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Intra-Individual Variability in the Emergence of Complexity, Accuracy and Fluency in Speaking English at Secondary School: A Case Study of a Good, Average and Poor Language Learner

Abstract: According to Complex Dynamic Systems Theory (CDST), language is a complex dynamic system consisting of subsystems which show a lot of variability, especially during intensive development. Second language development is generally connected with an increase in complexity, accuracy and fluency but there are trade-offs within and between these language subcomponents. What is more, intra-individual variability, defined as differences in the level of developmental variables within individuals and between repeated measurements, is said to be an important developmental phenomenon. The aim of this article is to analyze the relationships between different measures of syntactic complexity, lexical complexity, accuracy and fluency, and to examine intra-individual variability with respect to the rate of development in longitudinal oral data provided by a good, average and poor language learner at the level of secondary school. Generally, the results of the study show some statistically significant differences between the learners in the development of these language subsystems but no such differences in intra-individual variability. Nevertheless, the study indicates a strong, positive correlation between the learners' level of intra-individual variability and the rate of development of the language subsystems in speech at this level.

Keywords: Complex Dynamic Systems Theory (CDST), variability, learner corpus, foreign language development

1. Introduction

Complex Dynamic Systems Theory (CDST) (de Bot) is a general label proposed to refer to both Complexity Theory (Larsen-Freeman and Cameron) and Dynamic Systems Theory (Verspoor, de Bot, and Lowie). According to this theory, language

is a complex system consisting of interrelated subsystems which affect one another over time. Language development is said to be a non-linear dynamic process characterized by intermittent periods of change and stability. Since these periods respectively correspond not only to progression and regression but also to high and low variability, it is hypothesized that intra-individual variability constitutes an important developmental mechanism in the language system (van Geert and van Dijk). The main aim within this theory is to investigate the ways in which many linguistic variables emerge, develop and interact. This is possible if usage-based, dense, longitudinal, written or spoken data are analyzed in a time series by means of specific dynamic procedures. So far few studies on intra-individual variability in second or foreign language development have been conducted (Verspoor, Lowie, and van Dijk; Spoleman and Vespoor). Thus, there is a need for more longitudinal dense case studies to examine developmental patterns of individual learners and whole groups.

2. Intra-individual variability in CDST

According to CDST (de Bot), language subsystems develop in various ways at different rates in a non-linear fashion. These subsystems interact forming supportive, competitive or conditional relationships. A supportive relationship takes place between variables or growers which "develop in unison because they support each other" (van Geert and van Dijk 86). Such growers are called supportive or connected growers. A competitive relationship occurs when growers "develop in alternating patters (when one goes up, the other goes down) because they compete with each other" (van Geert and van Dijk 86). These growers are called competitive growers or competitors. A conditional relationship is observed when "a minimal level of one grower is a necessary precondition for another grower to develop" (van Geert and van Dijk 86). Such growers are called conditional growers or precursors. Furthermore, it is said that the learner's language subsystems compete for different resources, which means that the allocation of resources to one subsystem will cause trade-offs between these subsystems (Schmid, Verspoor, and MacWhinney). In other words, although second language development usually involves a general increase of complexity, accuracy and fluency, there may be trade-offs between the individual components of language which are more visible in spoken than written data. In addition, these subsystems are "never entirely stable and may exhibit a great deal of variability, particularly during stages where the whole system is undergoing intensive development" (Schmid et al. 39). According to Siegler (2006), substantial intra-individual variability can be observed in using problem solving strategies in case of learners of all ages at all levels of learning. Their progress in learning is characterized by cyclical periods of regression and progression which coincide with the periods of low and high variability. Indeed,

according to Thelen and Smith (342–43) variability is "a central element of a developing system" as well as "a metric of stability and a harbinger of change". Low variability indicates that the system has stabilized for a given aspect of language for some period of time, whereas high variability shows that the language system is changing and moving towards another state or stage in development until it settles down again (Larsen-Freeman and Cameron). According to CDST, variability is an important developmental phenomenon which should not be treated as the error of measurement but constitute the basis for language analysis conducted in order to "discover when and how changes take place in the process of development, how different subsystems develop and interact, and how different learners may have different developmental patterns" (van Dijk, Verspoor, and Lowie 59–60).

3. Method

The main aim of the present research project is to investigate the phenomenon of intra-individual variability in the emergence of complexity, accuracy and fluency in speaking English at secondary school in the case of a good, average and poor language learner. The term *intra-individual variability* refers to "differences in the level of a developmental variable within individuals and between repeated measurements" (van Geert and van Dijk 341). If this kind of variability "spans over a year or more", it may be also called *developmental variability* (van Geert and van Dijk 346). The term *emergence* is used here to denote microgenetic growth in the development of different language subsystems observed at many regular measurement points over a longer period of time (Larsen-Freeman and Cameron). On the basis of the aim of the project, the following research questions have been formulated:

1. How do syntactic complexity, lexical complexity, accuracy and fluency emerge in oral production at secondary school?
2. What relationships can be observed between these variables?
3. What is the rate of development of these variables?
4. What are the levels and patterns of intra-individual variability in the development of these variables?
5. What is the influence of intra-individual variability on the rate of development of these variables?

The research method is a case study, which constitutes a part of a larger corpus-based hybrid type of study which involves both quantitative and qualitative data. The whole research project was conducted among 106 learners at one of secondary schools in Częstochowa in 2014–2017. During the study, an electronic corpus of learner spoken language was built on the basis of 21 repeated measurements which took the form of semi-controlled interviews on different topics conducted once a month (table 1). The whole corpus consists of around

2,100 recorded interviews which need to be transcribed and verified. The procedure of building the corpus consisted of such stages as interviewing and recording the learners upon their consent, providing them with general feedback and evaluation, storing the recordings, transcribing selected interviews and analyzing them on the basis of the samples consisting of the first ca. 200 words. The corpus may be described as usage-based, as it is based on the learners' oral performance, and developmental, as it traces group and individual language development over the period of three years. What is more, it provides dense, longitudinal data produced under "relatively natural conditions", i.e. "data where all aspects of the linguistic production process are, as far as possible, fully under the control of the learner" (Schmid et al. 39). In the present paper, the analysis of three mini-corpora, each consisting of 21 interviews which trace language development of a good, average and poor language learner, will be presented.

Table 1: Research design in a time series

Research design in a time series										
	Semester 1					Semester 2				
	Sept	Oct.	Nov.	Dec.	Jan.	Feb.	March	April	May	June
Grade 1	Org.	**Test 1** Fashion	**Test 2** Internet	**Test 3** Music	**Test 4** Education	Winter break	**Test 5** Ecology	**Test 6** Pets	**Test 7** Work	**Test 8** Holidays
Grade 2	Org.	**Test 9** Books & films	**Test 10** Shopping	**Test 11** Friendship	**Test 12** Christmas	Winter break	**Test 13** Family	**Test 14** Health	**Test 15** Fame	**Test 16** Home & living
Grade 3	Org.	**Test 17** Love	**Test 18** TV	**Test 19** Crime	Winter break	**Test 20** Terrorism	**Test 21** Tolerance	End of school-year	Matura exam	—

In the present study, a number of variables has been identified. The independent variable is intra-individual variability in the development of syntactic complexity, lexical complexity, accuracy and fluency operationalized as the differences in the level of such measures between repeated measurements within an individual learner. The scale for this variable is interval. More specifically, syntactic complexity is operationalized as the number of clauses per T-unit (C/T). A T-unit is defined as "a minimal terminal unit or independent clause with whatever dependent clauses, phrases and words are attached to or embedded within it", and it is said to be a more reliable unit of speech analysis than a sentence (Larsen-Freeman and Cameron 143). Lexical complexity is construed in terms of lexical diversity operationalized as the so-called sophisticated type-token ratio (sophisticated TTR) which stands for word types per square root of two times the words (Larsen-Freeman), and which, in contrast to standard TTR, takes into account the length of the sample (Ellis and Barkhuizen). Accuracy is defined as the number of correct T-units per all T-units, whereas fluency is defined as an average number of words

per T-unit (Larsen-Freeman). The dependent variable is the rate of development of syntactic complexity, lexical complexity, accuracy and fluency operationalized as the difference in the level of such measures between the first measurement point, i.e. test 1 in grade 1, and the last measurement point, i.e. test 21 in grade 3, within an individual learner. The scale for this variable is interval. The intervening variable may be described as the role of variability in second language development. The scale for this variable is interval. The moderator variable refers to the learners' age, the scale for this variable being nominal. The control variables include the same nationality of the subjects, the same course-book, the same number of English lessons per week, and no longer stay in an English-speaking country. The scale for the control variables is nominal.

The present research project involved a number of instruments. As already mentioned, in order to collect the data, 21 semi-structured interviews connected with topics from the learners' course-book were conducted. In order to analyze the data, two computer programmes were used, namely Syntactic Complexity Analyser (Lu, "Automatic Analysis") and Lexical Complexity Analyser (Ai and Lu; Lu, "The Relationship"). The analysis of accuracy was conducted manually in Excel, while the analysis of fluency was a part of the syntax analysis. The analysis of intra-individual variability required several statistical procedures (Verspoor et al.). First, the data were normalized as the variables were measured on different scales, smoothed by means of a polynomial trendline of the 2nd degree used to show a general trend in the data set, and detrended in order to show the net growth of the data set without the influence of an upward or downward trend which might otherwise distort the relationships between variables in time. Then, the so-called moving correlations, in which each measurement point takes into account the previous measurement point, were calculated and visualized. Next, the patterns of intra-individual variability were analyzed by means of moving min-max graphs which depict intra-individual variability as a moving range of minimum and maximum scores, the level of intra-individual variability was calculated in terms of the coefficient of variation, and differences in intra-individual variability between different language subsystems were checked by means of a resampling procedure called a Monte Carlo Analysis. Finally, the level of intra-individual variability was correlated with the rate of development.

The subjects in the present case study were selected from the whole sample of learners on the basis of the placement test conducted at the beginning of secondary school as well as on the basis of their first oral and written assignment in the research project. All three learners were at the age of 16 to 19 in grades 1–3, respectively. By the time of the study, they had been learning English for 10 years. At secondary school, they attended classes with an extended English programme and had from 4 to 6 lessons per week depending on the grade. None of these learners participated in extracurricular classes or stayed for a longer time in an English-speaking country. A good learner (GL) was a female learner living in the city

whose parents were white-collar workers with high education and some knowledge of English. In the learner's opinion, her father had very good while her mother—basic knowledge of English. Throughout secondary school, this learner obtained good results in learning in general (GPA = 5.17),[1] including English (M = 5.17), and passed the matura exam obtaining very good results for both written (basic level—100.0%; extended level—98.0%) and oral (100.0%) parts. It was also the only learner in the sample of 106 learners who obtained CAE in the third grade. At the beginning of the research project, she obtained an average of 5.5 points (the placement test—6.0, speaking—5.0; writing—5.5). An average learner (AL) was a male learner who resided in a village and whose father had secondary education and basic knowledge of English and mother—higher education and average knowledge of English. He obtained the following results: GPA—4.25, English—3.92; basic level written exam—70.0%, extended level written exam—66.0%, oral exam—77.0%. In the project, he obtained an average score of 3.45 points (the placement test—3.0, speaking—3.75; writing—3.5). A poor learner (PL) was a male learner who lived in the city and whose parents had high education, the father knowing English very well and the mother—at a basic level. His results were as follows: GPA—3.54, English—2.67, basic level written exam—98.0%, oral exam—96.0%. He did not take an extended level written exam but obtained better results than the average learner on the other parts of the matura exam. In the project, he obtained one of the lowest scores, i.e. 2.17 points (the placement test—1.0, speaking—2.0, writing—3.5).

4. Results

4.1. The development of complexity, accuracy and fluency

The results of the study (table 2) indicate that as far as the development of syntactic complexity in speech over the period of three years at secondary school is concerned, the good learner (GL), on average, produced 2.30, the average learner (AL)—1.47 and the poor learner (PL)—1.51 clauses per T-unit. In terms of lexical complexity, the type-token ratio was 4.40 for the good learner, 4.04 for the average learner and 3.91 for the poor learner. In terms of accuracy, on the basis of the ratio of correct T-units per all T-units, it may be said that the good learner produced 60.0% while the average and poor learners—respectively 26.0% and 28.0% of correct T-units while speaking English. Finally, in terms of fluency, it is observed that a good learner provided 11.30, the average learner—10.10 and the poor learner—9.45 words per T-unit. The statistical analysis of the results conducted by means of one-way ANOVA (p = 0.05) shows that the differences between the three learners are statistically significant in all four language sub-systems. However,

[1] GPA—grade point average.

the Tukey-Kramer test, i.e. a means differentiation test, reveals that in the case of syntactic and lexical complexity as well as accuracy, the differences between the good and average learner and between the good and poor learner are statistically significant but the difference between the average and poor learner is not. In terms of fluency, only the difference between the good and poor learner was statistically significant.

Table 2: The development of complexity, accuracy and fluency—raw data

The development of complexity, accuracy and fluency												
	Syntactic complexity			Lexical complexity			Accuracy			Fluency		
	GL	AL	PL	GL	AL	PL	GL	AL	PL	GL	AL	PL
Test 1	1.65	1.27	1.28	4.08	3.75	3.88	0.70	0.33	0.32	8.70	8.50	6.88
Test 21	3.00	1.33	1.81	4.81	4.03	3.66	0.86	0.38	0.26	12.11	8.42	10.24
RD	1.35	0.06	0.53	0.73	0.28	–0.22	0.14	0.05	–0.06	3.41	–0.08	3.36
Min.	1.15	1.04	0.90	3.76	3.14	3.27	0.37	0.05	0.11	8.42	7.19	6.34
Max.	4.67	1.87	2.13	5.02	5.15	4.41	0.86	0.42	0.44	14.29	13.71	14.20
CV	0.80	0.04	0.11	0.15	0.21	0.10	0.02	0.01	0.01	4.21	3.05	4.69
Mean	2.30	1.47	1.51	4.40	4.04	3.91	0.60	0.26	0.28	11.30	10.10	9.45
SD	0.92	0.21	0.35	0.39	0.47	0.33	0.14	0.10	0.08	2.10	1.79	2.22
ANOVA	0.000			0.001			0.000			0.018		
Turkey-Kramer Test[2]	GL ≠ AL GL ≠ PL AL = PL			GL ≠ AL GL ≠ PL AL = PL			GL ≠ AL GL ≠ PL AL = PL			GL = AL GL ≠ PL AL = PL		

2

As far as the rate of development (RD) and the level of variation (CV) are concerned (table 2), in terms of syntactic complexity, it is observed that the good language learner produced 1.65 clauses per T-unit in speech on the first test (grade 1, test 1) and 3.00 clauses per T-unit on the last test (grade 3, Test 21), which means that the rate of development was equal to 1.35. At the same time, the data show that on test 14 in grade 2 the good learner produced 1.15 clauses per T-unit (MIN = 1.15) and on test 15 in grade 2 the learner produced 4.46 clauses per T-unit (MAX = 4.46), which means that the minimum and maximum values in all oral tests do not overlap with the scores on the first and the last test, respectively. This indicates the existence of some variation in the development of syntactic complexity, which in this case was equal to 0.80. Furthermore, the general trend in the data set is increasing throughout secondary school, though it is rather constant in the first grade (tests 1–8) (diagram 1.1). In comparison, the rate of the average learner was 0.06, with variation equal to 0.04, whereas the rate of the poor learner was 0.53 and variation—0.11. In the case of the average learner, the general trendline shows

[2] As this test involves the comparison of absolute difference and critical range, detailed numbers are not provided here.

some regress in the middle of the whole observation period while in the case of the poor learner it shows systematic progress (diagrams 1.2 and 1.3).

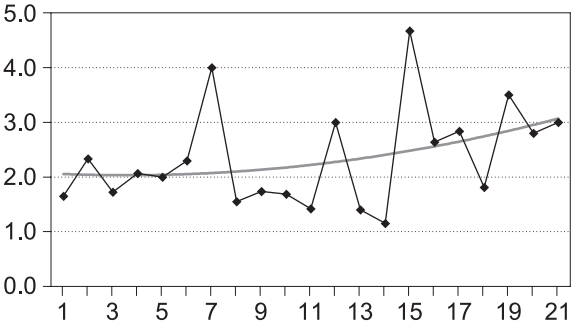

Diagram 1.1: GL—the development of syntactic complexity

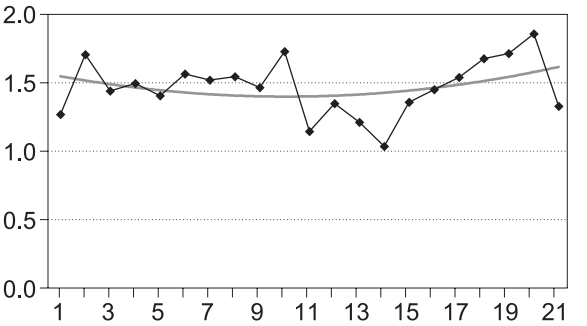

Diagram 1.2: AL—the development of syntactic complexity

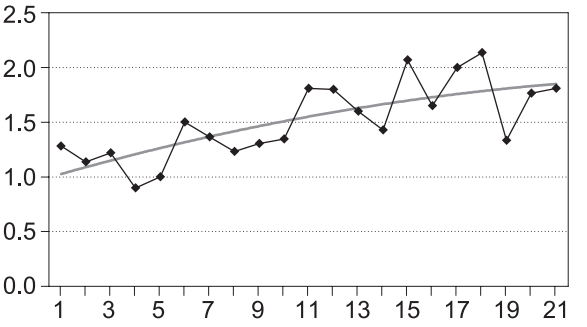

Diagram 1.3: PL—the development of syntactic complexity

In terms of lexical complexity, the learners obtained the following results for the rate of development: GL—0.73, AL—0.28, PL— –0.22 as well as for variation: GL—0.15, AL—0.21, PL—0.10 (table 2). The general trend in the development of lexical complexity is rather stable in the case of all three learners, though a very slight decrease may be observed through the whole observation period in the case of the good learner (diagram 2.1), in the middle of the period in the case of the average learner (diagram 2.2), and a slight increase at the beginning and a slight decrease at the end of the period in the case of the poor learner (diagram 2.3).

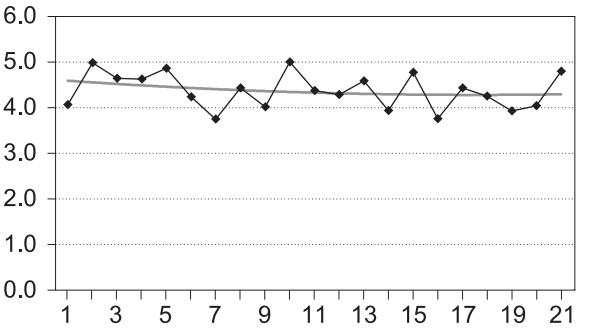

Diagram 2.1: GL—the development of lexical complexity

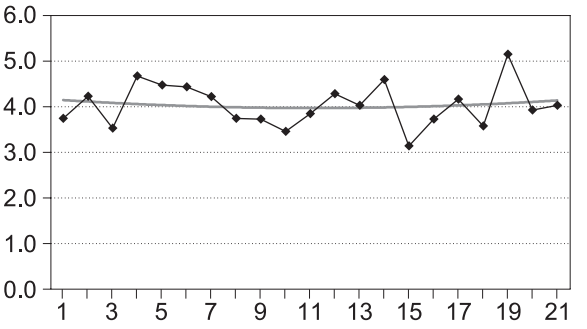

Diagram 2.2: AL—the development of lexical complexity

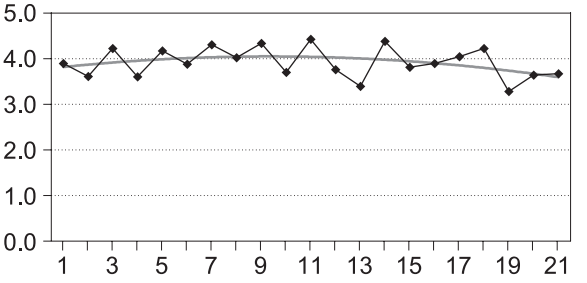

Diagram 2.3: PL—the development of lexical complexity

In terms of speech accuracy, the learners obtained the following results for the rate of development and variation, respectively: GL—0.14, AL—0.05, PL— –0.06 and GL—0.02, AL— 0.01, PL—0.01 (table 2). In the case of the good learner, the general trendline is increasing but shows moderate regress in the middle of the observation period (diagram 3.1). In the case of the average learner, it indicates systematic progress (diagram 3.2) while in the case of the poor learner—systematic regress in the development of accuracy throughout secondary school (diagram 3.3).

Finally, in terms of speech fluency, the learners obtained the following results for the rate of development GL—3.41, AL— –0.08, PL—3.36 and variation GL—4.21, AL—3.05, PL— 9.45 (table 2). In the case of the good and poor learners (diagrams 4.1 and 4.3), the general trendline depicts a moderate but systematic

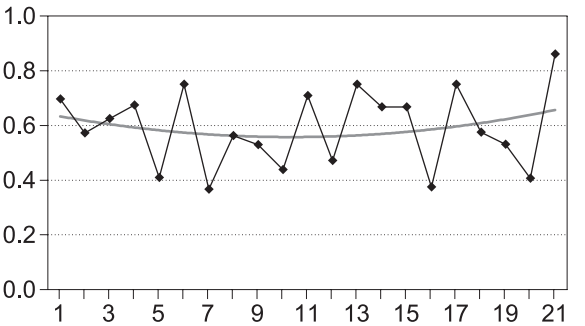

Diagram 3.1: GL—the development of accuracy

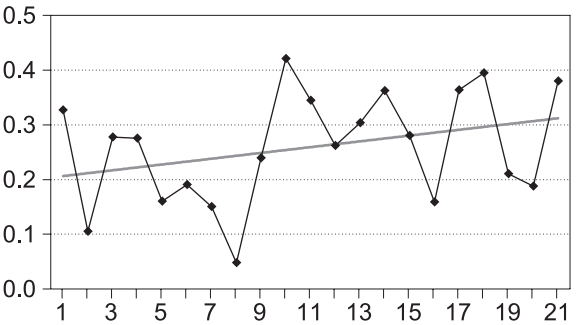

Diagram 3.2: AL—the development of accuracy

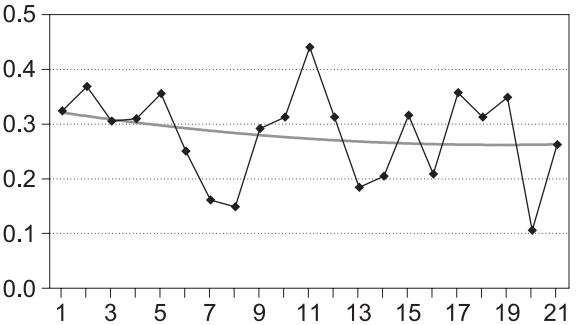

Diagram 3.3: PL—the development of accuracy

increase in the development of fluency throughout secondary school, whereas in the case of the average learner (diagram 4.2), the trend is generally increasing but indicates a moderate decrease in the middle of the observation period.

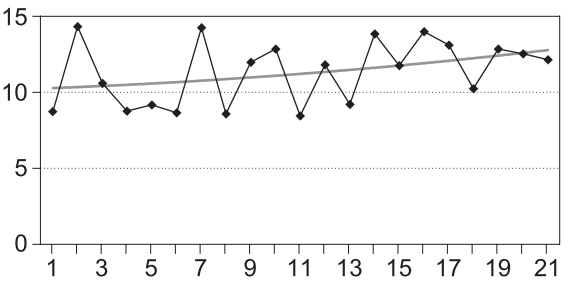

Diagram 4.1: GL—the development of fluency

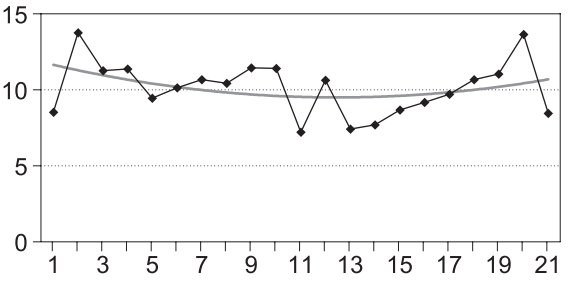

Diagram 4.2: AL—the development of fluency

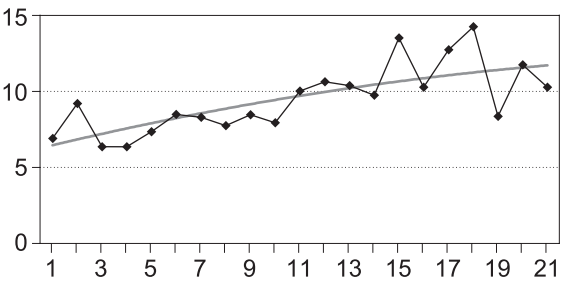

Diagram 4.3: PL—the development of fluency

4.2. The patterns of intra-individual variability

As far as the patterns of intra-individual variability in the development of syntactic complexity are concerned (diagrams 5.1, 5.2 and 5.3), it may be said that in the case of the good language learner two periods of substantial variability (tests 2–8 and tests 10–16) and in the case of the average learner one period (tests 6–11) of moderate variability can be observed in contrast to the poor learner whose bandwidth remains narrow till test 14 (grade 1 and 2) but, just like in the case of the average learner, it becomes broader towards the end of the observation period indicating some change and potential further development in the subsystem of syntactic complexity. Such stable patterns of intra-individual variability indicate lack of activity in the language system and usually mean that the learner focuses on a different language subsystem which occupies his or her cognitive resources.

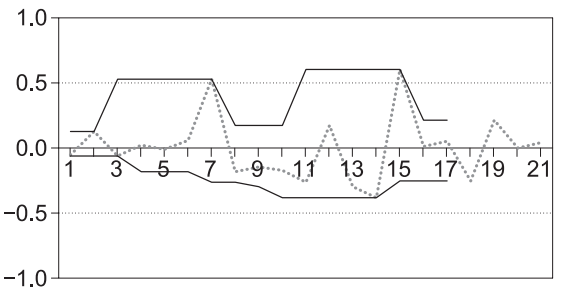

Diagram 5.1: GL—intra-individual variability in the development of syntactic complexity

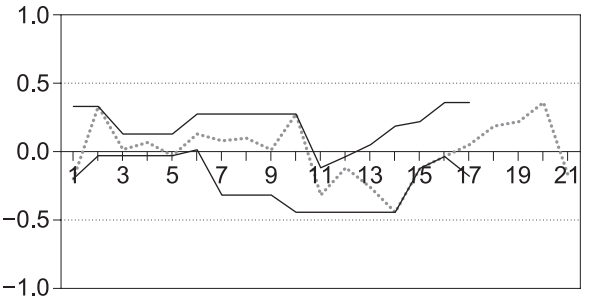

Diagram 5.2: AL—intra-individual variability in the development of syntactic complexity

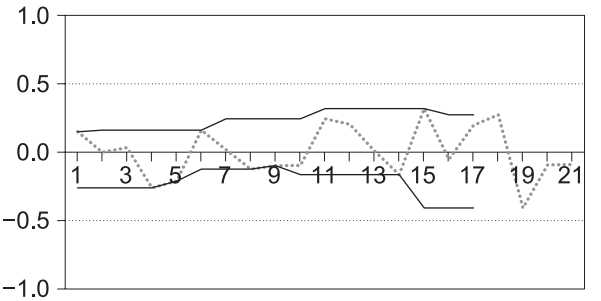

Diagram 5.3: PL—intra-individual variability in the development of syntactic complexity

The patterns of intra-individual variability in the development of lexical complexity indicate rather high variability throughout the whole observation period for the good learner (diagram 6.1). In the case of the average and poor learner (diagrams 6.2 and 6.3), variability is rather low at the beginning (AL— tests 1–10; PL—tests 1–7) and rather high later on (AL—tests 10–21; PL—tests 7–13 and 15–21). In all three cases, the bandwidth becomes broad at the end of the observation period indicating lack of stability and potential further development in this subsystem.

The patterns of intra-individual variability in the development of accuracy in speaking English at secondary school indicate rather stable, moderate variability which increases towards the end (tests 16–21) for the good learner (diagram 7.1), two longer periods of moderate variability (tests 5–9 and tests 12–21) for the

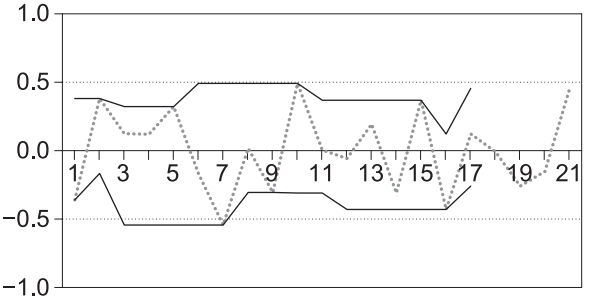

Diagram 6.1: GL—intra-individual variability in the development of lexical complexity

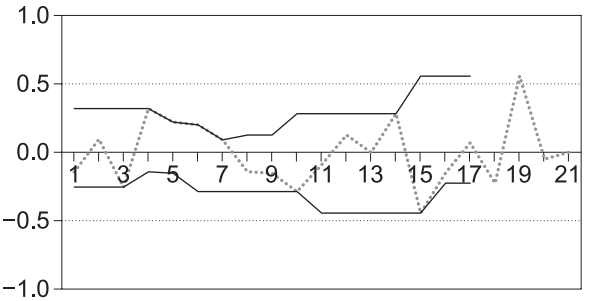

Diagram 6.2: AL—intra-individual variability in the development of lexical complexity

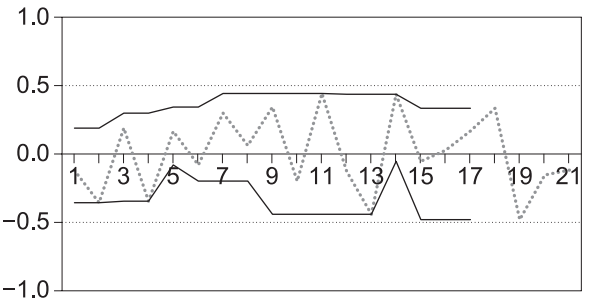

Diagram 6.3: PL—intra-individual variability in the development of lexical complexity

average learner (diagram 7.2), and one period of relatively high variability (tests 6–12) preceded and followed by the periods of moderate variability (tests 1–6; tests 12–21) for the poor learner (diagram 7.3).

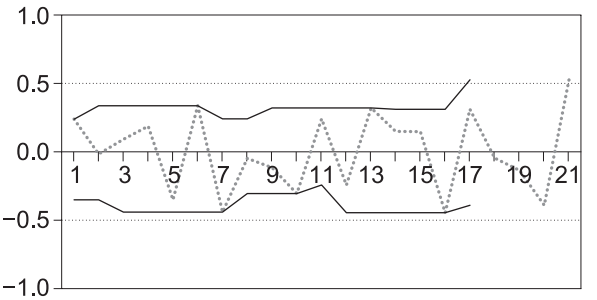

Diagram 7.1: GL—intra-individual variability in the development of accuracy

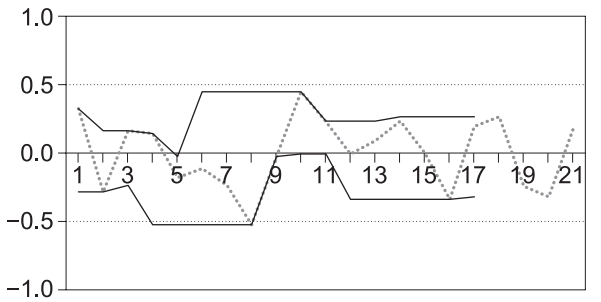

Diagram 7.2: AL—intra-individual variability in the development of accuracy

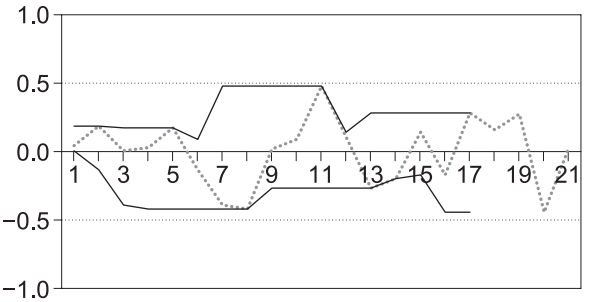

Diagram 7.3: PL—intra-individual variability in the development of accuracy

The patterns of intra-individual variability in the development of fluency in speaking English at secondary school reveal generally stable, high variability which slightly decreases towards the end of secondary school for the good learner (diagram 8.1). This contrasts sharply with very low (tests 1–11) and rather low variability (tests 3–16) in the case of the poor and average learner, which increases towards the end of secondary school (diagrams 8.3 and 8.2). It might be argued that in the case of the good learner the sub-system stabilizes after a longer period of variability, whereas in the case of the other learners it becomes variable after a long period of stability.

Notwithstanding the patterns of intra-individual variability in the development of syntactic complexity, lexical complexity, accuracy and fluency, a Monte Carlo Analysis proves that the differences between the good, average and poor learners in all these aspects are statistically insignificant (table 3).

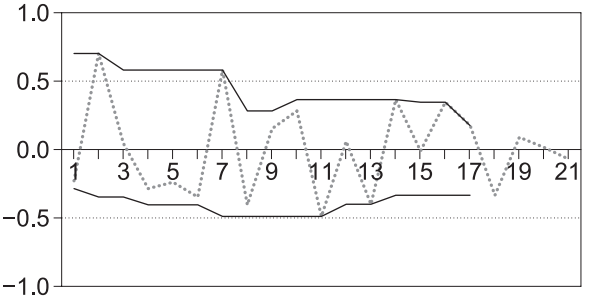

Diagram 8.1: GL—intra-individual variability in the development of fluency

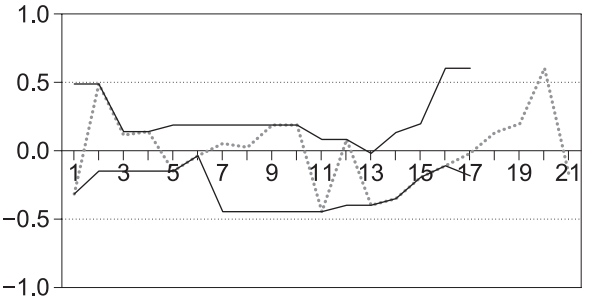

Diagram 8.2: AL—intra-individual variability in the development of fluency

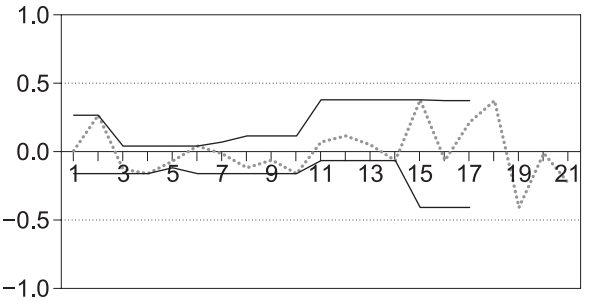

Diagram 8.3: PL—intra-individual variability in the development of fluency

Table 3: Intra-individual variability—a Monte Carlo Analysis ($p < 0.05$)

Intra-individual variability				
Data	Syntactic complexity	Lexical complexity	Accuracy	Fluency
Good & average learner	0.848	1.000	1.000	1.000
Good & poor learner	0.821	1.000	1.000	1.000
Average & poor learner	1.000	1.000	1.000	1.000

4.3. Moving correlations between the variables

The results of the study also show the relationships between selected variables in a time developmental series. As far as syntactic and lexical complexity is concerned, correlation coefficients, calculated in terms of Spearman's rho, indicate a positive but weak relationship in the case of the poor learner (.3239) and no relationship in the case of the good (–.0279*) and average (.0059*) learners (table 4). However, the so-called moving correlations in dynamic diagrams (diagrams 9.1, 9.2 and 9.3), which show how the relationship between the two factors has changed over the whole observation period, indicate a dual relationship in that the two variables compete and support each other interchangeably, which can be best observed in the case of the good learner.

Table 4: Correlations between complexity, accuracy and fluency[3]

Complexity, accuracy and fluency—correlations[3]					
Data	Learner	Syntactic complexity	Lexical complexity	Accuracy	Fluency
Syntactic complexity	GL	—	–.0279*	–.2135*	.3742
	AL	—	.0059*	–.3755	.8881
	PL	—	.3239	.2410*	.8238

[3] Statistically insignificant correlations are marked with an asterisk.

Lexical complexity	GL		—	.3137	–.1538*
	AL		—	.0535*	–.4363
	PL		—	.0404*	.2306*
Accuracy	GL			—	–.4374
	AL			—	–.3889
	PL			—	.1950*
Fluency	GL				—
	AL				—
	PL				—

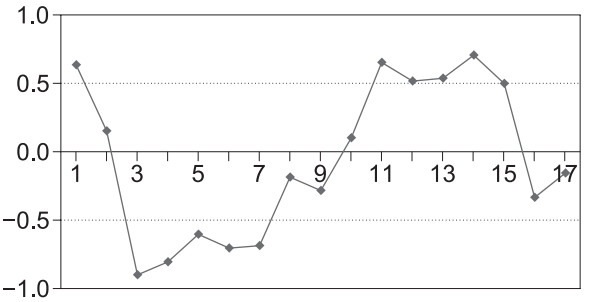

Diagram 9.1: GL—moving correlation between syntactic and lexical complexity

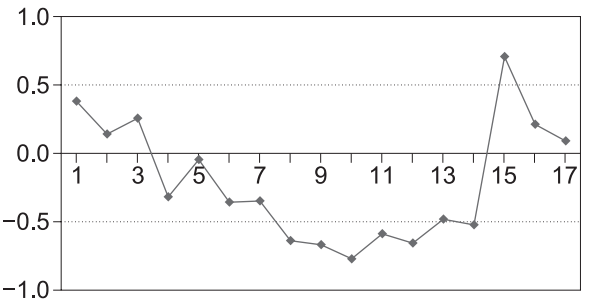

Diagram 9.2: AL—moving correlation between syntactic and lexical complexity

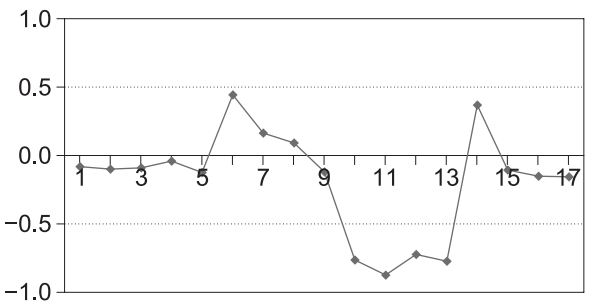

Diagram 9.3: PL—moving correlation between syntactic and lexical complexity

The results on the relationship between syntactic complexity and accuracy indicate a negative and weak relationship, which is statistically significant for the average (–.3755) but not for the good learner (–.2135*), and a weak and positive but

statistically insignificant (.2410*) relationship for the poor learner (table 4). However, in the case of the poor learner, moving correlation illustrates a typical pre-conditional relationship in which the two variables first form a competitive and then a supportive relationship (diagram 10.3). In other words, they compete as the so-called pre-conditional growers in that one variable needs to be developed first for the other variable to be developed later. Such pre-conditioning, though more moderate, may be also observed in the case of the good learner (diagram 10.1). In the case of the average learner, the relationship is probably best described as dual (diagram 10.2).

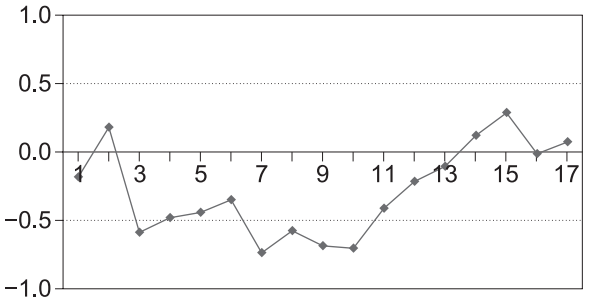

Diagram 10.1: GL—moving correlation between syntactic complexity and accuracy

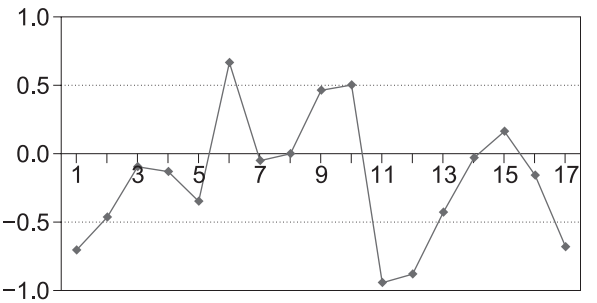

Diagram 10.2: AL—moving correlation between syntactic complexity and accuracy

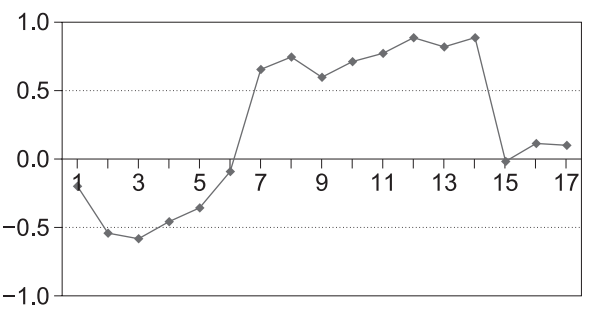

Diagram 10.3: PL—moving correlation between syntactic complexity and accuracy

The relationship between syntactic complexity and fluency is positive and statistically significant for all three learners but it is strong for the average (.8881) and poor (.8238) and weak for the good (.3742) learner. Dynamic diagrams of moving correlations (diagrams 11.1, 11.2 and 11.3) show a supportive relationship between the two variables, which is best illustrated in the case of the average and

poor learners. It may be said that syntactic complexity and fluency develop as supportive growers in that the development of one grower supports the development of the other grower.

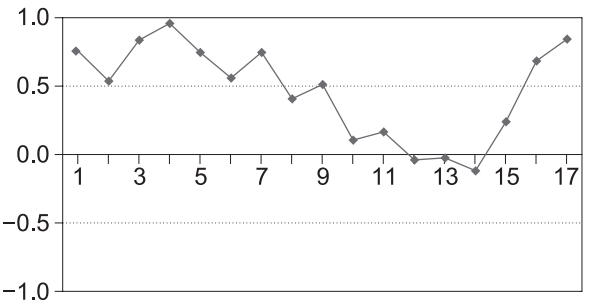

Diagram 11.1: GL—moving correlation between syntactic complexity and fluency

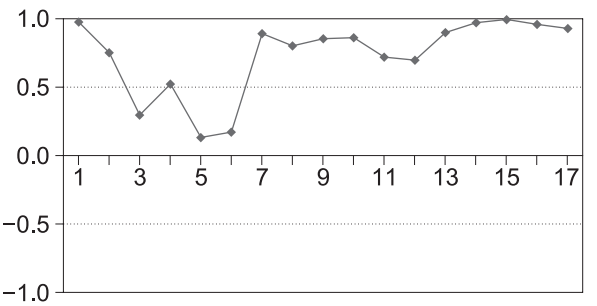

Diagram 11.2: GL—moving correlation between syntactic complexity and fluency

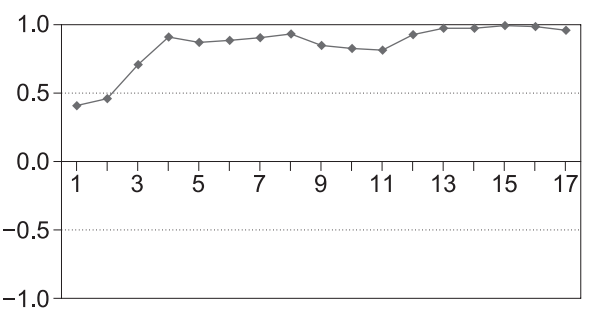

Diagram 11.3: GL—moving correlation between syntactic complexity and fluency

The correlation between lexical complexity and accuracy is positive but weak and statistically significant in the case of the good learner (.3137) but insignificant in the case of the average (.0535*) and poor learners (.0404*) (table 4). Moving correlations graphically represent a pre-conditional relationship for the good learner (diagram 12.1) and rather dual relationships for the average and poor learners (diagrams 12.2 and 12.3).

The correlation between lexical complexity and fluency is negative and weak in the case of the average learner (–.4363) but statistically insignificant in the case of the good (–.1538*) and poor learner (.2306*) (table 4). Moving correlations

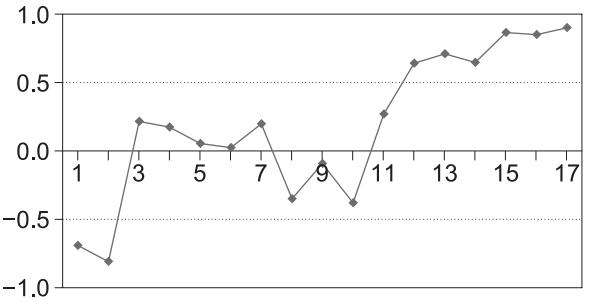

Diagram 12.1: GL—moving correlation between lexical complexity and accuracy

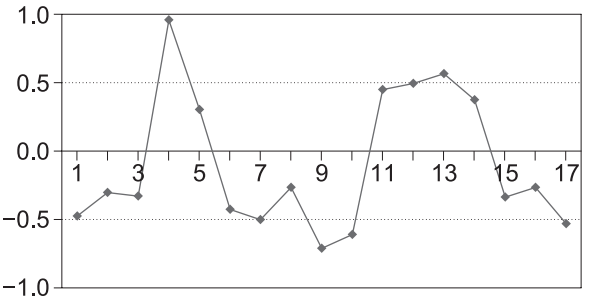

Diagram 12.2: AL—moving correlation between lexical complexity and accuracy

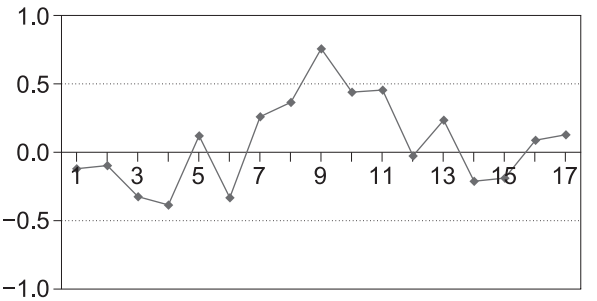

Diagram 12.3: PL—moving correlation between lexical complexity and accuracy

graphically visualize a dual relationship for the good and poor learners (diagrams 13.1 and 13.3) and a rather competitive relationship for the average learner (diagrams 13.2).

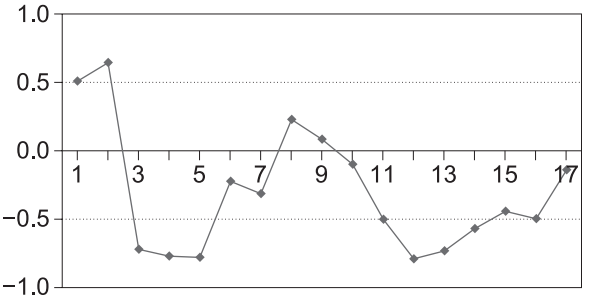

Diagram 13.1: GL—moving correlation between lexical complexity and fluency

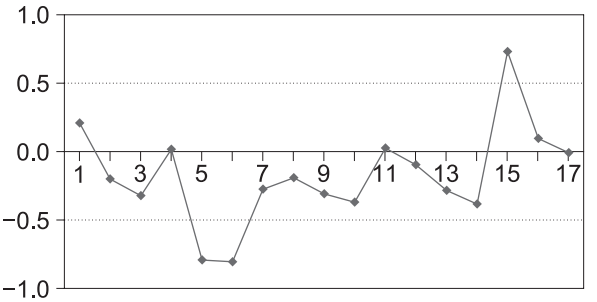

Diagram 13.2: AL—moving correlation between lexical complexity and fluency

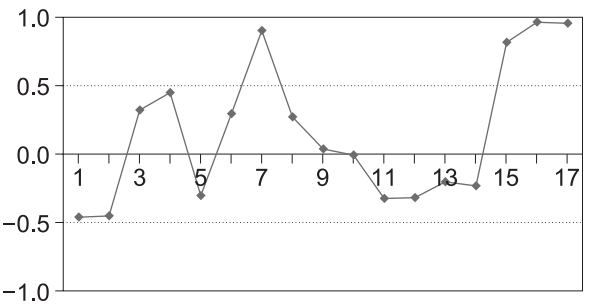

Diagram 13.3: PL—moving correlation between lexical complexity and fluency

The relationship between accuracy and fluency is statistically significant, negative and weak in the case of the good (–.4374) and average (–.3889) learner and insignificant in the case of the poor learner (.1950*) (table 4). Moving correlations illustrate a clear competitive relationship for the good learner (diagram 14.1) and a dual relationship for the average and poor learners (diagrams 14.2 and 14.3).

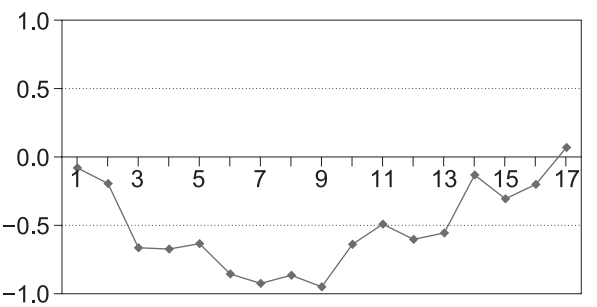

Diagram 14.1: GL—moving correlation between accuracy and fluency

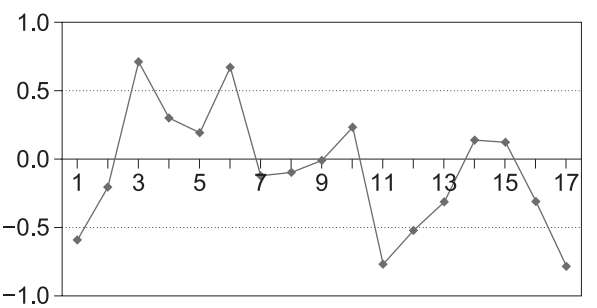

Diagram 14.2: AL—moving correlation between accuracy and fluency

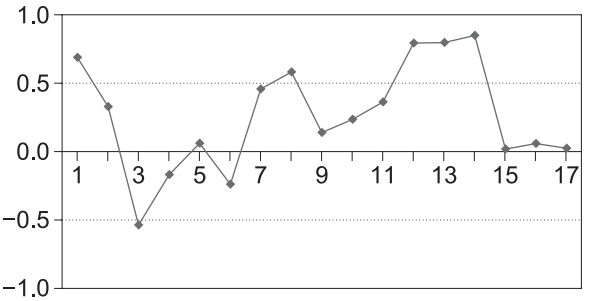

Diagram 14.3: PL—moving correlation between accuracy and fluency

Finally, the relationship between the rate of development and intra-individual variability is very strong and positive in the case of all three learners (.9909). However, it is strong and positive for the good (.9800) and poor (.9825) learner but weak and negative for the average learner (–.6601) (table 5). These results need to be considered with caution as further analyses which take into account more developmental variables indicate positive but lower correlations.

Table 5: The correlation between the rate of development and intra-individual variability

The rate of development and intra-individual variability			
Good learner	Average learner	Poor learner	All learners
.9800	–.6601	.9825	.9909

4.4. Discussion

With respect to the development of complexity, accuracy and fluency, it can be said that the good learner produced syntactically and lexically more complex language in speech than the average learner and the poor learner, whose language in turn was characterized with the same level of syntactic and lexical complexity. Furthermore, the good learner used more accurate language in speech than the average and poor learner, whose accuracy did not differ in this respect. Finally, the good learner was more fluent than the poor but not the average learner in speaking English. At the same time, the average learner was not more fluent than the poor learner. As far as the rate of development is concerned, the good learner made the best progress in terms of syntactic complexity, lexical complexity, accuracy and fluency. The average learner made greater progress than the poor learner in lexical complexity and accuracy but not in syntactic complexity and fluency. It is also important to point out that general trendlines in the data sets show a systematic increase in syntactic complexity and in fluency in the case of the good and poor learner but not in the case of the average learner who undergoes a significant decrease in the development of these subsystems in the middle of the observation period. In terms of lexical complexity, the trends are rather stable in all learners, however, a slight increase in the case of the poor learner and a slight decrease in the case of the

average learner can be observed in the middle of the observation period. In terms of accuracy, a systematic increase is observed in the case of the average learner and a systematic decrease in the case of the poor learner. In other words, the good learner develops her syntactic complexity and fluency while having some problems with accuracy, her lexical complexity being rather constant. The average learner develops his accuracy at the cost of fluency, experiencing some problems with syntactic but not lexical complexity, though the latter is hardly developed. Finally, the poor learner develops his syntactic complexity and fluency more than lexical fluency but all that takes place at the cost of accuracy.

With respect to intra-individual variability, it may be said that the patterns of intra-individual variability illustrate periods of higher variability which take place interchangeably with periods of lower variability or simply stability in different language subsystems in the case of all three learners. Generally speaking, these periods seem to be of different length and intensity and seem to appear at different points in the observation period, which makes them qualitatively unique for each learner. More specifically, in the development of syntactic complexity and fluency, these patterns seem to illustrate greater intra-individual variability in the case of the good learner than the average and especially poor learner. The patterns which illustrate this phenomenon in the development of lexical complexity and accuracy appear to differ to a lesser extent. Nevertheless, from the statistical point of view, all these differences are insignificant. Furthermore, as far as the levels of intra-individual variability are concerned, it turns out that higher intra-individual variability seems to coincide with a higher rate of development. The correlation between the two factors is positive, strong and statistically significant in the case of the good and poor but not average learner. This finding seems to render some support for one of the main claims in CDST which says that intra-individual variability is an important developmental mechanism in language learning. This, however, needs to be confirmed in further research on a bigger sample of learners.

With respect to the relationships between selected variables, it may be observed that the relationships between the selected language subsystems are not always the same in the case of the good, average and poor learner. The relationship between syntactic and lexical complexity is dual, the relationship between syntactic complexity and accuracy—pre-conditional, except for the average learner for whom it is dual, while the relationship between syntactic complexity and fluency—supportive for all three learners. The correlation between lexical complexity and accuracy is dual for the average and poor learners but pre-conditional for the good learner. The correlation between lexical complexity and fluency is dual for the good and poor learners but competitive for the poor learner. Finally, the relationship between accuracy and fluency is dual for the average and poor learners but competitive for the good learner. This diversity is congruent with one of the main claims of CDST which says that language development is not only non-linear but also unique in that a developmental trajectory of one learner does not have to

overlap with the trajectory of another learner, not to mention an average trajectory of the whole group. Nevertheless, it is necessary to verify the findings in question on a big sample of learners using a hybrid type of study which will provide both quantitative data of the whole group and qualitative data of the individuals.

5. Conclusions

CDST represents an new approach in the field of applied linguistics which emphasizes a non-linear and dynamic nature of language development characterized by multiple interactions which take place within and between complex language subsystems, and with intermittent periods of progression and regression which correspond to the periods of variability and stability in the developing language system. The proponents of CDST have designed a number of procedures used specifically to examine the relationships between different language subsystems changing over time, including the phenomenon of intra-individual variability, thanks to which language development may be studied from a new perspective, rendering a useful insight into the whole process. The present study, rooted in the CDST framework, firstly shows that the good, average and poor learners' trajectories in the development of syntactic complexity, lexical complexity, accuracy and fluency do not always overlap, nor do different relationships between these subsystems throughout secondary school. Secondly, the study indicates that although the patterns of intra-individual variability seem to be qualitatively different, these differences are statistically insignificant. Thirdly, the study renders some support for the claim that intra-individual variability has a positive influence on the rate of development of complexity, accuracy and fluency. Nevertheless, despite a focus in CDST on individual, longitudinal data, the results of the present case study need to be verified on a bigger sample of learners at a given level.

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