Table 1

Examples of Errors

Categories	Examples of errors
Noun forms	Furthermore, we could find out what our body needs in order to finish <u>everyday's</u> tasks. (*everyday*)
	I can give some <u>advices</u> on how to build new social relationships when you move to a new city. (*advice*)
	People in complex societies live healthy <u>life</u> with a lot of technology. (*lives*)
Verb forms	Modern medical technology <u>are</u> absolutely important for our physical health. (*is*)
	A lot of my friends' mothers always watch their popular shows at night, and they always <u>be</u> tired during the day. (*are*)
	There are several ways that a person <u>can started</u> a new life successfully. (*can start*)
	Individuals can start their new lives successfully by <u>improve</u> their knowledge about the place. (*improving*)
Derivational forms	We will witness a huge <u>transform</u> that could lead us into a completely diseased society. (*transformation*)

As far as I am concerned, technology has a negative effect on

human's <u>healthy</u>. (*health*)

Technology can only make our lives be unhealthy and <u>badly</u>.

(*bad*)

To account for variation in text length across students and time, proportion scores were obtained

by dividing the number of errors in each category by the total number of words. A subset of the

data (20%) was coded by the second researcher. Intraclass correlation coefficients were .94 for

nouns, .93 for verbs, and .92 for derivational forms.

Results

The initial exams had a mean length of 170.4 words ($SD = 43.9$) while the final exams

were longer with a mean length of 201.1 words ($SD = 41.7$); variation in text length was

accounted for by the measures of complexity and accuracy. As shown in Table 2, the MCI values

for nouns and verbs in the paragraphs decreased from the initial to final exam. The type/family

ratio, the more global measure of both inflectional and derivational morphology, did not change

over time.

Table 2

Morphological Complexity Measures by Time

	Initial exam		Final exam	
	M	SD	M	SD
MCI: Nouns	1.55	0.53	1.09	0.23
MCI: Verbs	4.65	1.32	4.21	1.23
Type/families	1.13	0.13	1.13	0.10

Paired-samples t-tests using an adjusted alpha level of .008 (.05/comparisons) indicated that the decrease in MCI values was significant for both nouns [$t(118) = 8.52$, $p = .001$, $d = 1.12$] and verbs [$t(118) = 2.83$, $p = .006$, $d = .25$]. The effect size, calculated using the Cohen's d formula with pooled standard derivations in the denominator, was in the medium range for applied linguistics research for nouns, while the effect size for verbs failed to reach the threshold for a small effect (Plonsky & Oswald, 2014). Not surprisingly, due to the identical mean scores, there was no significant change in the types/family ratio: $t(118) = .51$, $p = .612$, $d = 0$.

Turning to the accuracy measures (errors/words), the error rates for noun, verb, and derivational forms are shown in Table 3. The error rate for all three error types decreased over time with students making fewer errors on the final exam than the initial exam. Paired-samples t-tests indicated that the decrease in noun form errors was significant with a medium effect size [$t(118) = 3.77$, $p = .001$, $d = 1.21$] while the decrease in verb form errors was significant with an effect size below the threshold for a small effect: $t(118) = 3.41$, $p = .001$, $d = .31$. There was no significant change in the error rate for derivational forms: $t(118) = .90$, $p = .368$, $d = 0$).

Table 3

Error Rates by Time

	Initial exam		Final exam	
	M	SD	M	SD
Noun forms	.014	.010	.099	.008
Verb forms	.020	.014	.016	.012
Derivational forms	.005	.006	.005	.006

Discussion

To summarize the findings, whereas these EAP students wrote texts that contained lower inflectional complexity index values and fewer noun and verb errors over time, there was little change in the more global measure of morphological complexity (word types/family) or derivational accuracy. The decreased verbal morphological complexity contrasts with Yoon's (2017) cross-sectional study of English L2 writers at the A1 to B2 levels whose complexity index increased with proficiency. However, our EAP writers' morphological complexity values on the initial exam (4.65) were slightly higher than Yoon's (2017) B2 values (average of 4.51 for both essay topics), and then declined over time. The decrease in complexity over time may have occurred because the morphological complexity index does not consider accuracy (Brezina & Pallotti, 2019). It is possible that the complexity values decreased as the EAP students' accuracy improved. For example, use of an incorrect verb form (e.g., *it is motivated me; people are disagree*), oversuppliance of a verb affix (e.g., *are helping us managing*), use of a noun in a context that requires an adjective (e.g., *medicine technology*), creation of novel nouns (e.g., *sporter*), and oversuppliance of -s on non-count nouns (e.g., *homeworks*) can increase within- or between-set diversity depending on the other exponences in a set. Over time, the elimination of such forms may have reduced the diversity of forms in the sets, thereby lowering the complexity index. For noun complexity values specifically, the use of irregular plurals (e.g., *children*, *media*, *people*) increases MCI values, so decreases in complexity may have been associated with a reduction in the use of such forms.

Although prior longitudinal studies reported null findings for morphological accuracy and verb form errors (Polio & Shea, 2014; Yoon & Polio, 2017), our EAP students produced noun and verb forms more accurately over time. One possible explanation for the divergent findings is

methodological as there were differences in the accuracy coding across studies. Yoon and Polio (2017) combined nominal and verbal morphological errors into a single category which included article use, whereas the current study separated noun and verb forms and did not include article errors. Although Polio and Shea (2014) also considered verb phrase errors, it is not clear which errors were included as their appendix lists multiple verb error types separately. Another possible explanation is that the instructional contexts differed in terms of the emphasis given to inflectional forms. The EAP curriculum reported here had an explicit focus on verbal and nominal forms, and the course included explicit instruction, feedback, and formal assessments about inflectional accuracy.

In contrast to the changes in inflectional complexity and accuracy, these EAP students did not demonstrate any development in terms of the global complexity measure (types/family) or derivational accuracy. The prior longitudinal study (Horst & Collins, 2006) that measured ESL primary students' types/family ratio found that it increased from 1.14 to 1.21 over 400 instructional hours. However, their unit of analysis was "segments" of the entire corpus, which was operationalized as five learner texts. As a result, the measure did not directly capture the morphological complexity of a single learner, but the pooled complexity of five learners. The null finding for derivational accuracy was somewhat surprising considering that the EAP course emphasized AWL words (Coxhead, 2000) and included information and activities about word types in the same word family. It is possible that the paragraph-level texts were not long enough to require the use of multiple word types from the same family, as might be expected if writers were avoiding overuse of specific word types in a longer text. Alternatively, it is also possible that the topics were not sufficiently complex to require diverse types within a word family.

Because the written texts came from an existing EAP course, it was not possible to counterbalance the topics across the two time periods. As the reviewers pointed out, prior research has demonstrated topic effects in L2 writing (e.g., Yoon, 2017), which raises the possibility that the observed changes were due to topic effects rather than morphological development. Therefore, as a post-hoc analysis, we administered the same topics in a counterbalanced order to English L2 writers ($N = 24$) at the same university who had completed a more advanced EAP course about source-based essay writing from four months to three years prior. As shown in Table 4, paired-samples t-tests revealed that were no statistically significant differences between the initial and final exam topics for any measure.

Table 4

Post-hoc analysis

	Initial exam		Final exam		Comparison	
	M	*SD*	*M*	*SD*	*t*	*p*
MCI: Nouns	1.098	.148	1.053	.120	.335	.741
MCI: Verbs	5.263	1.176	5.179	.768	1.185	.248
Type/families	1.135	.036	1.130	.034	.513	.613
Noun error rate	.005	.008	.004	.005	.372	.714
Verb error rate	.006	.005	.007	.008	.994	.330
Derivational error rate	.004	.008	.002	.005	1.495	.149

Comparison with the descriptive values provided in Tables 2 and 3 indicates that our participants' complexity values on the final exam were similar for noun MCI and type/families, but their MCI verb values were lower and their error rates were higher for all three forms. Thus,

the post-hoc analysis points to verb complexity and accuracy as areas in which our participants

might experience further development. However, these comparisons should be interpreted

cautiously as the current study was not designed to compare the written performance of English

L2 writers from different levels.

Despite the challenges associated with morphological development and the relatively

short time interval examined here, these EAP students showed decreased inflectional complexity

and increased accuracy. Due to the small effect sizes, questions may be raised as to whether the

changes observed here are meaningful enough to warrant the conclusion that the students

experienced morphological development. It is possible that the amount of change necessary for

these students to develop was simply small. In other words, they may have been at a point in

their development where only a short instructional period was needed to spur change. In

addition, in such a limited time frame, perhaps only small changes can be expected, with

continued changes becoming apparent only over a longer time period. Nevertheless, we believe

the findings indicate that students enrolled in a semester-long EAP course with an explicit

language focus can experience morphological development, albeit the changes may be small. As

all the participants were enrolled in EAP courses, it was not possible to create a control group

that was denied instruction for research purposes. Future studies might instead compare the

effectiveness of different instructional approaches to determine which pedagogical innovations

may facilitate greater morphological development.

Acknowledgments

Author Bios

Kim McDonough is a Professor of Applied Linguistics in the Education Department at Concordia University. Her current research projects involve the occurrence of visual cues in task-based interaction and the role of collaboration in L2 writing.

Pakize Uludag is a PhD student in Applied Linguistics in the Education Department at Concordia University. Her research interests include L2 writing, language assessment, and corpus linguistics.

Heike Neumann is a Senior Lecturer of English as a Second Language and a language test developer in the Education Department at Concordia University. Her research interests include second-language writing pedagogy, English for academic purposes, and language assessment.

References

Bardovi-Harlig, K. (1998). Narrative structure and lexical aspect: Conspiring factors in second

language acquisition of tense-aspect morphology. *Studies in Second Language

Acquisition, 20*, 471-508. doi:10.1017/S0272263198004021

Boettger, R. K., & Emory Moore, L. (2018). Analyzing error perception and recognition among

professional communication practitioners and academics. *Business and Professional

Communication Quarterly, 81*, 462-484. doi: 10.1177/2329490618803740

Brezina, V. & Pallotti, G. (2015) "Morphological complexity tool", available from

http://corpora.lancs.ac.uk/vocab/analyse_morph.php

Brezina, V., & Pallotti, G. (2019). Morphological complexity in written L2 texts. *Second

Language Research, 35*, 99-119. doi: 10.1177/0267658316643125

Cobb, T. (n.d). *Web Vocab Profiler Classic, v.4* [computer program]. Accessed 12 December

2019 at https://www.lextutor.ca/vp/eng/.

Coxhead, A. (2000). A new academic word list. *TESOL Quarterly, 34*, 213-238. doi:

10.2307/3587951

DeKeyser, R. (2005). What makes learning second-language grammar difficult?: A review of

issues. *Language Learning, 55(s1)*, 1–25. doi: 10.1111/j.0023-8333.2005.00294.x

DeKeyser, R. (2016). Of moving targets and chameleons: Why the concept of difficulty is so

hard to pin down. *Studies in Second Language Acquisition,* 38, 353– 363 .

doi:10.1017/S0272263116000024

Ellis, R., & Yuan, F. (2004). The effects of planning on fluency, complexity, and accuracy in

second language narrative writing. *Studies in Second Language Acquisition, 26*, 59-84.

doi: 10.10170S0272263104261034

Glew, D., Meyer, T., Sawyer, B., Schuhmann, P., & Wray, B. (2011). Evaluating and improving

the assessment of undergraduate student writing in a school of business at a large regional

university. *Journal of Effective Teaching, 11*(2), 55-74.

Goldschneider, J. M. , & DeKeyser, R. (2001). Explaining the "natural order of L2 morpheme

acquisition" in English: A meta-analysis of multiple determinants. *Language Learning,

51*, 1-50. doi: 10.1111/1467-9922.00147

Horst, M., & Collins, L. (2006). From faible to strong: How does their vocabulary grow?

Canadian Modern Language Review, 63, 83–106. doi: 10.1353/cml.2006.0046

Larsen-Freeman, D. (2010). Not so fast: A discussion of L2 morpheme processing and

acquisition. *Language Learning,* 60, 221–230. doi: 10.1111/j.1467-9922.2009.00556.x

MacWhinney, B. (2012). The logic of the unified model. In S. M. Gass & A. Mackey (Eds.),

Routledge Handbook of Second Language Acquisition (pp. 211-227). New York:

Routledge.

Neumann, H., Padden, N., & McDonough, K. (2019). Beyond English language proficiency

scores: Understanding the academic performance of international undergraduate students

during the first year of study. *Higher Education Research and Development*, *38*, 324-338.

doi: 10.1080/07294360.2018.1522621

Pallotti, G. (2015) A simple view of linguistic complexity. *Second Language Research, 31*,

117—134. doi:10.1177/0267658314536435

Plonsky, L., & Oswald, F. L. (2014). How big is "big"? Interpreting effect sizes in L2 research.

Language Learning, 64, 878-912. doi: 10.1111/lang.12079

Polio, C. (2017). Second language writing development: A research agenda. *Language Teaching,

50*, 261–275. doi:10.1017/S0261444817000015

Polio, C., & Park, J. H. (2016). Language development in second language writing. In R.M.

Manchón & P. Matsuda (Eds.), *Handbook of second and foreign language writing* (pp.

287-306). Boston, MA: De Gruyter Mouton.

Polio, C., & Shea, M. (2014). An investigation into current measures of linguistic accuracy in

second language writing research. *Journal of Second Language Writing, 26*, 10-27. doi:

10.1016/j.jslw.2014.09.003

VanPatten, B. (Ed). (2004). *Processing instruction: Theory, research, and commentary*.

Mahwah, NJ: Lawrence Erlbaum.

Verspoor, M., Schmid, M.S., & Xu, X. (2012). A dynamic usage based perspective on L2

writing. *Journal of Second Language Writing*, 21, 239 - 263.

doi:10.1016/j.jslw.2012.03.007

Yoon, H. (2017). Linguistic complexity in L2 writing revisited: Issues of topic, proficiency, and

construct multidimensionality. *System, 66,* 130-141. doi:10.1016/j.system.2017.03.007

Yoon H. & Polio C. (2017). The linguistic development of students of English as a second

language in two written genres. *TESOL Quarterly, 51*, 275-301. doi:10.1002/tesq.296