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The correlations between the average semester growth rates of syntactic and lexical complexity in L2 writing development at secondary school

The article is devoted to the development of language complexity in a relatively under-researched area of adolescent writing from the point of view of Complex Dynamic Systems Theory (CDST). It describes the second part of a panel study which aimed to examine the relationships among the average semester growth rates (ASGRs) of specific measures of syntactic and lexical complexity within and between these two subsystems in writing in English as a foreign language at the secondary school level. The study involved the analysis of The Written English Developmental Corpus of Polish Learners (WEDCPL). The corpus, which comprises over 1900 essays, was created on the basis of 21 repeated measurements conducted in a group of 100 secondary school learners during a period of three years. With respect to the specific measures of syntactic and lexical complexity, the study indicated that nominalization developed faster than subordination and coordination, and that lexical variation developed faster than lexical density and sophistication per semester. Moreover, the relationships between the ASGRs of both syntactic and lexical measures were more supportive within than between the subsystems. The main pedagogical implication for English language teachers refers to fostering more coordinated development of language complexity at secondary school in the EFL context.

Keywords: Complex Dynamic Systems Theory (CDST), syntactic complexity, lexical complexity, average semester growth rate (ASGR), longitudinal learner corpus, L2 writing, secondary school

Słowa kluczowe: Teoria Złożonych Systemów Dynamicznych, złożoność syntaktyczna, złożoność leksykalna, średnie semestralne tempo wzrostu, podłużny korpus ucznia, pisanie w J2, szkoła średnia

1. Introduction

In Complex Dynamic Systems Theory (CDST), language is conceptualised a system composed of internally complex subsystems which develop in a non-linear, variable and inter-connected way (Larsen-Freeman, Cameron, 2008; Verspoor, de Bot, Lowie, 2011; Hiver, Al-Hoorie, 2020). The subsystems develop not only in different ways but also at different rates (van Geert, van Dijk, 2002; Larsen-Freeman, 2006; Rokoszewska, 2022). Moreover, they interact forming supportive, competitive, conditional or dual relationships which evolve over time (van Geert, van Dijk 2002; Larsen-Freeman, 2006). The trade-offs between developing subsystems are indicative of the competition for learners' cognitive and linguistic resources (Verspoor et al., 2011).

Complexity, next to accuracy and fluency (CAF), is a key dimension of L2 production, proficiency and development (Housen, Kuiken, Vedder, 2012). From the CDST perspective, it is a multi-componential construct which should be studied not only synchronically in language tasks but also diachronically over the course of language development. The main components of linguistic complexity are syntactic and lexical complexity which refer to the size, breadth and depth of the learner's repertoire of L2 grammatical structures and L2 lexical items, respectively (Bulté, Housen, 2012).

So far CDST-informed research on CAF has relied on longitudinal corpora containing data collected from single subjects and small groups. Moreover, it has examined the co-development of different subsystems rather than their rates of growth. Given this research gap, it is hoped that the current study will make an important contribution to CDST-informed research by investigating the average semester growth rates (ASGRs) of selected CAF measures and the correlations between them on the basis of a learner written developmental corpus compiled from a panel of secondary school learners. The first part of the study indicated that fluency developed faster than complexity and accuracy per semester, and that the relationships between the ASGRs of these subsystems were mainly competitive (Rokoszewska, 2024 in press). This part of the study will focus on the ASGRs of specific measures of syntactic and lexical complexity.

2. Syntactic and lexical complexity in CDST

CDST studies have shed some light on the development of language complexity in L2 writing. Initially, syntactic complexity was analysed as a general and unitary concept. However, Norris and Ortega (2009), who advocated the so-called organic approach to language development, argued that syntactic complexity should be measured in terms of its more specific subcomponents, such as coordination, subordination and nominalisation, which indicate language complexification at the pre-intermediate, intermediate and upper-intermediate levels, respectively. However, Bulté and Housen (2018) did not find support for this developmental sequence. They followed Dutch learners of English from the beginner level for 19 months at secondary school and reported progress in subordination and nominalisation at the cost of coordination in their written texts. Inoue (2016) demonstrated that task requirements had a more profound effect on syntactic complexity than proficiency level. Lambert and Kormos (2016) argued that syntactic complexity should be analysed with respect to particular types of subordinate clauses. Verspoor, Lowie and van Dijk (2008) found that a Dutch student of English at an advanced level, whom they observed for three years, overused adverbial, nominal and relative clauses before reaching a balance among them. Other studies focused on syntactic complexity beyond the clause level. In research on languages other than English (LOTE), Vyatkina, Hirschmann and Golcher (2015) traced the development of modification in German in the case of English learners for four semesters and concluded that the use of different types of modifiers varied over time.

As for the development of lexical complexity, Caspi (2010), who traced four advanced students of English for a period of ten months, established that the levels of vocabulary knowledge formed an ordered hierarchy, in that the relationship between vocabulary reception and production was preconditional, whereas the relationship between controlled and free production was competitive over time. Studies which have investigated the development of lexical sophistication, density and variation have provided varied results. Some researchers observed progress in the development of lexical sophistication and variation in contrast to regress in the development of lexical density (Malvern et al., 2004; Storch, Tapper, 2009; Zheng, 2016). However, other researchers did not find significant improvement in the development of any of these lexical indices (Bulté, Housen, 2014; Knoch, Rouhshad, Storch, 2014).

The co-development of lexical and syntactic complexity has been investigated in several studies. In the case study of the Dutch student of English mentioned above, Verspoor, Lowie and van Dijk (2008) also examined the dynamic interaction between lexis and syntax and found a competitive relationship

between average sentence length and lexical variation. Spoelman and Verspoor (2010), who traced a Dutch student of Finnish from the beginner to the upper-intermediate level for three years, found supportive relationships between word and sentence complexity as well as between word and noun phrase complexity, but a competitive relationship between sentence and noun phrase complexity. Caspi (2010) observed that advanced students of English progressed from lexical complexity and accuracy to syntactic complexity and accuracy, which led to the conclusion that lexis developed before syntax and that complexity developed before accuracy. The claim concerning the development of lexis and syntax has received some support from other studies. Verspoor, Schmid and Xu (2012) examined texts written by 489 Dutch learners of English aged 12 to 15, who were enrolled in a bilingual programme at secondary school, in terms of 64 linguistic variables. One of the main findings of this cross-sectional study was that lexicon preceded syntax as it was demonstrated that beginner and intermediate learners were preoccupied with the development of lexis, whereas pre-intermediate learners paid more attention to the development of syntax. Verspoor, Lowie and Wieling (2020) obtained similar results in a longitudinal case study while observing 22 learners at the age of 12 to 13 for the period of 23 weeks in the same educational context. They found that changes in syntactic complexity, which were recorded at the pre-intermediate level, were followed by changes in lexical complexity. Notwithstanding, CDST studies revealed that syntactic and lexical complexity may develop differently even in identical twins (Lowie et al., 2017).

Recently, CDST-informed research has been criticised for a lack of quantitative studies examining the main tenets of this theory (Pallotti, 2021). Hiver and Al-Hoorie (2020) explain that it is a common misunderstanding that quantitative studies are inappropriate for this kind of research. In such studies, the group functions as the system under investigation, with aggregated data revealing crucial group trends. The present study employed one of the quantitative methods recommended for CDST-informed research which has been rarely used so far, namely panel design (Hiver, Al-Hoorie, 2020), to investigate the interaction within and between the subsystems of syntactic and lexical complexity, while recognising the fact that results from group-based studies must not to be applied to individual learners because the group hardly ever constitutes an ergodic ensemble (Lowie, Verspoor, 2019).

3. Method

The aim of the present study was to investigate the relationships among the average semester growth rates (ASGRs) of specific measures of syntac-

tic and lexical complexity within and between these two subsystems in L2 English writing at secondary school. The study addressed the following research questions:

RQ1–What progress do learners make in syntactic and lexical complexity in writing in English over the whole learning period at secondary school?

RQ2–What are the average semester growth rates (ASGRs) of specific syntactic and lexical measures?

RQ3–What relationships take place within and between the subsystems of syntactic and lexical complexity in terms of the ASGRs?

On the basis of the research questions, the following research hypotheses were formulated:

$1H_0$–There is no significant progress in the development of the specific measures of syntactic and lexical complexity in writing in English at secondary school.

$1H_1$–There is significant progress in the development of the specific measures of syntactic and lexical complexity in writing in English at secondary school.

$2H_0$–There are no significant differences between the ASGRs of the syntactic indices and between the ASGRs of the lexical indices in writing in English at secondary school.

$2H_1$– There are significant differences between the ASGRs of the syntactic indices and between the ASGRs of the lexical indices in writing in English at secondary school.

$3H_0$–There are no significant relationships within and between the subsystems of syntactic and lexical complexity in terms of the ASGRs in writing in English at secondary school.

$3H_1$–There are significant relationships within and between the subsystems of syntactic and lexical complexity in terms of the ASGRs in writing in English at secondary school.

The research method was panel design in which the same variables are measured in the same individuals during repeated measurements spanning a longer period of time (Hiver, Al-Hoorie, 2020). It focused on six specific measures of syntactic and lexical complexity whose operationalisation is presented in Table 1 (Lu, 2010, 2012; Malvern et al., 2004). The syntactic measures were selected because they are said to be reliable indicators of language complexification at pre-intermediate, intermediate and upper-intermediate levels (Norris, Ortega, 2009). The lexical measures were selected in line with Lu's (2012) recommendation to examine lexical complexity on the basis of a small set of measures which do not correlate with one another. The main unit in the analysis of syntax was the T-unit, which denotes the main clause with embedded subordinated clauses. The advanced

tokens were words beyond the first 2,000 most frequent words in the British National Corpus in the British National Corpus (BNC). The average semester growth rate (ASGR) was defined as the average difference in a variable between tests conducted in a given semester.

Table 1. Research variables

VARIABLE	SYMBOL	DESCRIPTION
subordination	SB	dependent clauses per T-unit (DC/T)
coordination	CO	coordinated phrases per T-unit (CP/T)
nominalisation	NM	complex nominals per T-unit (CN/T)
lexical density	LD	lexical tokens per all tokens
lexical sophistication	LS	advanced tokens per all lexical tokens
lexical variation	LV	randomised type-token ratio (D)

The research sample consisted of 100 learners, i.e. 45 boys and 55 girls, who were at the age of 16 to 19 at secondary school. The learners were enrolled in an extended English programme and took a B1 course in grade 1 and a B2 course in grades 2 and 3. They covered the same coursebooks, with four lessons in grade 1, six lessons in grade 2, and five lessons in grade 3. In practice, the learners came from seven language groups taught by five teachers. The instruction adhered to the presentation, practice, production lesson plan, focused on all language areas and skills, was conducted mostly in English, and involved regular formal assessment. On the final exam in English, the learners obtained higher results (B1–91.8%; B2–72.1%) than the national results (B1–73.0%; B2–63.0%).

The Written English Developmental Corpus of Polish Learners (WEDCPL) was compiled on the basis of the data collected from the same group of 100 learners during 21 repeated measurements organised over the period of three years (2014–2017) at the secondary school level (Table 2). The corpus comprises 1924 per 2100 texts, meaning that the return rate equals 91.6%. The size of the analysed corpus was 393 202 words, with the average sample length being 204 words.

The procedure of corpus compilation was that first the learners wrote compositions on various topics from their coursebook during English lessons every month and were provided with feedback. Next, the learners' hand-written texts were converted into electronic transcripts with the use of the speech recognition programme Dragon Naturally Speaking (Nuance®, 2014) and the accuracy of these transcripts was checked by a formally appointed inter-rater (r = 1.00). All data are stored in both paper and electronic files.

Table 2. Research design in a time series per semesters

DATA	GRADE 1		GRADE 2		GRADE 3
	SEM 1	SEM 2	SEM 3	SEM 4	SEM 5
Test 1	Fashion	Ecology	Books & films	Family	Love
Test 2	Internet	Pets	Shopping	Health	TV
Test 3	Music	Work	Friendship	Fame	Crime
Test 4	Education	Holidays	Christmas	Home & living	Terrorism
Test 5	–	–	–	–	Tolerance

The analysis of the corpus in terms of syntactic complexity was conducted with the use of The L2 Syntactic Complexity Analyser (L2SCA) (Lu, 2010). Lexical density and sophistication were computed with the use of The L2 Lexical Complexity Analyser (L2LCA) (Lu, 2012) while lexical variation with Text Inspector (Bax, 2012). The reliability of the word count in these programmes was 1.00. The research samples were subjected to appropriate pre-processing for automated syntactic and lexical analyses. For the former, spelling, morphological and morphosyntactic errors were corrected, whereas for the latter, minor spelling errors and morphosyntactic errors were corrected. However, words containing major spelling and morphological errors as well as L1 or L3 words were excluded from the lexical analysis (Hemchua, Schmitt, 2007).

As for statistical procedures, general trends in the development of complexity indices were delineated by means of the second degree polynomials, whereas the co-development of selected indices by the sixth degree polynomials (Verspoor et al. 2011). The differences between the learners' initial and final semester results were checked by means of the Wilcoxon signed-rank test (α = 0.05, N = 100) for related samples, whereas the differences between the ASGRs of syntactic and lexical complexity by means of the U-Mann Whitney test (α = 0.05, N = 100) for unrelated samples because the Kolmogorov-Smirnov test of normality (α = 0.05, N = 100) did not indicate the normal distribution of scores. The ASGR was calculated according to the formula suitable for iterative data, in which n stands for the number of scores, Π–for the product, and x_i–for the *i-th* score. The relationships between ASGRs were established by means of Pearson's linear correlation coefficient (r). The critical value for correlations (r*) equalled 0.197 (N = 100; α = 0.05).

$$ASGR = \left(\sqrt[n-1]{\prod_{i=2}^{n} \frac{x_i}{x_{i-1}}} - 1 \right) * 100\%$$

4. Results

4.1. Development of syntactic complexity per semester

The study showed that the learners, on average, produced 0.41 (SD = 0.04) subordinate clauses, 0.30 coordinated phrases (SD = 0.03) and 1.11 (SD = 0.15) complex nominals per T-unit (Table 3). The general trend lines illustrated some progress in the case of all three variables (Fig. 1–3). However, the Wilcoxon test revealed that the learners' final results were significantly higher than their initial results in the case of subordination (p = 0.00*) and nominalisation (p = 0.02*) as opposed to coordination (p = 0.16) (Table 3). The co-development of the specific syntactic variables showed that coordination and nominalisation grew together while competing to some extent with subordination in a time series (Fig. 4).

Table 3. Development of subordination, coordination and nominalisation per semester

DATA	SB	CO	NM
M	0.41	0.30	1.11
SD	0.04	0.03	0.15
Min	0.37	0.27	0.92
Max	0.46	0.34	1.29
p-value	0.00*	0.16	0.02*

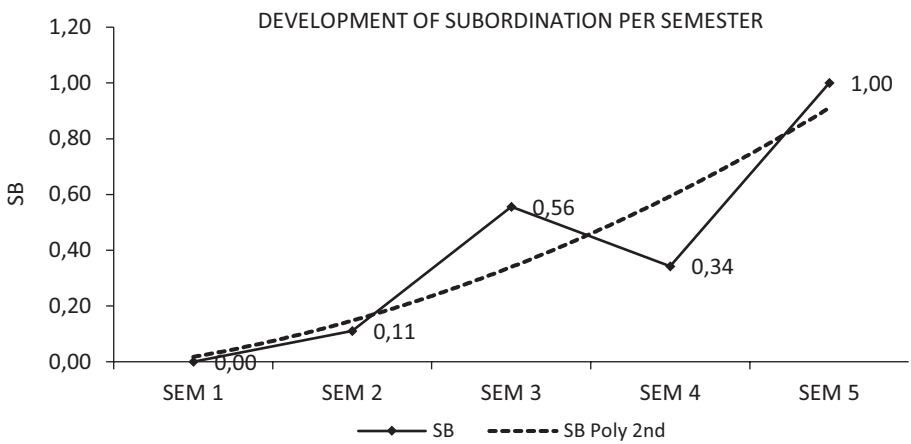

Figure 1. Development of subordination per semester with polynomial trend line of 2nd degree

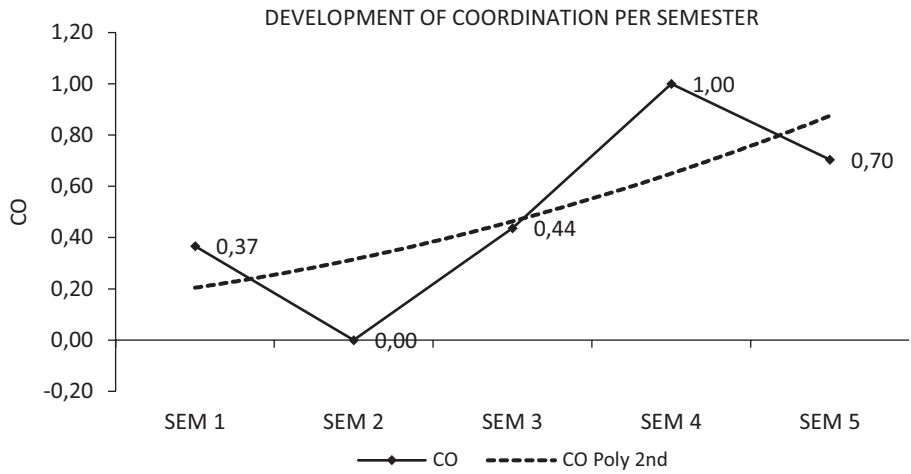

Figure 2. Development of coordination per semester with polynomial trend line of 2nd degree

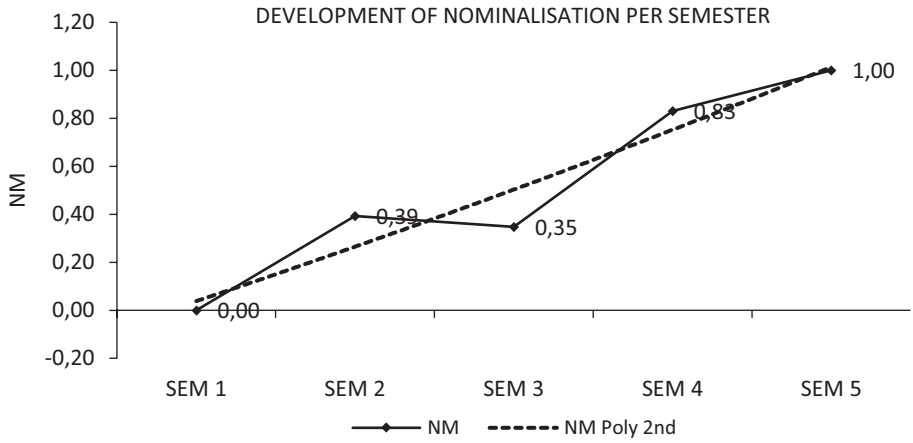

Figure 3. Development of nominalisation per semester with polynomial trend line of 2nd degree

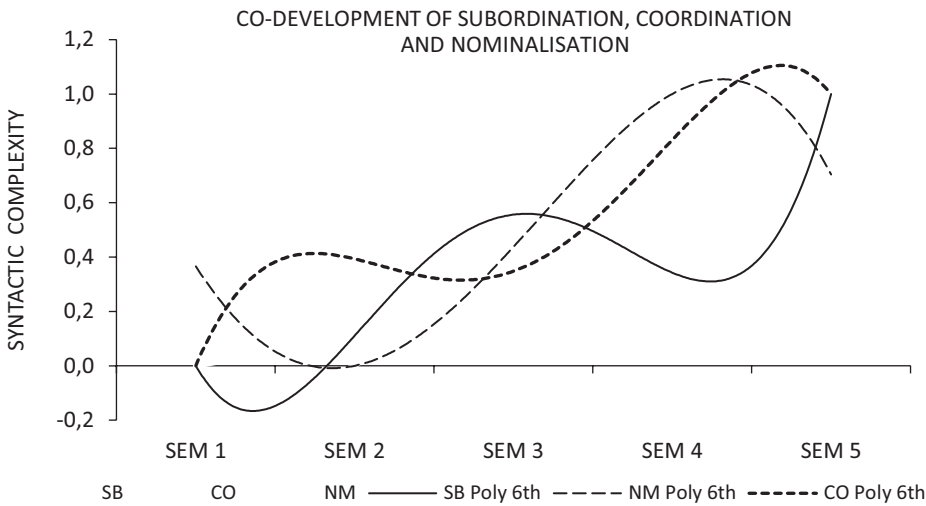

Figure 4. Co-development of subordination, coordination and nominalisation per semester–polynomial trend lines of 6th degree

4.2. Development of lexical complexity per semester

In terms of lexical density, the learners, on average, used 52.00% (SD = 0.01) of lexical items per all items in a text, whereas in terms of lexical sophistication, they used 22.00% (SD = 0.02) of advanced items (Table 4). For lexical variation, the learners obtained the score of 79.68 points (SD = 5.20). The general trend lines illustrated an increase in the development of lexical variation (Fig. 7) and lexical density (Fig. 5) as opposed to a decrease in the development of lexical sophistication (Fig. 6). The Wilcoxon test revealed that the learners' final results were significantly higher than their initial results in lexical density (p = 0.00*), the same in lexical variation (p = 0.17), but significantly lower in lexical sophistication (p = 0.00*). The co-development of the specific lexical variables pointed to some support between lexical density and variation, which grew in competition with lexical sophistication over time (Fig. 8).

Table 4. Development of lexical density, sophistication and variation per semester

DATA	LD	LS	LV
M	0.52	0.22	79.68
SD	0.01	0.02	5.20
Min	0.51	0.20	71.63
Max	0.53	0.24	84.32
p-value	0.00*	0.00*	0.17

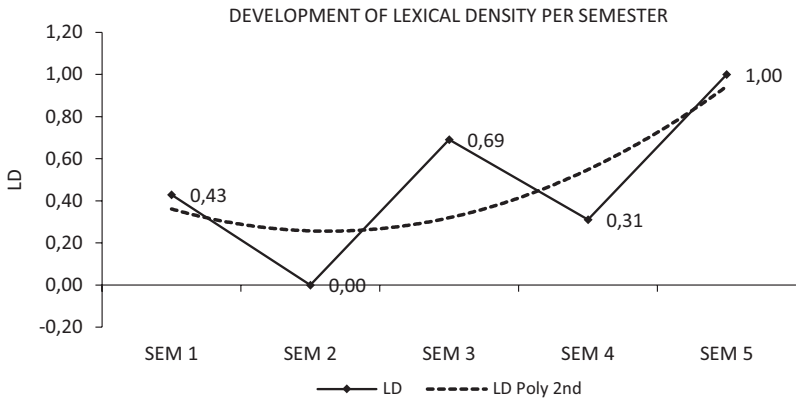

Figure 5. Development of lexical density per semester with polynomial trend line of 2nd degree

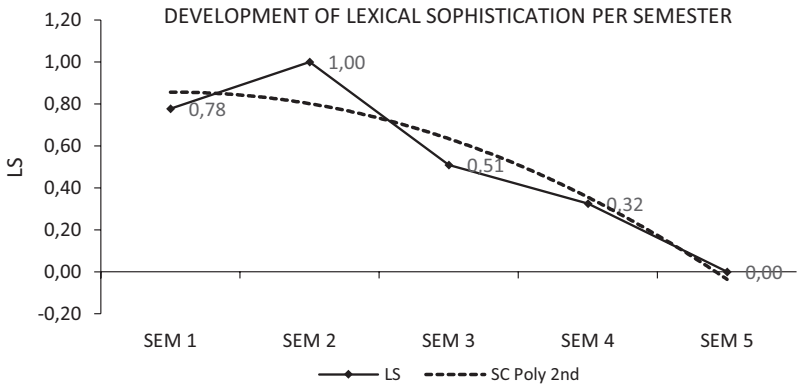

Figure 6. Development of lexical sophistication per semester with polynomial trend line of 2nd degree

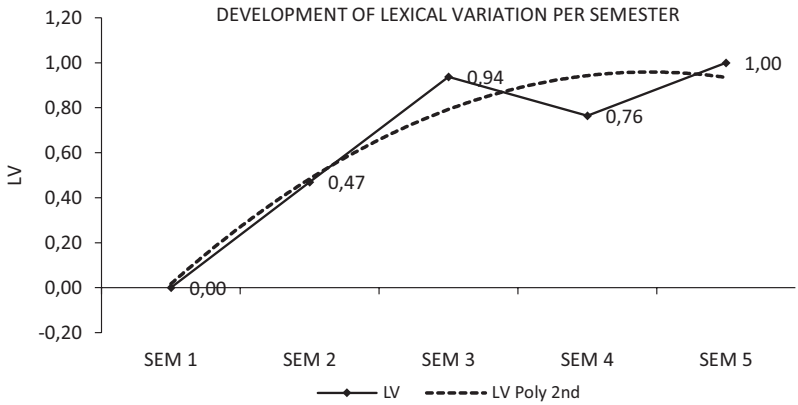

Figure 7. Development of lexical variation per semester with polynomial trend line of 2nd degree

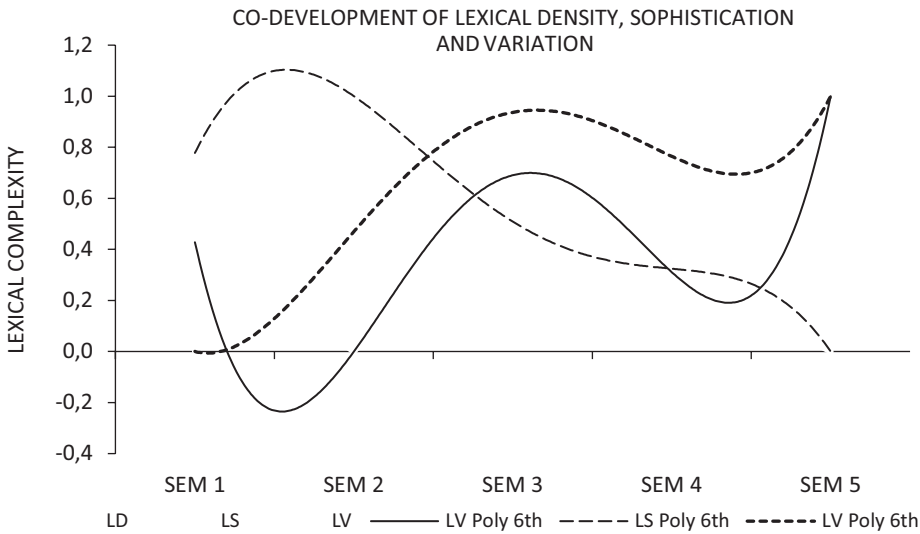

Figure 8. Co-development of lexical density, sophistication and variation per semester–polynomial trend lines of 6th degree

In the light of the data, the first research hypothesis ($1H_0$), which says that there is no significant progress in the development of the specific measures of syntactic and lexical complexity in writing in English at secondary school (cf. 3), can be rejected in favour of the alternative hypothesis ($1H_1$), which says that there is significant progress in the development of the specific measures of syntactic and lexical complexity in this context (cf. 3), in the case of all variables, except coordination, lexical sophistication, and lexical variation.

4.3. Semester growth rates of syntactic and lexical complexity

In reference to the average semester growth rates (ASGRs) of specific syntactic measures, it was established that nominalisation increased by 8.96% (SD = 6.34), subordination by 7.89% (SD = 12.38) and coordination by 2.23% (SD = 9.87) per semester (Table 5, Fig. 9). Hence, the ASGR of nominalisation was higher than the ASGR of subordination (p = 0.05*), which was in turn higher than the ASGR of coordination (p = 0.00*). Furthermore, lexical variation and density increased respectively by 4.26% (SD = 4.39) and 0.61% (SD = 1.41), whereas lexical sophistication decreased by 3.58% (SD = 4.81) per semester (Table 5, Fig. 9). Thus, the ASGR of lexical variation was higher than the ASGR of lexical density (p = 0.01*), which was in turn higher than the ASGR lexical sophistication (p = 0.00*).

Table 5. Average semester growth rates of syntactic and lexical complexity

DATA	SB	CO	NM	LD	LS	LV
ASGR	7.89	2.23	8.96	0.61	–3.58	4.26
SD	12.37	9.87	6.34	1.41	4.81	4.39
Min	–22.04	–20.56	–4.85	–2.86	–16.61	–4.91
Max	64.64	28.29	24.44	3.89	9.45	18.66

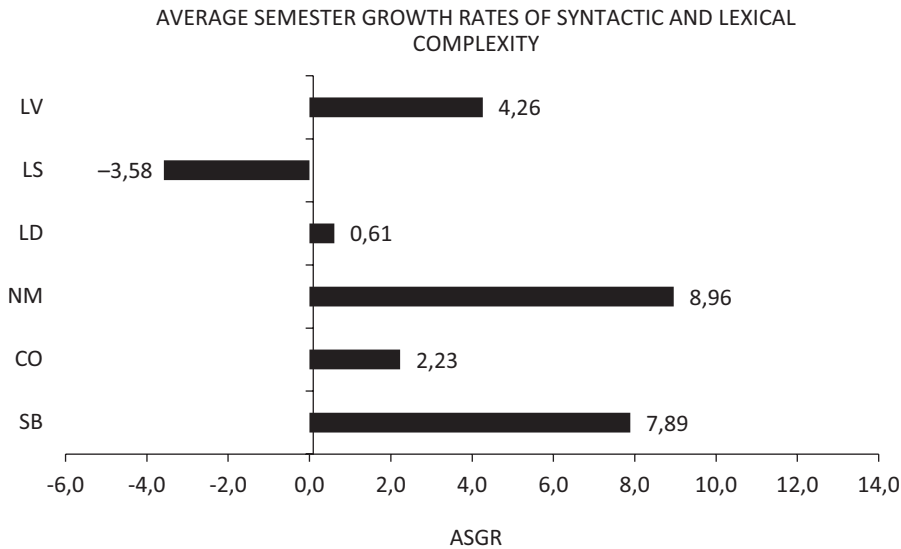

Figure 9. Average semester growth rates of syntactic and lexical complexity

Thus, the second zero hypothesis ($2H_0$), which posits that there are no significant differences between the ASGRs of the syntactic indices and between the ASGRs of the lexical indices in writing in English at secondary school (cf. 3), is rejected in favour of the alternative hypothesis ($2H_1$), which states that there are significant differences between the ASGRs of the syntactic indices and between the ASGRs of the lexical indices in this context (cf. 3).

4.4. Relationships between the growth rates of syntactic and lexical complexity

As far as the relationships within the subsystem of syntactic complexity are concerned, the study showed moderately positive correlations between the ASGRs of subordination and nominalisation (r = 0.38*) as well as between the

ASGRs of coordination and nominalisation (r = 0.40*) (Table 6). The linear regression models revealed that if the ASGR of nominalisation increased by 1% per semester, the ASGRs of subordination and coordination would increase by 0.74% and 0.62%, respectively (Table 6, Fig. 10–11). As for the subsystem of lexical complexity, the correlations between the ASGRs of lexical density and sophistication (r = 0.37*) as well as between the ASGRs of lexical density and variation (r = 0.26*) were positive but weak (Table 6). The linear regression models showed that if the ASGR of lexical density increased by 1% per semester, the ASGRs of lexical sophistication and variation would increase by 1.26% and 0.81%, respectively (Table 6, Fig. 12–13).

Table 6. Average semester growth rates–relationships within syntactic and lexical complexity

DATA		*r*	R^2	Linear regression model
SB	CO	0.10	1.00	–
SB	NM	0.38*	14.00	0.74%
CO	NM	0.40*	16.00	0.62%
LD	LS	0.37*	14.00	1.26%
LD	LV	0.26*	7.00	0.81%
LS	LV	0.02	0.04	–

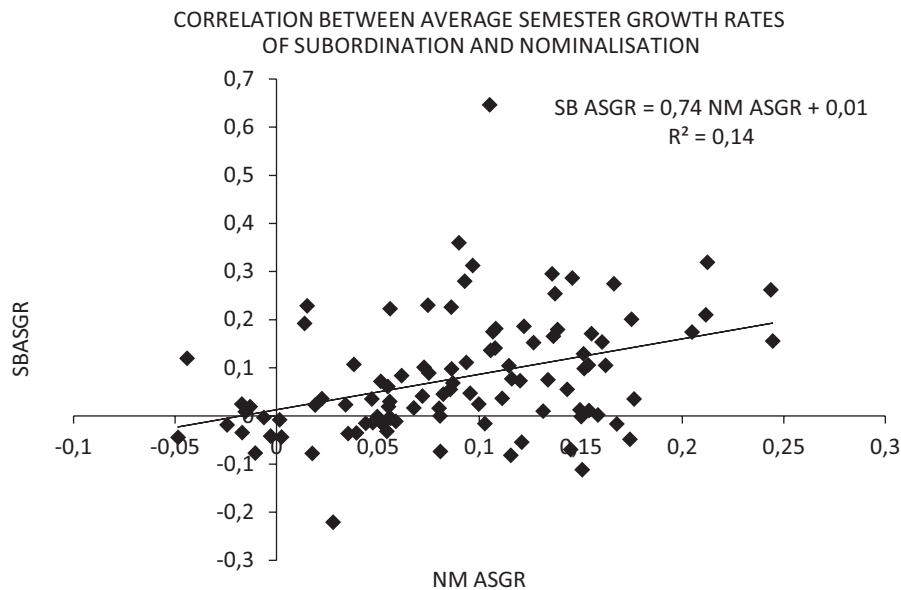

Figure 10. Average semester growth rates of subordination and nominalisation–linear regression model

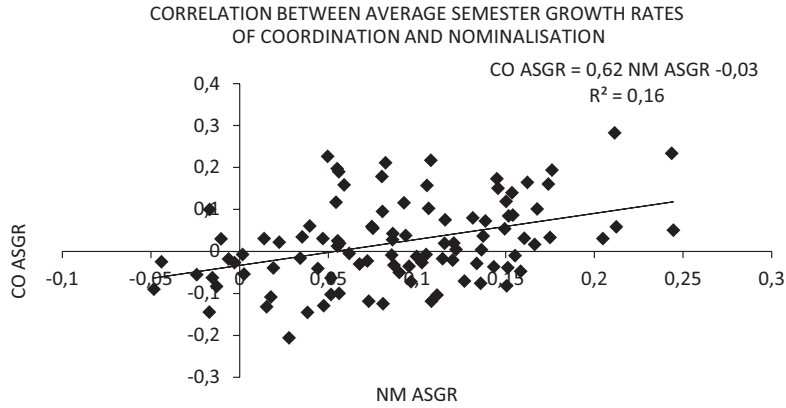

Figure 11. Average semester growth rates of coordination and nominalisation–linear regression model

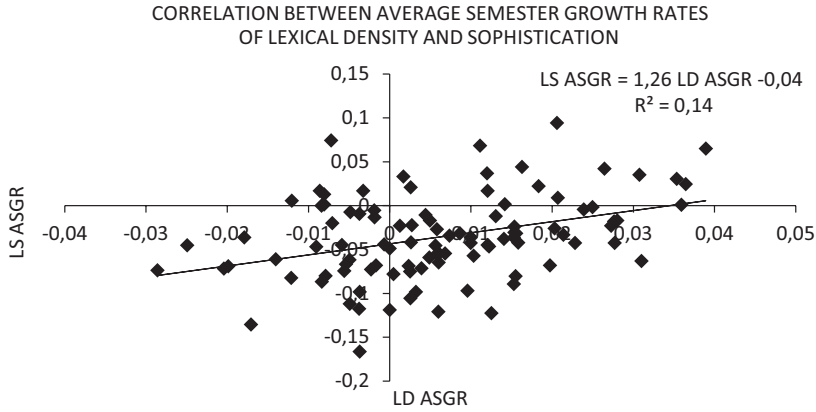

Figure 12. Average semester growth rates of lexical density and sophistication–linear regression model

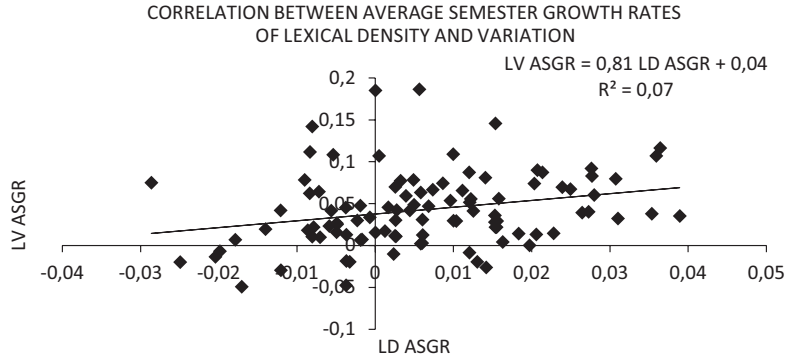

Figure 13. Average semester growth rates of lexical density and variation–linear regression model

Concerning the relationships between the subsystems of syntactic and lexical complexity, it was found that the correlations between subordination and lexical density (r = –0.36*) as well as between subordination and lexical sophistication were (r = –0.18*) negative but weak, whereas the correlation between coordination and lexical sophistication was positive (r =0.21*) (Table 7). According to the linear regression models, if the ASGR of subordination increased by 1% per semester, the ASGRs of lexical density and sophistication would decrease by 0.04% and 0.07%, respectively (Table 7, Fig. 14–15). However, if the ASGR of coordination went up by 1%, the ASGR of lexical sophistication would increase by 0.10% (Table 7, Fig. 16).

Table 7. Average semester growth rates–relationships between syntactic and lexical complexity

DATA		*r*	R^2	Linear regression model
SB	LD	–0.36*	12.96	–0.04
SB	LS	–0.18*	3.24	–0.07
SB	LV	0.11	1.21	–
CO	LD	0.15	2.25	–
CO	LS	0.21*	4.41	0.10
CO	LV	0.06	0.36	–
NM	LD	0.06	0.36	–
NM	LS	0.12	1.44	–
NM	LV	0.05	0.25	–

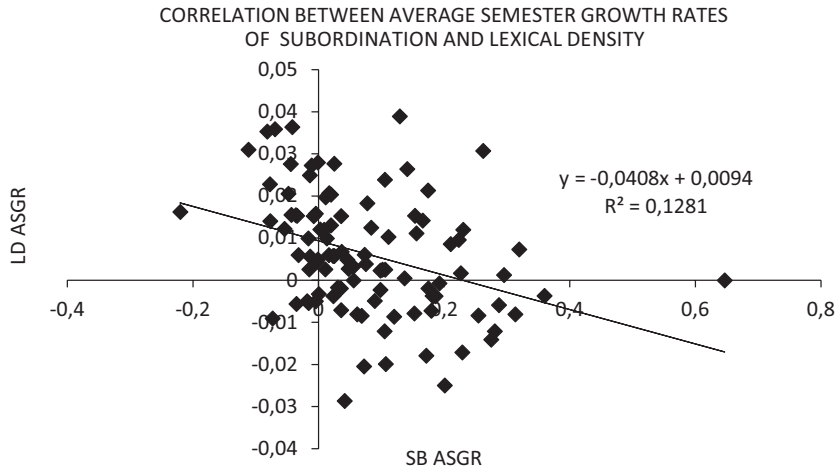

Figure 14. Average semester growth rates of subordination and lexical density–linear regression model

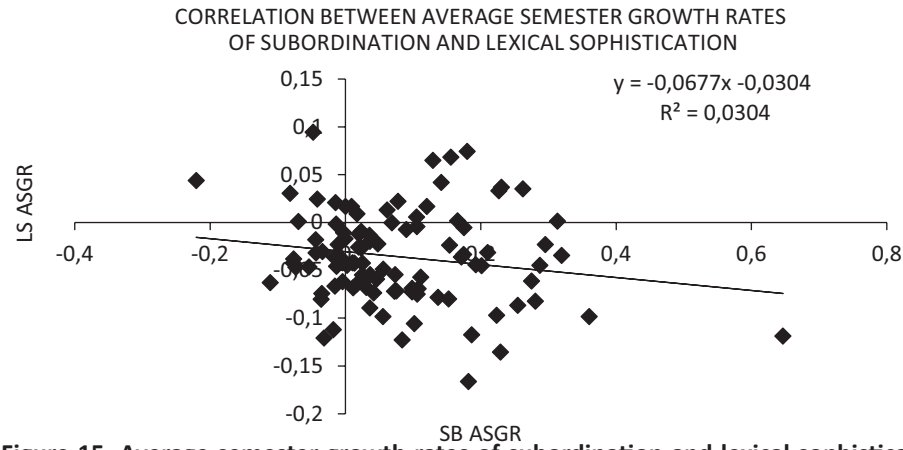

Figure 15. Average semester growth rates of subordination and lexical sophistication–linear regression model

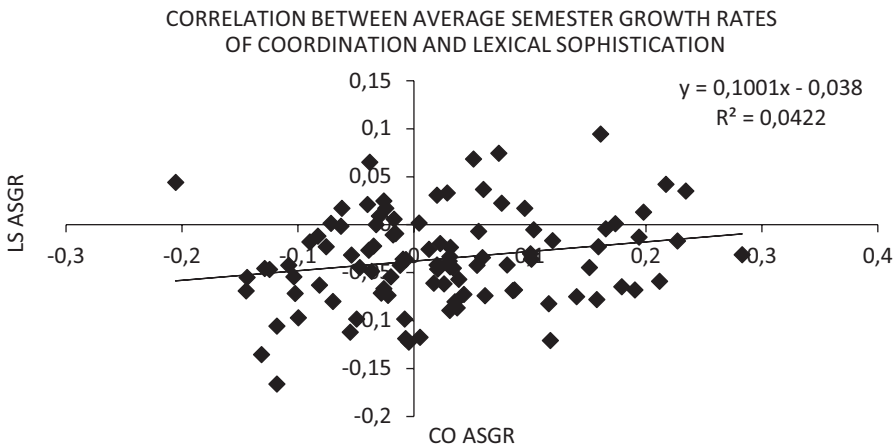

Figure 16. Average semester growth rates of coordination and lexical sophistication–linear regression model

Hence, the third zero hypothesis ($3H_0$), which assumes that there are no significant relationships within and between the subsystems of syntactic and lexical complexity in terms of the ASGRs in writing in English at secondary school (cf. 3), can be rejected in favour of the alternative hypothesis ($3H_1$) (cf. 3) only in the case of the following relationships: nominalisation with subordination and coordination, lexical density with lexical sophistication and variation, subordination with lexical density and sophistication, and coordination with lexical sophistication.

5. Discussion

The goal of the reported study was to investigate the average semester growth rates (ASGRs) of syntactic and lexical complexity and the relationships between them in L2 writing development at the level of secondary school. Concerning the first research question (RQ1), which focused on the learners' progress in syntactic and lexical complexity, it was established that the learners made significant progress in subordination and nominalization as opposed to coordination, and that they progressed in lexical variation but regressed in lexical sophistication. The learning trajectories were dynamic and variable, pointing to the non-linear development of language found in numerous CAF studies informed by CDST (Larsen-Freeman, 2006; Verspoor et al., 2008; Spoelman, Verspoor, 2010; Caspi, 2010; Lowie et al., 2017). The study showed that making significant progress in all complexity variables was difficult for learners in the EFL context.

In relation to the second research question (RQ2), which focused on the average semester growth rates (ASGRs) of syntactic and lexical complexity, it was found that nominalisation developed faster than subordination and coordination, and lexical variation developed faster than density and sophistication per semester. Thus, the study provided support for the claim that language variables develop at different rates (van Geert, van Dijk, 2002; Larsen-Freeman, 2006). The finding that the learners made significant progress in subordination and nominalisation as opposed to coordination overlapped with Bulté and Housen's (2018) study of teenage learners, disconfirming Norris and Ortega's (2009) developmental sequence. However, the fact that the learners progressed in lexical density and variation but regressed in lexical sophistication contrasts with studies which reported no significant gains in these measures (Bulté, Housen, 2014; Knoch et al., 2014) and with studies which reported gains in lexical sophistication (Malvern et al., 2004; Storch, Tapper, 2009; Zheng, 2016). Thus, the learners, who function with limited cognitive resources, prioritised some subsystems over others and did not manage to coordinate their development (van Geert, Verspoor, 2015; Hou, Loerts, Verspoor, 2020).

The third research question (RQ3) pertained to the relationships within and between the subsystems of syntactic and lexical complexity in terms of the ASGRs. Within the subsystem of syntactic complexity, positive correlations were found between the ASGRs of nominalisation and both subordination and coordination. Thus, the use of complex nominals was conducive to constructing more complex clauses and phrases. Within the subsystem of lexical complexity, positive correlations were observed between lexical density and both sophistication and variation. Hence, dense use of lexical items

fostered the use of more advanced and varied vocabulary. In contrast, the interaction of the subsystems indicated that the correlations between subordination and both lexical density and sophistication were negative while the correlation between coordination and lexical sophistication was positive. This indicates that the learners were able to use more sophisticated words in coordinated phrases rather than subordinate constructions. In total, the study provided some support for the interconnected development of complexity indices (Larsen-Freeman, Cameron, 2008; Verspoor et al., 2008; Spoelman, Verspoor, 2010; Caspi, 2010. Bulté, Housen, 2018). It revealed more support among the ASGRs within the same subsystems of syntax or lexis than between them. This resonates with the findings of the study (Rokoszewska, 2022) on average monthly growth rates (AMGRs), which indicated support within the same subsystems, like syntactic or lexical complexity, but competition between different subsystems, like complexity, accuracy and fluency.

Despite some limitations which referred to group data, panel conditioning (Hiver, Al Hoorie, 2020), different topics within the iterative research procedure, and varied teaching styles (Rokoszewska, 2024 in press), the study yielded practical implications for language teachers who should work systematically on the development of language complexity. In terms of syntactic complexity, they should focus not only on sentential but also phrasal complexity, whereas in terms of lexical complexity, they should work more effectively on lexical sophistication. This can be done by providing learners with effective usage-based instruction to foster the development of language complexity that will be evident not only in controlled, but also in free language performance. Teachers should also realise that language development may entail progress in some subsystems but regress in others due to the fact that learners are unable to apply their limited cognitive resources to all language subsystems at the same time. Thus, teachers should foster more coordinated language development to make their learners successful.

6. Conclusions

The study into the average semester growth rates (ASGR) of syntactic and lexical complexity yielded some interesting conclusions. Firstly, the development of language complexity was a dynamic and fluctuant but rather slow process within which the learners made significant progress in selected syntactic and lexical measures. This indicates that producing language which would be significantly more complex at the end of secondary school in free written communication was difficult for foreign language learn-

ers. Secondly, some language subsystems were developed at the cost of other subsystems. On a semester basis, subordination and nominalisation were developed to the disadvantage of coordination, while lexical density and variation developed to the disadvantage of sophistication. Thirdly, the ASGRs of nominalisation and lexical variation were higher than the ASGRs of the remaining syntactic and lexical indices. This highlights the need to facilitate more coordinated language development, by helping learners work on language subsystems which they find more difficult. Finally, the language subsystems co-developed forming different types of relationships examined in terms of the ASGRs. These relationships indicated more support within than between the subsystems of lexical and syntactic complexity. Notwithstanding, there arises the need to analyse the panel data with respect to selected individual learners who may follow their own learning trajectories, forming different types of intricate relationships.

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