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Inter-individual Variability in CAF: A Case Study of Two Individuals and Two Pairs' Written Productions

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ABSTRACT

The present study tracked the development of general measures of complexity, accuracy and fluency (CAF), and specific measures of accuracy and complexity in the writings of two EFL learners writing individually, and those of two pairs of EFL learners writing in pairs within the framework of dynamic systems theory. The individuals and the pairs were similarly asked to do 7 tasks during a semester. The learners' developmental pathways as well as the differences between individuals and pairs in terms of general and specific measures of CAF across the 7 tasks were depicted through graphs. Results indicated that the performance of learners in each of the measures was non-linear during the semester. Moreover, concerning general measures of CAF, learners writing individually outperformed in terms of fluency and complexity features. However, no clear distinction emerged in terms of general accuracy measures of their writings. Furthermore, development of general and specific accuracy measures in the writings was consistent. However, although it was found that the learners writing individually outperformed in terms of general measure of complexity, this developmental pattern was not evident in their performance in terms of specific complexity measures.

Keywords: Accuracy, Fluency, Complexity, Development, Dynamic Systems Theory

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1. Introduction

Learners' language proficiency in writing can effectively be evaluated through three measures of complexity, accuracy, and fluency (CAF) (Abrams & Rott, 2016; Biber, Gray & Staples, 2014; Bulté & Housen, 2012; Housen & Kuiken, 2009; Housen, Kuiken & Vedder, 2012; Révész, 2011; Shehadeh, 2011; Spoelman & Verspoor, 2010; Thai & Boers, 2016; Trebits, 2014). Complexity is pertinent to the restructuring of the performance. However, accuracy deals with controlling one's production and avoiding errors. Fluency is related to one's ability both to connect words to their meanings, and to attend to what one is presenting (Ellis, 2008).

Despite the fact that CAF measures are used to assess learners' proficiency, indicating the multi-componential nature of language use and development, dynamic

systems theory explicates developmental differences within an individual as well as across groups. In other words, there is variation due to both intra-individual and inter-individual differences. Therefore, the theory advocates that learning a second language is an individualized nonlinear endeavor (Larsen-Freeman & Cameron, 2008).

Although much of language performance is conducted individually, collaborative language performance combines individuals' problem-solving with social orientation. Indeed, collaborative performance helps individuals pay attention to their choice of syntax, semantics and discourse in collaboration with each other (Wigglesworth & Storch, 2012). Pedagogically speaking, collaborative language production can facilitate learners' performance by providing them with more time and



promoting their autonomy. Learners will experience more self-esteem and less stress and anxiety when dealing with collaborative activities and discussing. Furthermore, learners will be more enthusiastic and willing to accomplish the task collaboratively (McDonough, 2004).

Theoretically speaking, the use of collaborative (pair and group) language performance is supported by the sociocultural theory of mind introduced by Vygotsky (1978). He emphasized the social and cultural processes as mediators of individuals' activity and thought. Indeed, both social and psychological processes have a role in individual development. However, social processes are the prerequisite for the psychological ones. Knowledge and skills are appropriated and transformed from inter-psychological processes to intra-psychological ones. Therefore, learning and development is collaborative in nature. The concept of learning as a social practice in the sociocultural theory of mind includes mediation, interaction, collaboration and scaffolding.

Nevertheless, since dynamic systems paradigm is relatively new, and few studies employed it to examine measures of complexity, accuracy and fluency (Polat & Kim, 2014), this study will examine the development and inter-individual variations in successive writing tasks done by two learners writing individually and two pairs writing together in pairs in terms of general and specific measures of CAF. Therefore, the following research questions are raised.

1. How do the learners writing individually and the ones writing in pairs develop in terms of general measures of CAF?
2. How do the same individuals and pairs develop in terms of the specific measures of complexity and accuracy?

2. Literature Review

If one wants to review approaches to variability in second language development, he should start on Chomsky's approach. Chomsky's approach to language has been criticized on the ground that it focuses on an individual's competence (what one knows), and not performance (what one does); that is to say, variability is ignored in this approach. According to Chomsky, competence is an individual and invariant endeavor whereas performance incorporates variability, false starts, hesitations, repetitions, and slips of the tongue. He also believed that language development is an individual act, which is

determined internally through the language acquisition device (Van Lier, 2004).

However, constructivist approaches (connectionist/emergentist models) disagree with innate module of learning. They believe that language is not learned by an innate capacity, but through abstracting the regularities in the linguistic input. Frequency of the input and connections between various elements of in a sentence, and the strengthened associations are among the key requirements of language development (Gass & Selinker, 2008).

On the other hand, information processing approaches consider highly complex cognitive processes of automaticity, restructuring, and U-shaped learning as the requirements for second language development. Accordingly, language development begins with declarative knowledge, which is conscious knowledge about facts and then, through practice, declarative knowledge will turn into procedural knowledge, which is concerned with motor and cognitive skills. Indeed, procedural knowledge deals with sequencing pieces of information and using language. Furthermore, unlike declarative knowledge, procedural knowledge is not accessible to conscious awareness (Gass & Selinker, 2008).

The sociocultural theory, a more recent approach to language acquisition, emphasizes the role of historical, social, cultural and physical context in language development. It indicates that an individual's activity is mediated by both symbolic and physical artifacts. As for second language, the approach highlights variability in second language development. According to this theory, several factors cause variability among individuals: whether the interlocutor is a native speaker or not, whether the context is formal or informal, and whether the activity deals with speaking or writing are among the factors affecting the inter-individual variation (Verspoor, Bot & Lowie, 2011).

The dynamic systems theory focuses on change through the following basic characteristics. First, there is a butterfly effect at the beginning conditions. That is, even small differences in the initial conditions of systems can have subsequent enormous effects. Concerning language learning, it refers to the different learning outcomes as a result of even minimal differences between learners. Second, all parts in a dynamic system are interconnected. Therefore, a change in a

part (lexical, phonological or syntactical system) affects other parts. Third, nonlinearity in development refers to non-existence of a direct cause-and-effect relationship. Then, there might be variation in the way a system works. Furthermore, due to the interconnectedness of many elements in the system, predicting how the system will change is difficult. Fourth, from a dynamic systems theory point of view, there is no specific direction in development. It just focuses on change, which is affected by the two factors of interaction with the environment and internal self-organization. Fifth, it views language as a dynamic system, which is a set of components interacting over time, and language development as a dynamic process. In order to develop, one must be equipped with some resources, both internal and external ones. Internal resources include the capacity, conceptual knowledge, and motivation; external resources include the context, time, input, reinforcement provided by the environment, and materials such as books. These resources are limited and interconnected (Bot & Larsen-Freeman, 2011; Bot, Lowie & Verspoor, 2007).

Moreover, from the perspective of the dynamic systems theory, variability provides prominent information concerning the developmental process and its nature. In fact, variability occurs due to the system's flexibility and the behavior being in the context. It can be considered both a source of change and development, and a specific part of development. The dynamic systems theory claims that development occurs in the context in which an individual performs (Bot et al., 2007).

To summarize, since some approaches to (second) language acquisition tended to find universal patterns in individuals' language development, they ignored variability. Still some other approaches which focused on variability highlighted the external causes of variability. However, the dynamic systems theory deals with variability in a different way. It focuses on the time and the way variability occurs in the development process, the inter-individual variability in second language development, and the development and interaction of various sub-systems.

Among the studies which investigated individuals' development and variation in second language performance, some focused on integrative and discrete-point tasks (e.g. Abrams & Rott, 2016),

some focused on oral fluency (e.g. Derwing, Munro & Thomson, 2007; Polat & Kim, 2014), and some focused on learners' written products (e.g. Baba & Nitta, 2014; Spoelman & Verspoor, 2010; Verspoor, Bot & Lowie, 2004; Verspoor, Schmid & Xu, 2012; Vyatkina, 2012; 2013).

Verspoor et al. (2004) conducted a case study and focused on the variation in some features of texts written by two learners during six weeks through dynamic systems theory. They focused on the number of words used in the learners' writings, number of times each of the tenses were used, the percentage of non-English words used, and the number of sentences and conjunctions in the texts. The researchers indicated that instead of averaging the learners' performances showing their general tendencies, it was possible to consider variation and investigate individuals' development process. Finally, the learners' lack of development observed in the study was accounted for by the fact that six weeks was too short for the development of writing.

Spoelman and Verspoor (2010) explored the patterns of development of two aspects of performance (accuracy and complexity) in the acquisition of Finnish by a native speaker of Dutch in a longitudinal study. The sample included the learner's assignments which were written at home without time limitations. Accuracy was estimated through calculating the ratio of error-free clauses, and the analysis of complexity was done through considering word, noun phrase and sentence constructions. The data analysis showed that the accuracy rate was lower in the earliest written texts, yet it was higher in the few last samples collected. Furthermore, results showed that word complexity and sentence complexity developed. However, there was a competition between these two measures and noun phrase complexity. That is, one developed at the expense of the other. Furthermore, no relationship was found between measures of accuracy and complexity measures over time.

In the investigation of second language learners' written products through dynamic systems perspective, Verspoor et al. (2012) coded the learners' compositions at sentence, phrase and word levels. The analysis of the data showed that the frequently used measures which distinguished between learners' writing proficiency levels (i.e., the length of sentences, the total number of dependent



clauses, the total number of chunks, the total number of errors, and the use of present and past tenses) were also effective in the study's context. The analysis of the written performances from the perspective of dynamic usage showed that there were non-linear development and variation in terms of the above-mentioned variables. However, the study did not consider learners' development of writing proficiency (as it claimed); it merely focused on just one aspect of writing proficiency (i.e. complexity).

Vyatkina (2012) investigated group development (in a cross-sectional study) and individual development (in a longitudinal study) of linguistic complexity in the performance of beginning learners of German. General measure of complexity, sub-clausal measure of complexity, and complexity via subordination and coordination were estimated. The results of the cross-sectional phase showed a general upward trend on most of the measures. Learners produced more complex texts as they developed in time. There was a linear increase in general and sub-clausal measures of complexity; however, coordinate complexity decreased during the time; at the beginning of language production, learners overused coordinating conjunctions because they were more available to them. However, as time passed, they became familiar with other available choices, such as subordinating conjunctions. Therefore, an increase was evident in learners' use of subordinating conjunctions. However, the results of the longitudinal phase investigating two learners showed a significant variability in each individual learner's developmental pathway. In terms of the general measure of complexity, the productions of the two learners showed development across time. The increase in general complexity in one of the case's production was more than that of the cross-sectional data; however, the general complexity in another case was lower than the cross-sectional mean. Furthermore, there was no clear developmental trend in the general complexity. Concerning the use of conjunctions, fluctuations were observed in both learners' performance. This was contrary to the pattern evident in the cross-sectional data, in which the use of coordinating conjunctions decreased.

In a more recent study, Vyatkina (2013) explored the individual developmental path and variation between

two low proficiency learners who followed the same instruction. The variation was investigated in terms of specific measures of complexity-- coordinate structures, nominal structures, and nonfinite verb structures. The results showed that both learners developed similarly in the first half of the data collection phase. Initially, they used 0.4 complex structures per clause, and gradually it increased to 1.2 in the sixth session. Both cases used similar patterns at some specific points of data collection. As an example, they used more nonfinite verb phrases when writing their seventh task. They also used more complex nominal structures when writing their eighth task. These observations were explained by referring to the kind of instruction they had received. That is, in the seventh session, they received instruction on nonfinite verb phrases, and in the eighth session, they received instruction on nominal structures. In sum, the developmental paths of the two cases diverged in the last third phase of data collection. During this period, one of the learners used more nominal structures and nonfinite verbs; however, the other one used more coordinate structures.

Baba and Nitta (2014) explored the patterns of fluency development in second language writing from a complex dynamic systems perspective. They attempted to see if two EFL learners would experience phase transition in the fluency of their timed compositions which were written during a semester. Each time, the learners were given three different topics to choose from. Fluency was estimated by counting the number of words used in a composition. Results showed that the fluency of the learners' compositions changed repeatedly; however, the changes were not in a linear form. Furthermore, both learners experienced phase transition in the fluency of their productions at least once during the semester. However, the time of phase transitions in the fluency of the learners' compositions differed. In one of the cases, transition occurred in the middle of the semester; in the other case, it took place at the end of the semester. It was concluded that even in the same context, where learners were learning the same material and from the same teacher, each learner might follow a unique developmental path.

As the above literature review indicates, the studies conducted on the development of learners' writing performances so far focused on just one or two dimensions of writing proficiency. In

other words, none of the studies examined the development of learners' performance in terms of all CAF measures (i.e. writing proficiency). Furthermore, some of the studies merely analyzed one of the general measures CAF (e.g. Spoelman & Verspoor, 2010) and, in fact, ignored the specific measures. Moreover, to the best of the researchers' knowledge, no study has yet depicted and compared writing development in the performance of learners writing individually and those writing in pairs. Accordingly, the present study intends to fill the aforementioned gaps by scrutinizing and comparing all general and specific measures of CAF in the performances of EFL learners writing individually and those writing in pairs.

3. Methodology

3.1. Participants

The participants were four EFL learners purposively selected from among the students in two writing classes in Shiraz University, Iran. All the students had taken the course Academic Writing, a two-credit course which was held once a week for a semester (16 weeks) During the semester, one of the classes which included 17 learners wrote paragraphs individually; the other class which included 16 learners wrote paragraphs in self-selected pairs. However, both classes were taught by the same instructor who followed the same instructional curriculum, syllabus, lesson plans and material. Two learners from the class writing individually and two pairs of learners from the class writing in pairs were purposively selected to participate in this study at the outset. In fact, after careful analysis of the sample writings produced by the learners in each class which served as the pretest, a learner who gained the minimum score in terms of the mean of CAF features (Individual A), and a learner who gained the maximum score (Individual B) in terms of the same features were selected from the class writing individually. These two individuals were female and, as they had already gained Oxford Placement Test scores of 49 and 32, respectively, they were both estimated to be at the intermediate level of proficiency. Furthermore, a pair of learners with the minimum mean score (Pair C) and a pair of learners with the maximum mean score (Pair D) of CAF features were selected from the class writing in pairs for further analysis. The first pair consisted of two females with Oxford placement test scores of 50 and 33; the second selected pair included one male and one female with

Oxford placement test scores of 45 and 48, respectively. In fact, these two pairs were also estimated to be at the intermediate level of proficiency. Learners in each pair had known each other for 18 months.

3.2. Materials and instruments

The first version of the Oxford Placement Test (2001) was used to determine the proficiency level of learners and to provide hints for choosing the appropriate measure of syntactic complexity following Norris and Ortega (2009). The Cronbach's Alpha index estimating the internal consistency of the items in the Oxford Placement Test (2001) was .85, which suggests very good internal consistency reliability for using the test for the purpose of the present study (Pallant, 2007).

Moreover, 25 paragraphs (17 paragraphs written individually by the learners in one class, and 8 paragraphs written in pairs by the learners in the other class) and 28 paragraphs, which were written by selected learners, were the material of the study. In other words, each of the two learners selected from the class writing individually were asked to write 7 paragraphs during the semester individually; each of the two pairs selected from the class writing in pairs were asked to write 7 paragraphs during the semester collaboratively.

3.3. Data collection procedures

First of all, the Oxford Placement Test (2001) was administered in both classes. Furthermore, at the outset of the study, the students in both individual and pair writing classes were asked to write a paragraph at the beginning of the course. That is, learners in the class working individually were asked to do the task alone; however, learners in the other class were asked to first select a partner (for the whole semester) and then write the paragraph in pairs. This writing was the basis on which individual learners were selected. That is, two learners from the class writing individually, and two pairs of learners from the class writing in pairs were selected based on the means of CAF features in their writings. Then, to examine their progress and developmental path (in terms of multidimensional variability) of the selected learners, they were asked to write on seven prompts (see Appendix for the prompts) during the semester. It is worth mentioning that the pairs were asked to collaborate in all the writing stages, including generating ideas, relating ideas



together, planning, drafting, and revising their final drafts.

To maintain uniformity, every writing task was timed. However, following Storch (2005), the allotted time was adjusted to suit the collaborative writing condition. Therefore, learners writing individually were given 30 minutes to write each paragraph, and learners writing in pairs were given 40 minutes.

3.4. Data analysis procedures

Adopting Lu's (2011, p. 38) idea that, "a full picture of language development in L2 writing can only be obtained by engaging fluency, accuracy, and complexity measures at various linguistic levels", the present study employed CAF to assess the quality of the participants' written paragraphs. In so doing, first of all, all paragraphs were coded for T-units and clauses. Schneider and Connor (1991) defined T-units as any independent clause and all its required modifiers, or any non-independent clause punctuated as a sentence (as indicated by end punctuation), or any imperative. Then, CAF measures were determined as follows.

3.4.1. General Measures of CAF

Norris and Ortega (2009) defined complexity in terms of subordination, general complexity, and sub-clausal complexity characterized as phrasal elaboration. As they argued, each measure is effective in investigating the complexity in a specific proficiency level. That is, effective coordination shows complexity at the beginning proficiency level, effective subordination indicates complexity at the intermediate and upper-intermediate proficiency levels, and sub-clausal complexity shows complexity at the advanced proficiency level. Since the proficiency level of all the participants of the present study was estimated to be intermediate, subordination measures were used as the predictor of general syntactic complexity. Therefore, general syntactic complexity was investigated through estimating the proportion of clauses to T-units (Foster & Skehan, 1998), and the proportion of dependent clauses to clauses (Wolfe-Quintero, Inagaki & Kim, 1998).

To investigate the accuracy of the participants' writings, the proportion of error-free T-units to all T-units and the proportion of error-free clauses to all clauses were estimated (Wigglesworth & Storch, 2009; Dobao, 2012). The results were expressed in terms of percentages. It is worth mentioning that in the present study,

syntactic errors (e.g., errors in word order, missing elements) and morphological errors (e.g., verb tense, subject-verb agreement, errors in the use of articles and prepositions, and errors in word forms) were considered. Errors concerning the word choice were taken into account when the word used obscured the meaning. However, errors in spelling and punctuation were ignored.

Following Wigglesworth and Storch (2009), fluency of the learners' written paragraphs was estimated in terms of three measures of the average number of words, T-units and clauses per text. It is worth noting that to estimate the average number of words, all the paragraphs were first typed exactly in the same way as they were written manually, and then the number of words in each paragraph was counted automatically by the *Word Count* option in *Microsoft Word* (2010).

To estimate the intra-rater reliability, the second researcher randomly selected 10 sample paragraphs from among those written individually, and 10 sample paragraphs from among those written in pairs. It is worth mentioning that since the number of words in a paragraph was counted automatically, there was no error in its estimation. However, as precision of the estimates of the number of T-units, dependent clauses, overall clauses per text, error free clauses and error free T-units were central in estimating CAF features, the second researcher investigated them again after a four week time span. Then, an agreement index was conducted to estimate intra-rater reliability. The reliability coefficients estimated separately for each measure turned out to be .95, .93, .93, .91 and .91, respectively. Furthermore, to estimate inter-rater reliability, 10 samples were randomly selected from among those written individually, and 10 samples from among those written in pairs. Then, a Ph. D. candidate in TEFL, who was already familiar with the procedures as a result of receiving the necessary training, was asked to code T-units, dependent clauses, overall clauses per text, error free clauses and error free T-units. Finally, agreement indices were estimated to be .93, .90, .94, .89, and .90, respectively.

3.4.2. Specific Measures of Complexity and Accuracy

Following Vyatkina (2013), specific measures of complexity included coordinate structures, complex nominal structures, and verb structures. Therefore, different aspects of syntactic complexity,

including coordinate and subordinate clauses as well as verbal and nominal phrases, were investigated (Norris & Ortega, 2009). Coordinate structures encompassed nominal phrases, predicate phrases and coordinate clauses. Complex nominal structures included attributive adjective phrases, prepositional phrases, nominal clauses, and relative clauses. Nonfinite verb structures included infinitive phrases governed by modal and auxiliary verbs, and past participle phrases. Furthermore, following Re've's, Ekiert and Torgersen (2014), specific measures of accuracy were estimated through considering subject-verb agreement and tense of the verb. Then, suppliance in obligatory contexts (Brown, 1973) was estimated for each of these measures.

Finally, to describe possible variations in the specific and general measures of complexity, accuracy and fluency, dynamic systems perspective was followed. Dynamic systems perspective is not to predict the system's change since many factors (most of which are not identifiable) affect the system. However, it describes the system's characteristics and patterns (Verspoor et al, 2011). Therefore, these measures were plotted for all the cases to show the developmental differences among them.

4. Results

4.1. Development in General Measures of CAF

Inter-individual variability is evident in each of the general measures of CAF presented in Figure 1. As the graphs show, the average lines are somehow ascending; however, some of the participants' performances diverge and those of others converge the average line in each graph.

Furthermore, as Figure 1 show, participants followed different and specific routes of development in each of the general CAF measures. Even the participants who were exposed to similar treatment during the study showed different patterns of development. That is, Individual A and individual B, who wrote their tasks individually, had different routes of development in general CAF measures. Similarly, Pair C and Pair D, who wrote their tasks in pairs, had different routes of development in general CAF measures during the time.

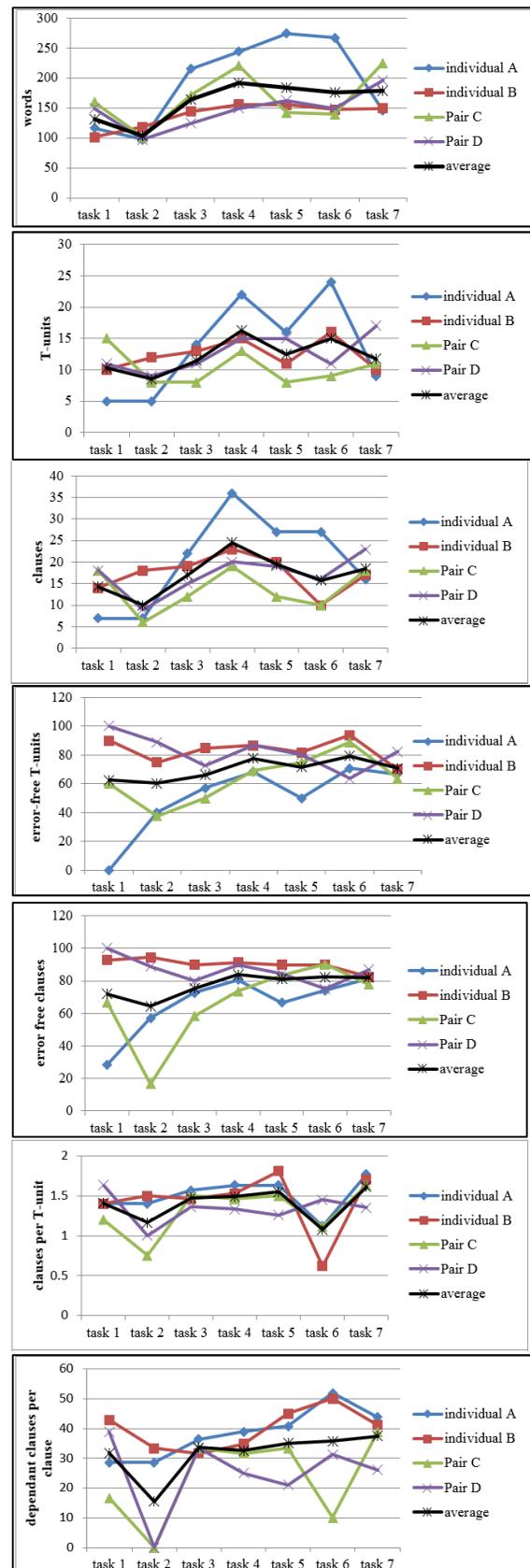


Figure 1: Inter-individual variation and the average for the four participants on general features of CAF over time

Moreover, as the graphs in Figure 1 show, Individual A and Individual B performed with higher fluency and complexity features than Pair C and Pair D. However, in terms of accuracy feature, Individual A and Pair C performed below the average line, and Individual B and Pair D performed above the average line.

4.2. Development in Specific Measures of Complexity

Figure 2 presents summative frequencies of all specific complexity

strategies per clause for the participants. The comparison of the dynamic of the overall column height shows that individual A, pair B, and pair C developed similarly in the first half of the observation, starting at around 1.5 complex structures per clause and gradually increased their frequency at Task 2, and decreased at task 3. Moreover, all the participants used similar proportions of similar strategies at several time points. For instance, they used more complex nominal at all of the tasks. Similarly, they used more coordinate structures than nominal at tasks 1, 2, 3, 5, and 6.

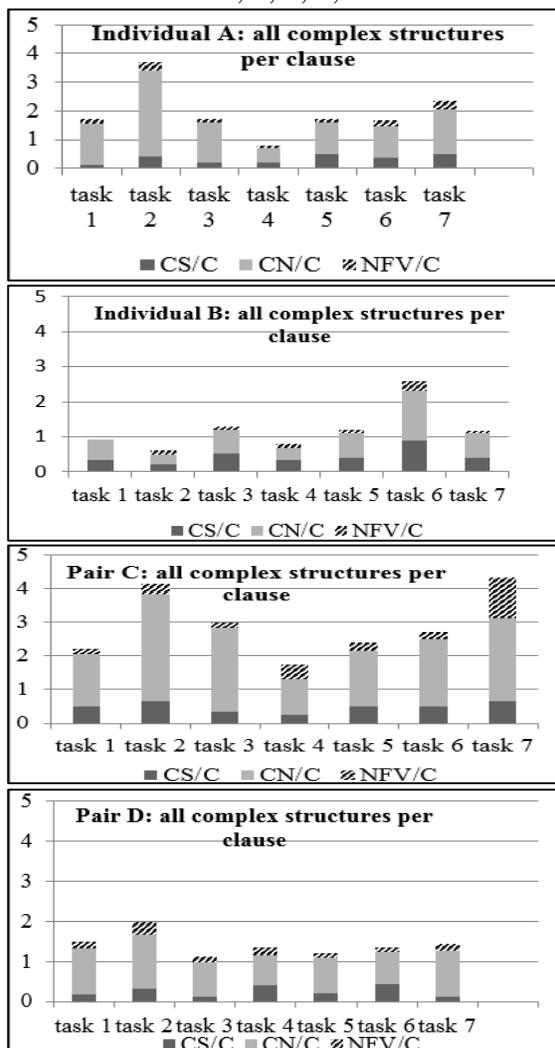


Figure 2: Summative frequencies of coordinate structures per clause (CS/C), complex nominals per clause (CN/C), and nonfinite verb structures per clause (NFV/C)

The column graphs in Figure 3 represent the frequencies and distribution of the coordinate structures per clause by Individual A, Individual B, Pair C and Pair D at each time point. All graphs illustrate upward and downward oscillations, but Individual B's frequencies were almost higher than those of Individual A. Furthermore, Pair C's frequencies were almost higher than those of Pair D. More specifically, Individual B's frequencies ranged from .22 to 0.9 with an average of .44, whereas Individual A's frequencies ranged from .14 to .5 with an average of .33.

In addition, Pair C's frequencies ranged from .26 to 0.66 with an average of .48; whereas, Pair D's frequencies ranged from .13 to .43 with an average of .25. Furthermore, Pair C's frequencies of coordinate structures per clause were higher in most of the tasks than those of Individual A, Individual B, and Pair D.

The analysis of specific coordinate phrases showed that coordinate predicate phrases appeared in almost all learners' texts. That is, learners added more verb forms in their productions. However, Individual B used more predicate phrases than other learners. As for the peak of predicate phrases per clause, it reached the value of .31 at task 7 for Individual A, the value of .5 at task 6 for Individual B, the value of .27 at task 7 for Pair C, and the value of .25 at task 6 for Pair D. Concerning the use of nominal phrases, Individual A used more nominal phrases than Individual B. Moreover, Pair C used more nominal phrases than Pair D. A cross comparison of the graphs shows that Pair C used more nominal phrases than Individual A, Individual B, and Pair D. In addition, the peak of nominal phrases per clause was at task 2 with the value of .28 for Individual A, at task 7 with the value of .35 for Individual B, at task 2 with the value of .5 for Pair C, and at task 6 with the value of .12 for Pair D.

Furthermore, the analysis of coordinate clauses per clause shows that almost all learners used them in their productions. However, frequency of coordinate clauses per clause was greater in Individual B's writing than those of Individual A, Pair C, and Pair D. More specifically, frequency of coordinate clauses per clause for Individual B reached a peak at Task 3 with the value of .36. Although the dynamic for all learners fluctuates, for Individual A, the peak value of coordinate clauses per clause was 0.19 at task 4, for Pair C, it was 0.11 at tasks 1 and 7, and for Pair D, and it was .22 at task 2.

In sum, there were upward and downward oscillations in the learners' use of coordinate structures. Individual A, Individual B, Pair C, and Pair D used more coordinate phrases (nominal and predicates), but fewer coordinate clauses per clause in most of the tasks, especially in the final third of the observation period.

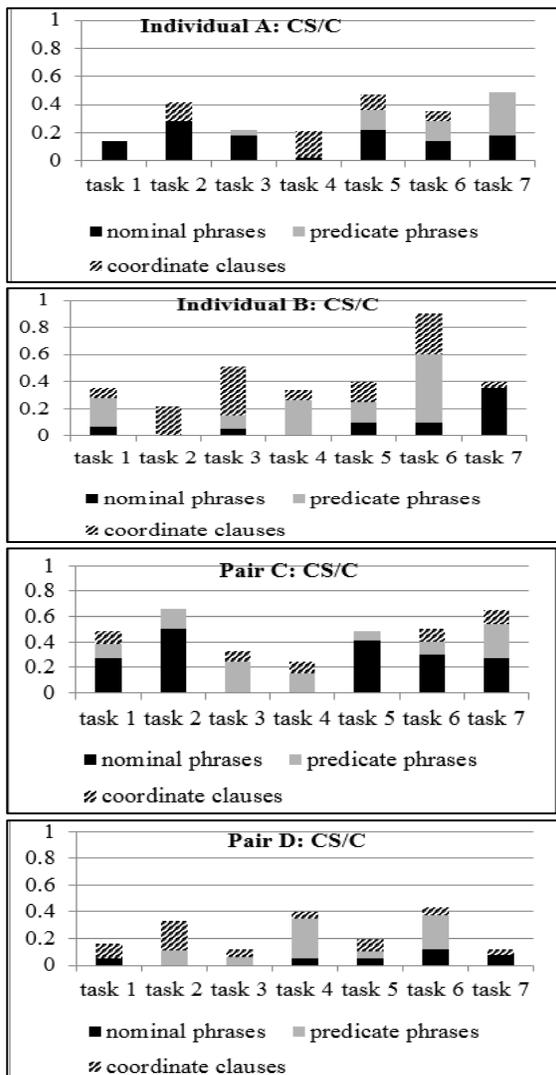


Figure 3: Frequencies of coordinate structures per clause (CS/C)

Moreover, although the frequencies of complex nominal structures per clause oscillate, the overall column height in Figure 4 shows that Individual A used more complex nominal structures per clause in almost all of the tasks than Individual B; Pair C used more complex nominal structures per clause in most of the tasks than Pair D. Moreover, Pair C used the most complex nominal structures per clause in all of the tasks; the peak of the production of complex nominal structures per clause appeared at task 2 with the value of 3.16.

Concerning the investigated types of complex nominal structures (adjective phrase, prepositional phrase, nominal clause, and relative clause), adjective phrase was more dominantly used by the learners. The means of adjective phrase per clause used were 1.31, .57, .52, .24 for Pair C, Individual A, Pair D, and Individual B, respectively. Therefore, as Figure 4 shows, Pair C used more adjective phrases per clause than the other learners. Furthermore, as the graphs in Figure 4 show, the second most frequently used complex nominal structures was prepositional phrase. The peak of production of prepositional phrase per clause by Individual A was at task 2

with the value of 1.85; for Individual B, it was at task 3 with the value of .26; for Pair C, it was at task 3 with the value of .91; for Pair D, it was at task 1 with the value of .61. Moreover, a brief look at all the graphs in Figure 4 shows that Pair C used more prepositional phrases per clause than the other learners.

As Figure 4 shows, relative clause is the third dominantly used complex nominal structure in all learners' productions. The peak of this structure per clause was at task 2 with the value of .28 for Individual A, at task 5 with the value of .35 for Individual B, at task 7 with the value of .22 for Pair C, and at task 3 with the value of .26 for Pair D. Furthermore, the cross comparison of all the graphs in Figure 4 shows that Individual A used more relative clauses per clause than the other learners.

As it is evident in Figure 4, nominal clause is the least frequently used complex nominal structure by all of the learners. However, Individual B used more nominal clauses per clause than the other learners. More specifically, the means of the used nominal clauses per clause were .05, .1, .03 and .03 for Individual A, Individual B, Pair C, and Pair D, respectively. Moreover, in the productions of Individual B, the peak of nominal clauses per clause was at task 6 with the value of .2.

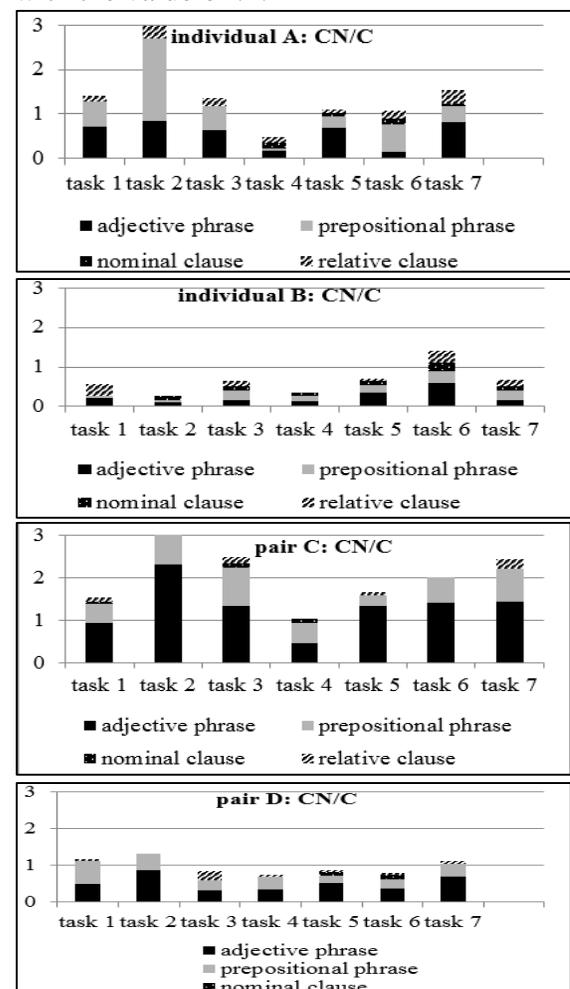




Figure 4: Frequencies of complex nominal structures per clause (CN/C)

The comparison of the use of nonfinite verb structures by learners (Figure 5) shows that Individual A used more nonfinite verb forms per clause than Individual B. Furthermore, Pair C used more nonfinite verb forms per clause than Pair D. Both graphs of Individual A and Pair C had a peak at task 7. Both Individual A and Pair C used only one nonfinite verb strategy at each particular time point except for task 2, task 6, and task 7 (in Individual A's graph), and task 4, task 6, and task 7 (in Pair C's graph), where they used both infinitive and participle verb phrases. However, Pair C outperformed Individual A in the use of nonfinite verb structures.

It should be noted that although Individual B and Pair D used fewer nonfinite verb structures than Individual A and Pair C, their productions contained more balanced combination of the varieties of this category.

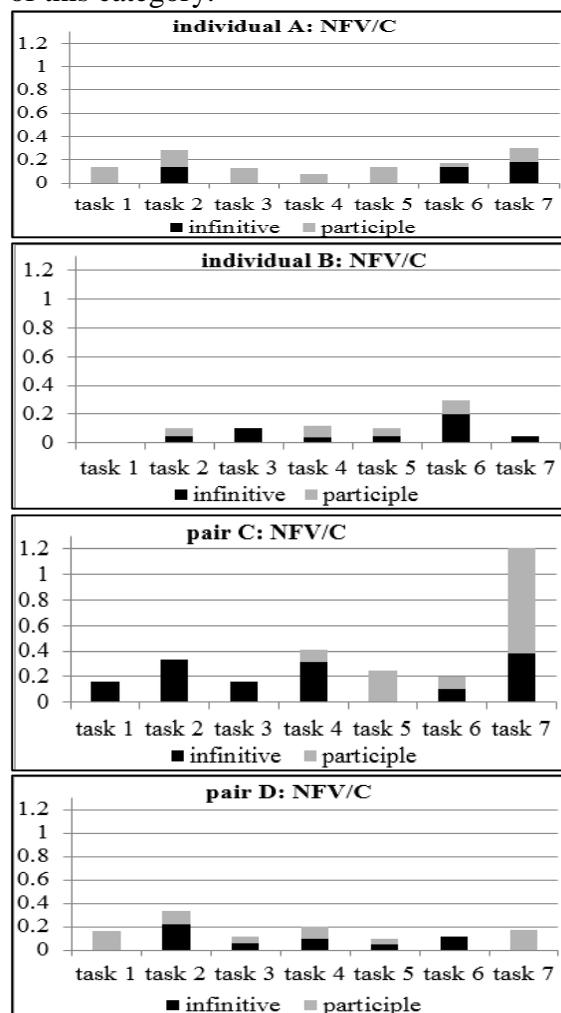


Figure 5: Frequencies of nonfinite verb structures per clause (NFV/C)

4.3. Development in Specific Measures of Accuracy

The column graphs in Figure 6 show the frequencies and distribution of specific accuracy features (subject-verb agreement and verb tense) by learners at each time point. The graphs indicate that all the

participants paid attention to these specific accuracy features in their productions. However, Individual B's frequencies are greater than those of Individual A, Pair C, and Pair D. As for the peak of subject-verb agreement, it reached the value of .94 at task 3 for Individual A, the value of 1 at tasks 1 to 6 for Individual B, the value of 1 at tasks 1, 3, 4, 6 and 7 for Pair C, and the value of 1 at tasks 1, 2, and 5 for Pair D. Concerning the peak of verb tense, it reached the value of .92 at tasks 5 and 6 for Individual A, the value of 1 at tasks 1, 2, 6 and 7 for Individual B, the value of 1 at tasks 1 and 6 for Pair C, and the value of 1 at tasks 1 and 2 for Pair D.

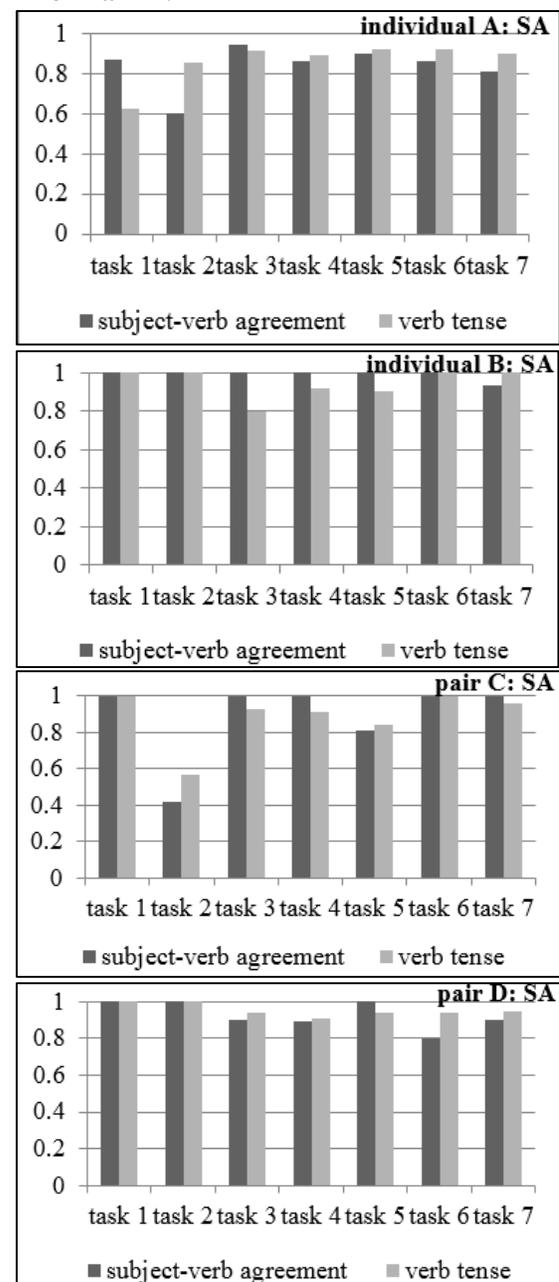


Figure 6: Frequencies of specific accuracy measures

5. Discussion

Each of the graphs showing learners' development in terms of general CAF measures showed oscillations. This supports dynamic systems theory, which advocates nonlinearity of the developmental process. In addition, according to this theory, a complex and

dynamic system is one that changes with time. Therefore, language proficiency aspects (i.e. complexity, accuracy and fluency) change over time. That is, variability observed in the learners' productions is considered a norm (Larsen-Freeman, 2009; Verspoor, Lowie & Van Dijk, 2008).

Moreover, as noticed above, in each of the graphs depicting the learners' performances in terms of general CAF measures, the average of the participants' performance in each of the tasks was estimated and plotted. The average curves differed from each of the curves showing the learners' performances. In other words, learners did not follow the same developmental route in each of the general measures of CAF as that of the group (i.e. the average line). Therefore, what Larsen-Freeman (2006) and Bot et al. (2007) mentioned regarding the importance of describing individual performances due to their possible differences from the group performance was well supported.

Concerning the learners' development in terms of general measures of CAF, the graphs showed that Individual A and Individual B performed more fluently than Pair C and Pair D. Similarly, the learners writing individually outperformed the pairs during the semester in terms of general measures of complexity. However, no clear pattern emerged in terms of general accuracy measures; Individual B and Pair D (the ones who did not do so well in terms of general fluency and complexity measures) performed more accurately during the semester, respectively. Accordingly, trade-off hypothesis (Larsen-Freeman, 2009; Skehan, 2009) may be said to be supported. That is, the trade-offs among CAF features were due to the learners' limited capacities to pay attention to all features of language simultaneously. Therefore, due to the limited attention resources, learners might have paid attention to one of the features of CAF more than the others (Skehan, 2009). In this vein, Individual B and Pair D outperformed the others in terms of general accuracy feature, but not in general fluency and complexity features.

Although no case study comparing the development of learners writing individually and those writing in pairs was found in the literature, some parts of what mentioned in the previous paragraphs are consistent with some cross-sectional studies comparing the performance of a group of learners writing individually and a group writing in pairs. For instance, Storch (2005)

showed that the fluency of the texts produced by the pairs was less than that of individuals' productions. Similarly, Dobao (2012) revealed that learners writing individually produced longer texts than learners writing in pairs because the learners writing in pairs needed to devote more time to agree on both the content of their texts and the language in their writings.

However, the results of the present study concerning complexity and accuracy measures are inconsistent with those of Storch's (2005) study in that in his study, pairs outperformed in general complexity and accuracy features. Similarly, the results of the present study differ from those of Dobao (2012) which supported the positive effect of collaboration in pairs on the linguistic accuracy of learners' written texts, but found no differences between the group writing individually and the group writing in pairs in terms of syntactic complexity.

The use of different proportions of specific complexity features by each learner can also be related to the complexity theory. That is, due to limited attention capacity, learners were not able to consider all of the specific complexity measures simultaneously. For instance, Individual A used more complex nominal structures than coordinate structures and nonfinite verb structures in 7 tasks (Figure 2). Therefore, it may be claimed that complexity theory is not just a competition between CAF features; it may also emerge within specific measures of each of CAF feature. Furthermore, lack of balanced use of specific complexity measures in the performances of each of the learners may also indicate that the learners' syntactic complexity system was developing, and was not stabilized (Verspoor et al, 2011).

Moreover, the use of different amounts of coordinate structures (a specific complexity measure) by the learners can be related to what Byrnes, Maxim and Norris (2010) mentioned regarding the characteristics of less advanced and more advanced writers. According to them, less advanced writers combine clauses within sentences; however, learners who are more advanced in writing use more phrasal elaboration in the sentences they write. In this vein, it could be said that among the learners studied, Individual A and Pair C, who used more coordinate phrases, were at a more advanced stage.

In addition, various frequencies of the use of complex nominal structures by



learners might be related to the learners' exposure to each structure in their curriculum. In other words, the participants in the present study (who were in their third semester during the study) had been directly instructed adjective phrases and prepositional phrases in their first semester; however, they had received explicit instruction on nominal clauses and relative clauses in their second semester. That is, the learners had learned adjective phrases and prepositional phrases before they learned nominal clauses and relative clauses. This may account for their greater use of adjective phrases and prepositional phrases than nominal and relative clauses in their productions.

Concerning specific accuracy measures (i.e., subject-verb agreement and verb tense), the productions of each of the learners were nearly balanced, which shows a somehow stabilized accuracy system in the learners studied (Verspoor et al., 2011).

Finally, concerning the consistency of the development of learners in terms of general and specific measures of each of accuracy and complexity features in the present study, those who outperformed in terms of general measures of accuracy (Individual B and Pair D, respectively) outperformed in terms of specific accuracy measures as well. That is, there were consistent results in terms of general and specific accuracy measures. However, although it was shown that learners writing individually outperformed in terms of general measure of complexity, this developmental pattern was not evident in terms of specific complexity measures (Figure 2); Pair C outperformed in terms of specific complexity measures. Thus, as Norris and Ortega (2009) mentioned, it is important to investigate both general and specific measures of language proficiency to gain a more detailed picture of the learners' developmental path.

6. Conclusion

This study presented detailed developmental profiles of two learners writing individually and two pairs writing collaboratively in terms of general CAF measures and specific syntactic complexity and accuracy. The graphs depicting learners' development showed similarities and differences between learners' patterns of development. The analysis of the learners' performances in terms of general CAF measures showed that the learners writing individually (Individual A and Individual B) outperformed in terms of

general fluency and complexity features during the 7 tasks. However, no clear distinction emerged in terms of general accuracy measures. Furthermore, the graphs showed that the pairs writing collaboratively outperformed in specific complexity measures.

In sum, this study added to the knowledge gained through the longitudinal studies on second language development. Specifically, the study showed interlanguage development at intermediate proficiency levels. It provided detailed developmental patterns of learners in different writing conditions (i.e., individual and collaborative) in terms of general and specific CAF measures, an underexplored area.

Finally, further research is needed to provide a more comprehensive account of the issue under study. Future investigations can replicate this study while analyzing more sample writings or more cases. Furthermore, further research can analyze general and specific CAF measures in learners cross-sectionally and longitudinally, and then compare the results of cross-sectional and longitudinal data. Moreover, the development of learners' performance in terms of general and specific measures of CAF can be investigated using different proficiency level participants.

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Appendix: Prompts of the tasks

- Task 0: What is your idea about friendship?
- Task 1: Write about a place you visited.
- Task 2: Write about a problem you had at the school
- Task 3: What is your favorite TV program?
- Task 4: Do you agree that honesty is the best policy?
- Task 5: Describe your favorite person.
- Task 6: How can one lose weight?
- Task 7: Define and classify natural resources.