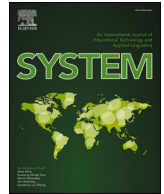




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Nonlinearity and inter- and intra-individual variability in the extent of engagement in self-reflection and its role in second language writing: A multiple-case study

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ABSTRACT

Self-regulation plays an important role in second language (L2) writing development (Wilby, 2020; Teng & Zhang, 2020). Hence, engagement in self-regulation is of crucial importance for successful writers (Cleary & Zimmerman, 2012). Self-reflection, one of the three phases of self-regulation (Zimmerman, 2000), was found to be the most paramount phase in L2 writing development (Nitta & Baba, 2014). Nevertheless, there is a scarcity of studies investigating engagement in self-reflection and longitudinal L2 writing development. This multiple case-study employed a time-series analysis to explore the temporal and dynamic changes in the extent of engagement in self-reflection and its possible role in L2 writing development. Six Hungarian English as Foreign Language (EFL) learners composed seven argumentative essays over a seven-month period, one in each month. After finishing the compositions, the participants were asked to comment on the quality of their essays. The essays were analysed for linguistic complexity indices, while the interviews were coded for self-reflective comments. This study found that as the six participants became more engaged in self-reflection, slight improvements were detected in linguistic complexity indices over time. However, both engagement in self-reflection and L2 writing development showed nonlinearity and inter- and intra-individual variability over time.

1. Introduction

Studying at foreign universities has gained popularity in Hungary since the country's accession to the European Union in 2004. The most popular destinations, such as the United Kingdom, Germany, Denmark, and the United States (Wynn, 2018), are selected according to university rankings such as the Times Higher Education World University Rankings (Times Higher Education World University Rankings, 2019) and their geographical proximity to Hungary. Prospective non-native university students of English are required to take an international standardised language proficiency test such as the International English Language Testing System (IELTS) or the Test of English as a Foreign Language (TOEFL) to study at a university in the United Kingdom or in the United States. Although there is a difference in the entry requirements for prospective students at UK universities, most prestigious universities in the UK require a 6.5 overall band score (B2+ CEFR level) (Hyatt, 2012).

Academic writing is one of the four skills tested in the IELTS or TOEFL and takes one fourth of the overall band score. However, academic writing was the weakest skill for all test takers in 2017 (Pearson, 2019) and for test takers whose first language was

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Hungarian in 2012 (IELTS Test taker performance, 2012). In addition, recent research showed that only a third of the Hungarian university students possesses the ability and the willingness to control their writing processes (Csizér & Tankó, 2017), although L2 writers need to employ several self-regulatory strategies, such as self-reflection, during the composition of a writing task (Kormos, 2012).

Successful self-regulation requires students' active engagement in the three phases (forethought, performance, and self-reflection) of self-regulation (Cleary & Zimmerman, 2012). Research on the longitudinal development of self-regulation and L2 writing found mixed results. Some studies found that L2 writing develops, while self-regulation stagnates over time (Wilby, 2020), while other studies found parallel development of self-regulation and L2 writing (Nitta & Baba, 2014; Teng & Zhang, 2020). In a longitudinal study on self-regulation and L2 writing, Nitta and Baba (2014) found that self-reflection played the most important role in L2 writing development.

In the field of SLA research, self-reflection is often used interchangeably with self-assessment (SA) and self-evaluation. Research on the effects of self-assessment on L2 writing development has tended to adopt a pretest-posttest research design (Birjandi & Tamjid, 2012; Teng & Zhang, 2020; Wilby, 2020) being unable to uncover the dynamics of self-reflection and L2 writing. However, according to the Complex Dynamic Systems Theory (CDST), language acquisition is seen as a complex dynamic process (de Bot et al., 2007; Larsen-Freeman, 1997). In other words, language learning process is nonlinear and there is variability among individuals and within an individual during the learning process (Larsen-Freeman, 2006). In addition, Zhang (2010) argued that metacognition, such as self-reflection, might be a dynamic construct. Therefore, there is an urgent need to understand the dynamics of students' engagement in self-reflection and L2 writing.

This study investigated the dynamics of students' engagement in self-reflection and L2 writing development by collecting both quantitative and qualitative longitudinal data from six Hungarian EFL learners who were preparing for their IELTS language test. Self-reflection was operationalized by the participants' engagement in self-reflection, while L2 writing was operationalized by the development of linguistic complexity. It was expected that both the extent of engagement in self-reflection (EESR) and linguistic complexity indices would show nonlinearity and inter- and intra-individual variability over time. In other words, the developmental trajectories of self-reflection and linguistic complexity indices will fluctuate over time. One specific learner's developmental trajectory of self-reflection and linguistic complexity will be different (intra-individual variability). In addition, one specific learner's developmental trajectory of self-reflection and linguistic complexity will be different from other learners' developmental trajectories of self-reflection and linguistic complexity (inter-individual variability).

2. Literature review

2.1. Complex Dynamic Systems Theory

Complex Dynamic Systems Theory (CDST) posits that language can be viewed as a complex dynamic system consisting of a set of interacting variables (de Bot et al., 2007). Furthermore, language acquisition is seen as a dynamic process (de Bot et al., 2007; Larsen-Freeman, 1997). In other words, language development is nonlinear and variable (Larsen-Freeman, 2006).

The concept of nonlinearity has been extensively researched in the field of SLA. For example, linguistic complexity and accuracy have been shown to develop nonlinearly over time (Larsen-Freeman, 2006; Verspoor et al., 2004; Wind, 2014, 2020). Verspoor et al. (2004) found that learners' writing development showed ebbs and flows over time. In other words, learners did not improve their writing in a linear fashion. In addition, Piniel and Csizér (2014) found that motivation, anxiety, and self-efficacy display nonlinear trajectories over time. Apart from developing nonlinearly, complex dynamic systems show variability over time (de Bot et al., 2007).

Variability and fluctuations are important features of complex dynamic systems (Thelen & Smith, 1994; van Geert & van Dijk, 2002). Learners progress through stages of development in an inconsistent manner (Larsen-Freeman, 2006), since variability is inherent to a complex dynamic system (de Bot et al., 2007). There might be a great deal of variability in learners' performances at one specific time over the course of development. However, there are certain periods, called attractor states, in which variability is relatively low (Wind & Harding, 2020).

Larsen-Freeman (2006) claimed that variability should not be dismissed as measurement error but instead variability should be investigated. A classic study on variability is of Larsen-Freeman's (2006) who examined the oral and written production of five Chinese learners of English. She found that there were no two learners who had gone through the same development path. CDST has been proved to be a fruitful perspective to the study of SLA (Hiver, Al-Hoorie, & Evans, 2021); therefore, it is not surprising that it has been adopted to other related areas such as psycholinguistics (Dörnyei et al., 2014) and self-regulation (Oxford, 2017).

2.2. Self-regulation from a social cognitive perspective

Self-regulatory processes, such as planning, self-evaluation, and adaptation, play an important role during a writing activity (e.g., Bereiter & Scardamalia, 1987; Flower & Hayes, 1980; Rohman, 1965). More precisely, high levels of self-regulation are essential for successful writing since writing activities are generally self-planned, self-initiated and self-sustained (Zimmerman & Kitsantas, 2007). According to a social cognitive perspective, self-regulatory processes, or "systems" (Zimmerman, 2000), and accompanying beliefs involve three cyclical phases: *forethought*, *performance* or *volitional control* and *self-reflection* processes (Schunk & Zimmerman, 1998). Zimmerman and Kitsantas (2007) claimed that the cyclical model of self-regulation includes both sources of motivation and cognitive processes in a cyclical feedback loop in which writing outcomes are utilized to adjust and guide future efforts to write.

According to the cyclical model of self-regulation by writers (CMSRW), *forethought* phase processes (e.g., task analysis, goal

setting, and strategic planning) and sources of motivation (e.g., self-efficacy, outcome expectancy, task interest, and goal orientation) prepare learners to engage in writing. Zimmerman and Kitsantas (2002) applied the CMSRW to the study of writing and demonstrated that the forethought phase can be paired with the planning phase in writing. Writers need to set goals, employ planning strategies, analyse task requirements, and collect background information for the writing task in the forethought phase (Manchón & Roca de Larios, 2011). Writers' interest, self-efficacy beliefs influence attention, effort and time allocated to the various phases of composing (Kormos, 2012).

Performance phase processes (e.g., self-control, attention focusing, and metacognitive monitoring) affect learners' attention, volition, and writing behaviour. In addition, performance phase processes provide input for self-reflection phase judgments. Kormos (2012) claimed that the performance phase is relevant for both the translation and planning phases of writing since translation and planning are usually cyclical and parallel processes in writing.

Self-reflection phase processes (e.g., self-judgment, self-evaluation, causal attribution, self-reaction, and self-satisfaction) affect forethought cyclically in connection with future efforts to write. Self-reflection phase can be matched with the monitoring phase of writing since writers need to self-evaluate their own writing processes and outcomes (Zimmerman, 2000). L2 writers need to monitor the appropriateness of the content, the organization, and the form of their own written outcome and revise accordingly. Kormos (2012) pointed out that monitoring and revising involve both cognitive and affective processes in which writers need to self-evaluate their own written product. Positive self-evaluations might encourage writers to engage in subsequent revisions and writing activities, while negative self-evaluations might negatively influence task engagement (Zimmerman & Kitsantas, 2002). Kormos (2012) claimed that CMSRW is useful in explaining how motivational variables might affect the L2 writing processes. L2 writers need to employ successful self-regulatory strategies, such as controlling attention, anxiety, boredom, and the environment.

Zimmerman's (2000) CMSRW was reinterpreted by Oxford (2017) who created the Strategic Self-regulation (S²R) Model which includes self-regulation and strategies and unites sociocultural and psychological aspects of self-regulated learning. Apart from adding an inner context (e.g., domain-related prior knowledge, cognitive style, self-efficacy beliefs, agency, autonomy, mindset, resilience, and hope) and a sociocultural context (e.g., relationships with the teacher and peers, physical resources, cultural beliefs, and values) to the CMSRW, Oxford (2017) claimed that there is feedback and interaction among the three phases of self-regulation and learners usually follow the phases in a nonlinear order. In a longitudinal study on self-regulation and personality, Jackson and Park (2020) demonstrated that self-regulation develops nonlinearly interacting with conscientiousness and neuroticism. However, successful self-regulation requires learners to engage actively in these processes (Cleary & Zimmerman, 2012).

2.3. A cyclical self-regulatory account of student engagement

Effective self-regulation requires learners' engagement in forethought, performance and self-reflection phases (Zimmerman, 2000). Cleary and Zimmerman (2012) defined self-regulatory engagement as "the extent to which individuals think strategically before, during, and after performance on some learning activity" (p. 241). In the field of SLA and educational psychology, student engagement has usually been conceptualised as a multifaceted construct including affective, behavioural, and cognitive engagement (Fredricks et al., 2004; Philp & Duchesne, 2016). Affective engagement refers to students' affective and emotional responses to their teachers, peers and institutions, while behavioural engagement denotes the extent to which students become involved in activities and task. Finally, cognitive engagement refers to students' mental and cognitive investment in processing information and ideas, and executing tasks.

Cognitive engagement refers to the active use of appropriate self-regulated strategies to assist cognitive mental processes (Philp & Duchesne, 2016). According to Helme and Clarke (2001), cognitive engagement denotes learners' deliberate allocation and maintenance of attention in their intellectual effort. Zimmerman (2000) also pointed out that self-reflection is a multicomponent cognitive process which involves different sub-processes such as self-evaluation, causal attributions and adaptive inferences. Self-evaluation is the initial cognitive dimension of self-reflection in which learners compare their actual performance on a specific task to some standard (Cleary & Zimmerman, 2012). However, studies on self-regulation interventions emphasize the use of self-related self-evaluation standards, such as improvement from previous performance (e.g., Cleary et al., 2008; Graham & Harris, 2005). Self-evaluation standards are considered optimal since students' attention and cognition are shifted towards indicators of personal progress or the effectiveness of their own learning strategies. Conversely, when learners' grades are publicly shown (i.e. normative comparisons), students' attention will usually shift to variables that are often unrelated or unnecessary to their personal success such as lack of personal ability (Schunk et al., 2008).

2.4. Empirical studies on self-regulatory processes and L2 writing development

There is a scarcity of studies investigating the longitudinal development of self-regulation and L2 writing, and the findings are mixed. Some studies found nonparallel development of self-regulation and L2 writing. For example, Wilby (2020) investigated the changes in 64 international students' writing motivation, self-regulation and writing task scores over the course of a pre-sessional English for academic purposes (EAP) programme. By adopting a quasi-experimental pretest-posttest research design, Wilby (2020) found that motivation and self-regulation strategy use did not change over time, except for the scores on the writing tasks.

There are some studies which found parallel development of self-regulation and L2 writing. For example, in a quasi-experimental research Teng and Zhang (2020) found that 39 Chinese learners became more active in using a large array of self-regulatory strategies and improved their L2 writing after receiving self-regulatory strategies-based writing instruction over five months. In a longitudinal mixed-methods study, Sasaki et al. (2018) found that Japanese L2 learners improved their L2 writing strategies (global and local

planning) and their L2 writing abilities. By adopting Oxford's (2017) S²R, Sasaki et al. (2018) revealed that developmental trajectories of global and local planning were differentially influenced by other cognitive and environmental factors at both group and individual levels. In another study on self-regulation in the evolution of the Ideal L2 self, Nitta and Baba (2014) found that their two focal participants' self-regulatory processes played an important role in the development of ideal L2 self and L2 writing. More importantly, it was found that self-reflection, or self-evaluation as they termed, played a more important role than the other phases of self-regulation in relation to L2 writing development. Self-regulatory processes were not only demonstrated to take place within the performance of a task, but they could be extended to longer periods of classroom learning (Nitta & Baba, 2014).

There is one case study which found no improvements in self-regulation and L2 writing. Wind and Harding (2020) found that one specific learner did not employ self-regulatory strategies successfully resulting in minor changes in L2 writing development. Wind and Harding (2020) attributed the stagnation of self-regulation and L2 writing to the emergence of salient attractor states in the participant's motivational system.

2.5. Empirical studies on self-reflection and L2 writing development

Self-regulated learning is closely related to self-assessment which is defined as self-generated feedback that promotes learning and improvements in learners' performance (Andrade, 2019). Brown and Harris (2014) suggest that self-assessment should not be treated as an assessment, but as an indispensable competence for self-regulation. Andrade (2019) claimed that SA processes are both practically and conceptually identical with the self-reflection phase in Zimmerman's (2000) CMSRW. Several studies found encouraging results regarding the potential role of self-assessment in promoting self-regulated learning and achievement (e.g., Al-Rawahi & Al-Balushi, 2015; Panadero et al., 2012, 2013).

There has been a dearth of studies investigating the longitudinal development of self-assessment and L2 writing. For example, Birjandi and Tamjid (2012) found positive associations between self-assessment and L2 writing development in their quasi-experimental study on 157 intermediate Teaching English as Foreign Language (EFL) students over one semester. Likewise, Zheng et al. (2012) found that self-assessment training contributed to L2 writing development in a study on 189 non-English major Chinese students' performance over an 8-week period.

Both Birjandi and Tamjid (2012) and Zheng et al. (2012) focused on the accuracy or "consistency" (Andrade, 2019) of self-assessment and adopted a pretest-posttest research design. However, Andrade (2019) pointed out that less research is needed on the accuracy of self-assessment. Instead, future studies should look at the internal mechanism that learners experience by engaging during the assessment of their own performance.

2.6. Empirical studies on student engagement

Research has tended to focus on behavioural engagement rather than on affective and cognitive engagement (Hiver, Al-Hoorie, Vitta, & Wu, 2021). Therefore, we have limited knowledge concerning L2 student engagement in self-reflection. However, there is one case study by Nitta and Baba (2018) which explored how two learners' use of self-regulation related to changes in L2 writing over 30 weeks. The two learners composed a 10-min timed-writing task with self-reflection on a weekly basis. The self-reflections were coded for self-regulatory processes, while engagement was measured by the number of Japanese characters in the self-reflections. The first learner demonstrated more elaborate engagement and employed more elaborate self-regulatory processes; hence more improvements were found in her L2 writing. Conversely, the second learner showed limited engagement and used less elaborate self-regulatory processes which resulted in little change in his L2 writing. Although Nitta and Baba's (2018) study nicely shows how longitudinal engagement in self-regulation changes over time, their study includes only two focal learners and engagement was operationalized by writing self-reflections. However, Zhou et al. (2021) and Reschly and Christenson (2012) claimed that engagement interviews might provide a deeper insight into learners' cognitive processing.

2.7. Research gap

Not only is there a scarcity of studies looking at the longitudinal co-development of self-regulation and L2 writing, most studies (Teng & Zhang, 2020; Wilby, 2020) adopted a pretest-posttest research design being unable to uncover the dynamics of the two constructs. Although three studies (Nitta & Baba, 2014, 2018; Sasaki et al., 2018) could successfully demonstrate the dynamics of self-regulation, Sasaki et al. (2018) looked at writing strategies, whereas Nitta and Baba (2014) focused on the coadaptation between the Ideal L2 self and self-regulation and Nitta and Baba (2018) on task-repetition. Moreover, in the field of self-assessment of L2 writing, most studies have adopted a pretest-posttest research design (Birjandi & Tamjid, 2012; Zheng et al., 2012). Hence, our knowledge is limited regarding the dynamics of engagement in self-reflection and L2 writing development. However, Zhang (2010) claimed that metacognitive abilities, such as self-reflection, might be a dynamic construct. Following Nitta and Baba's (2014) recommendation that self-reflective processes play an important role in L2 writing development, this study investigated the extent of engagement in self-reflective processes and L2 writing development over seven months collecting data from six Hungarian EFL learners.

2.8. The present study

This study forms part of a larger project which adopted a CDST approach to trace the development of linguistic complexity among a group of Hungarian EFL university students over a nine-month period (Wind, 2018). By applying a mixed-method, longitudinal

multiple case study research design, the study explored the dynamic changes in the engagement in self-reflection and L2 writing. I will address the following research questions:

1. How do the extent of the six learners' engagement in self-reflection and the linguistic complexity indices in the six learners' essays change over the seven-month investigation?
2. Is there inter- and intra-individual variability in the six learners' extent of engagement in self-reflection and linguistic complexity indices over the seven-month investigation?
3. How do the six learners' extent of engagement in self-reflection and linguistic complexity indices interact over the seven-month investigation?

3. Method

3.1. Research context

This study was carried out in an IELTS preparatory course at a private institute in Budapest. The primary aim of the course was to prepare the students for academic study abroad, preferably in the United Kingdom. The IELTS course was mainly targeted at students with IELTS scores of 5.5–6.5 (B2 on the CEFR). During the IELTS course, students received 3 h of in-class teaching per week. The IELTS course adopted a task-based approach and comprised two modules: (1) academic reading and writing, (2) academic listening and speaking. During the classes the students completed IELTS-type language tests and vocabulary tasks. The participants for this study were selected from the students of the IELTS preparatory course.

3.2. The participants

The six participants attended the IELTS preparatory course offered by a private institute in Budapest. The total number of students of the IELTS course was 15. Initially, data were collected from the 15 participants. However, only six learners produced the entire data set (seven essays and seven interviews). Therefore, the remaining participants' data were not analysed for this study. The participants were not remunerated to take part in this study. It turned out during the interviews that the participants considered their participation as an extra opportunity to practise the language during the interviews. The participants' (five female, and one male) ages ranged between 18 and 25. The participants' mother tongue was Hungarian, and they had learnt English as a foreign language in their primary or secondary schools before. [Table 1](#) shows the details of the participants.

3.3. Data collection

This study adopted a mixed method case study research design. According to [Johnson and Onwuegbuzie \(2004\)](#), mixed methods research is characterised by methodological pluralism and eclecticism. [Taguchi \(2018\)](#) also called for the adoption of mixed methods research to simultaneously investigate patterns of change over time and reveal individual and contextual factors which might affect the patterns being observed. In this study, the quantitative data were the 42 IELTS-type argumentative essays composed by the six participants, while the qualitative data were the 42 semi-structured interviews conducted with the participants after the compositions of the essays. The length of the observation period was determined by the IELTS course the participants attended.

The writing prompts for the seven argumentative essays were all related to the topic of 'foreign language learning', a topic considered relevant and familiar to the participants. The participants were required to write the seven argumentative essays, one in each month. The essays were written by hand in the classroom and the use of word-processing software, dictionaries, and reference materials was not permitted. The students were asked to work individually and to produce a written sample (at least 250 words) in approximately 40 min. The researcher did not give feedback on the learners' seven written samples during the data collection procedure. However, the instructor gave feedback on other written assignments during the IELTS programme. The order of the tasks was counterbalanced by employing a balanced Latin square design (see [Table 2](#)). Therefore, none of the participants completed the writing tasks in the same order and at the same time.

The final mini-corpus (11360 words) consisted of 42 essays composed by the six participants over a seven month period ([Table 3](#)).

The qualitative data consisted of 42 retrospective semi-structured retrospective interviews collected over the seven-month investigation. In the field of SLA, student engagement is usually assessed by conducting interviews ([Fan & Xu, 2020](#); [Hiver, Zhou,](#)

Table 1
Participants.

Code	Age	Sex	School
A	18	female	secondary school
B	19	female	university
C	22	female	university
D	22	male	university
E	22	female	university
F	25	female	university

Table 2
Data collection.

Participant	Data points						
	1	2	3	4	5	6	7
A	1	2	3	4	5	6	1
B	2	3	4	5	6	1	2
C	3	4	5	6	1	2	3
D	4	5	6	1	2	3	4
E	5	6	1	2	3	4	5
F	6	1	2	3	4	5	6

Table 3
Word count.

Participant	Data points							Total
	1	2	3	4	5	6	7	
A	282	288	209	244	209	209	274	1715
B	261	291	250	257	261	260	241	1821
C	227	213	253	233	226	219	230	1601
D	323	268	282	303	275	277	297	2025
E	316	238	271	357	327	216	293	2018
F	305	326	421	327	274	274	253	2180
	1714	1624	1686	1721	1572	1455	1588	11360

Tahmouresi, Sang, & Papi, 2020; Zhang & Hyland, 2018; Zhou et al., 2021). Zhou et al. (2021) pointed out that interviews are ideal to collect in-depth information on cognitive engagement. Another advantage of interviews, especially retrospective interviews, is that the researcher can gain insight into learners' cognitive component of engagement (Reschly & Christenson, 2012). The interviews were recorded with an mp3-player. The aim of the retrospective interviews was to measure the participants' engagement in self-reflection. During the retrospective interviews the participant commented on the quality of their essays and compared the day's essay with previous essay(s).

3.4. Quantitative data analyses

The quantitative data analyses involved five stages: (1) computing the linguistic complexity indices, (2) plotting the indices, (3) adding 2-period moving averages (MA) to the trajectories to show the trend lines, (4) normalizing the data to compare trajectories that are not presented on the same scale and (5) calculating correlations (Verspoor et al., 2011). Before data coding, the seven hand-written essays were digitalized by the researcher in order to prepare for the computational analyses.

Lexical complexity, a multidimensional construct (Bulté & Housen, 2012), was measured by the average word length (AWL) index. Verspoor et al. (2017) argued that the AWL index is a general measure of lexical complexity. According to Grant and Ginther (2000), more proficient L2 writers tend to use longer words. For example, the word *show* (band 1 in the Corpus of Contemporary American English) consists of four letters, while its less frequent synonym *demonstrate* (band 2) consists of 11 letters. The AWL index was computed by the Coh-Metrix 3.0 (Graesser et al., 2004, 2011).

Syntactic complexity, also a multidimensional construct (Norris & Ortega, 2009), was operationalized by the finite verb ratio (FVR) index. The FVR index, a frequently used measure in CDST studies, is calculated by dividing the total number of words by the finite verbs found in a specific text. The FVR index is identical with the mean length of clause (MLC) index which is calculated by dividing the total number of words by the total number of clauses detected in a specific text. Verspoor et al. (2017) claimed that the FVR index can be considered as a general measure of syntactic complexity at advanced levels. In addition, Polio & Yoon (2018) found that unit-length measures (e.g., the FVR) are significantly greater in argumentative writing. An increase in the FVR index suggests that L2 writers tend to use more noun phrases in their essays than verbs. The FVR index was calculated by the L2 Syntactic Complexity Analyzer (L2SCA) (Ai & Lu, 2013; Lu, 2010, 2011; Lu & Ai, 2015).

In order to address the first research question, the AWL and the FVR indices were plotted. In this way, the trajectories of the two indices were visually inspected. Second, Spearman's rank correlation coefficients were calculated in R Project for Statistical Computing 3.4 (R Core Team, 2013) between the linguistic complexity indices and self-reflection.

3.5. Qualitative data analyses

First, the audio-recorded interviews were transcribed by the researcher into MS Word file. Second, those parts (some sentences) of the interview which were conducted in Hungarian were translated into English by the researcher. Third, the interview data were coded for self-reflective processes by the researcher and a native teacher with 30 years of experience. The inter-rater reliability was 95% and the disagreement was resolved by discussion.

The coding procedure of self-reflective processes was partially adapted from [Nitta and Baba's \(2014\)](#) study. However, [Nitta and Baba \(2014\)](#) coded written reflections and not interviews to understand what self-regulatory processes their participants employed. In this study, self-reflective processes required evaluative comments that involved several cognitive processes such as specifying, reasoning, analysing or comparing essays. For example, participants sometimes analysed their own writing or compared the essays written for my study. Furthermore, the participants sometimes specified and gave reasons for their actions concerning writing. These actions were coded as self-reflective processes and were quantified as the participants' engagement in self-reflection. Finally, the self-reflective comments were grouped into five categories: self-reflective comments on (1) general improvement, (2) vocabulary, (3) grammar, (4) structure and (5) genre. The maximum score for the extent of engagement in self-reflection (EESR) index was 1 (the participant engaged in self-reflection in each category), while the minimum score was 0 (the participant did not engage in self-reflection in any of the categories). If there were more than two or more self-reflective comments in the same category (such as vocabulary), it was counted as only one comment. The EESR index was calculated by dividing the number of categories in which the participant engaged in self-reflection by the total number of categories. For example, if the participant reflected on his or her vocabulary and grammar during one interview, the EESR score was 0.4 (2 divided by 5). [Table 4](#) demonstrates examples of self-reflective comments.

In contrast, answers which did not include specifications, reasoning, analyses, or comparisons were not coded as self-reflective comments. See Interview Excerpt 1.

3.5.1. Interview excerpt 1

Interviewer: So thinking about the language did you try out any new words or phrases that you haven't used before?

Participant E: Just one new word and that was the "inevitable".

Interviewer: Aha.

Participant E: From the Quizlet

4. Results

This multiple case study adopted a time-series research design to capture the dynamics of the extent of engagement in self-reflection (EESR) and L2 writing development over seven months. RQ1 explored how the EESR and linguistic complexity indices change over time. RQ2 explored the inter- and intra-individual variability in the EESR index and linguistic complexity indices, while RQ3 investigated the interactions between the EESR index and linguistic complexity indices over time.

4.1. Group averages

[Fig. 1](#) shows the trajectory of the EESR index for the group data. A gradual increase can be observed between data points 1 and 5. However, at data point 6 the EESR index dropped, but then it increased again at data point 7. The EESR index was 0.27 at data point 1 which means that the participants engaged in self-reflection in only 1 and half of the categories (vocabulary, grammar, structure, genre, and general). In contrast, at data points 5 and 7, the EESR index was 0.80 which means that the participants engaged in self-reflection in four out of the five categories.

[Fig. 1](#) also shows the 2-period moving averages (MA) of the EESR index. Between data points 2 and 5 a gradual increase can be observed. However, between data points 5 and 7, the MA trajectory of the EESR index flattens out.

[Fig. 2](#) shows the trajectory of the average word length (AWL) index for the group data. The trajectory of the AWL index increased between data points 1 and 2, but then the AWL index dropped reaching its lowest point (4.23 letters) at data point 3. However, between data points 3 and 6, a gradual increase can be observed in the AWL index reaching its highest point at data point 6 (4.60 letters). Finally, the AWL index dropped again at data point 7. The trajectory of the 2-period moving averages displays a slightly upward trend over the seven-month period.

[Fig. 3](#) shows the trajectory of the finite verb ratio (FVR) for the group data. The FVR index dropped between data points 1 and 2 reaching its lowest point (FVR = 8.56). Between data points 2 and 4 a gradual increase can be seen. However, the FVR index dropped again at data point 5 but it started to increase between data points 5 and 7 reaching its highest point at data point 7 (FVR = 9.44).

Viewing the group data in [Figs. 1–3](#) has its limitations due to the Ergodicity problem. According to the ergodic principle, group statistics cannot be generalized to the individual, and vice versa (see [Lowie & Verspoor, 2019](#), for more detail).

Table 4
Self-reflection.

	Data point	Cognitive processing	Example
Interviewer	12		Are you happy with the level of vocabulary?
Participant E		Reasoning	No. I'm not satisfied with my vocabulary because I feel I repeat myself too much.
Interviewer	12		Compared to the previous pieces of writing, was it (Essay 12) an improvement?
Participant E		Comparing	I think no because my last essay (Essay 9) was I think the same level so I'm not satisfied with my vocabulary.

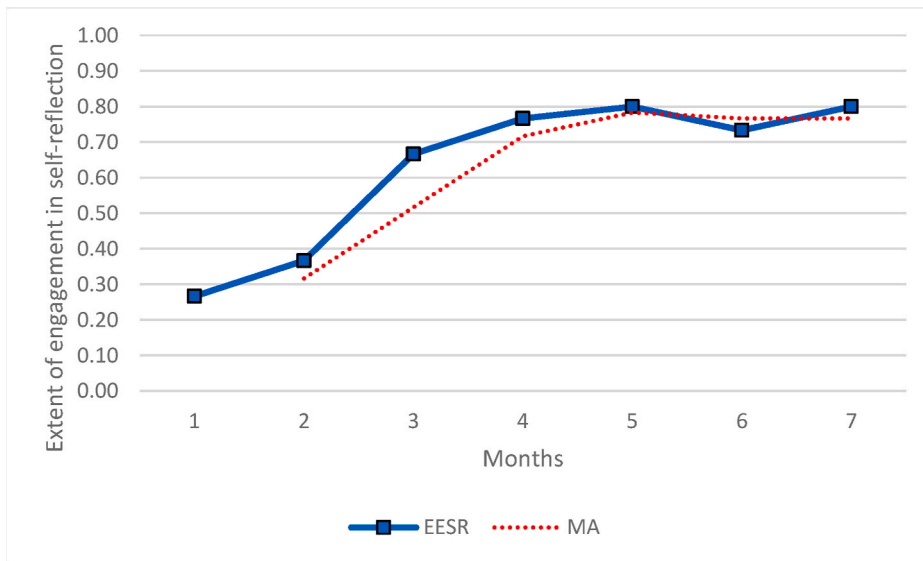


Fig. 1. Extent of engagement in self-reflection (group averages).

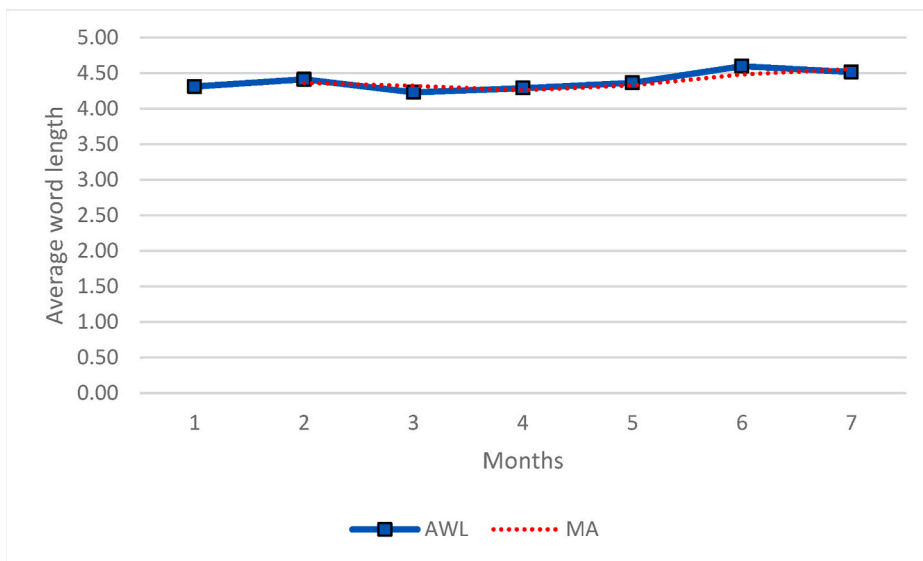


Fig. 2. Average word length (group averages).

4.2. Inter- and intra-individual variability

Fig. 4 shows the inter-individual variability in the EESR index over the seven-month investigation. Although the trajectory of the group average shows a gradual increase between data points 1 and 5 (pink line), Fig. 4 demonstrates that the participants' individual trajectories regressed and progressed between data points 1 and 5. For example, the trajectory for Participant D started to increase between data points 1 and 2 in line with the group data. However, the trajectory for Participant D dropped at data point 3, unlike the trajectory of the group. Likewise, the trajectory for Participant F increased between data points 1 and 3 in line with the group data. However, the trajectory for Participant F reached its highest point at data point 3 preceding the highest point for the group data detected at data point 5.

In order to demonstrate the extent of engagement in self-reflection, interview excerpts are presented. Interview excerpts 2 and 3 show the change in the extent of engagement in self-reflection related to vocabulary. In Interview excerpt 2, participant A did not give a rationale why she was dissatisfied with the level of vocabulary in her essay. In contrast, in interview excerpt 3 she gives a clear rationale why she was unhappy with the level of vocabulary in her essay.

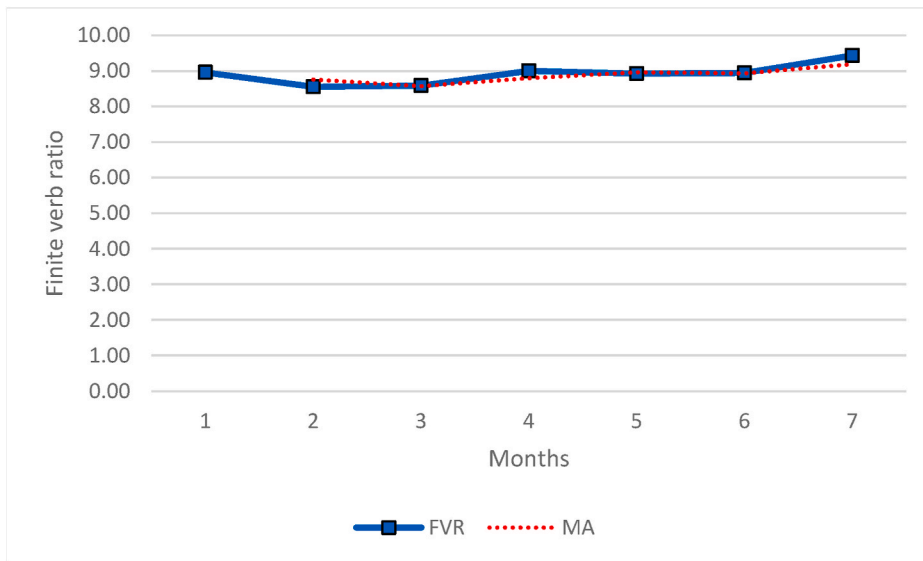


Fig. 3. Finite verb ratio (group averages).

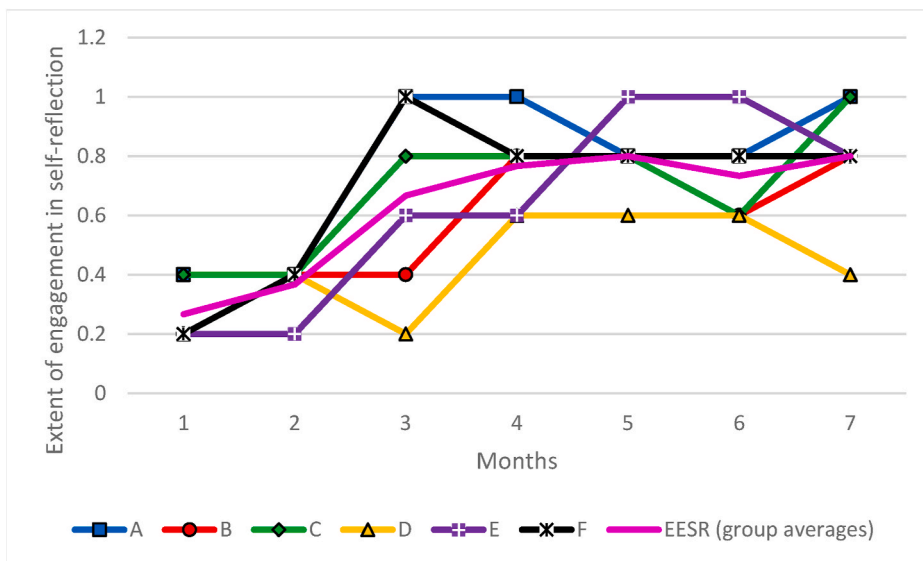


Fig. 4. Extent of engagement in self-reflection (inter-individual).

4.2.1. Interview excerpt 2 (Participant A; data point 2)

Interviewer: Were you happy with the level of vocabulary?
 Participant A: No.
 Interviewer: Why?
 Participant A: I don't know.

4.2.2. Interview excerpt 3 (Participant A; data point 3)

Interviewer: Do you think you have improved in this piece of writing?
 Participant A: I think today I'm not in my... best but of course I tried to use the things we learned ... I don't say that it worked in every situation but I tried it. For example, I really paid attention to use synonyms and not the same word again and again. In some way I think it worked but for example ... of course it was a task about language. I think, I used more than ten times *language* word. So, I think in some ways it worked but some ways I can't find (a synonym).

Interview excerpts 4 and 5 show the increase in the extent of engagement in self-reflection for participant B. At data point 3, participant B could not explain why she did not improve in writing, while at data point 4 she could give a rationale why she might have improved in vocabulary.

4.2.3. Interview excerpt 4 (participant B; data point 3)

Interviewer: Compared to the previous pieces of writing do you think it was an improvement?

Participant B: I'm sure it's not an improvement

Interviewer: And why do you think that?

Participant B: I don't know

4.2.4. Interview excerpt 5 (participant B; data point 4)

Interviewer: Compared to the previous pieces of writing do you think it was an improvement?

Participant B: I think it was a little bit because I used some words maybe which are more advanced.

Fig. 5 shows the group and the individual trajectories of the average word length (AWL) index. Fig. 5 shows that the trajectory of the average word length (AWL) index increased between data points 1 and 2 for the group data, but then it dropped at data point 3. The same patterns can be seen for Participant C, D, E, and F. However, the AWL trajectories for Participant A and B show different patterns. The AWL trajectory shows a gradual increase between data points 3 and 6 for the group averages. However, the same pattern can be seen only for two participants (B and F).

Fig. 6 shows the group and the individual trajectories of the finite verb ratio (FVR) index. Fig. 6 shows that the group FVR trajectory decreases between data points 1 and 2. However, the same pattern can only be seen for three participants (C, D and F). Likewise, the group pattern between data points 2 and 3 is similar only for three participants (A, C and D).

Intra-individual variability was usually seen as measurement error (Larsen-Freeman, 2006). However, from a CDST perspective, intra-individual variability is seen as an important source of information about the underlying developmental process (van Geert & Steenbeek, 2005). In order to see the three indices (EESR, AWL, and FVR) in one plot (Fig. 7), the data were normalised (Verspoor et al., 2011). Fig. 7 shows that the trajectories of the EESR, the AWL and the FVR indices display dissimilar trajectories over the seven months.

4.3. Interactions between self-reflection and linguistic complexity

In order to explore the possible relationship between the extent of engagement in self-reflection and L2 writing, correlations were calculated between the EESR and AWL, the EESR and the FVR, and the AWL and FVR indices. Table 5 shows the correlation matrixes between EESR and AWL, EESR and FVR and AWL and FVR for the six participants. The EESR-AWL correlation coefficients are positive for four learners (A, B, D, and E), while negative for two students (C and F), whereas the EESR-FVR correlation coefficients are positive for three participants (A, B, and E) and negative for three learners (C, D and F). The AWL-FVR correlation coefficients are positive for

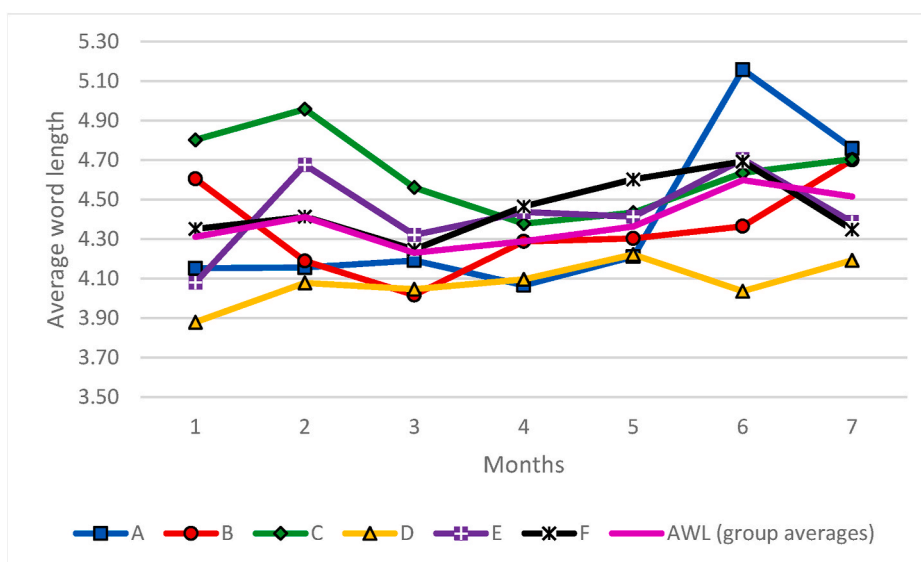


Fig. 5. Average word length (inter-individual).

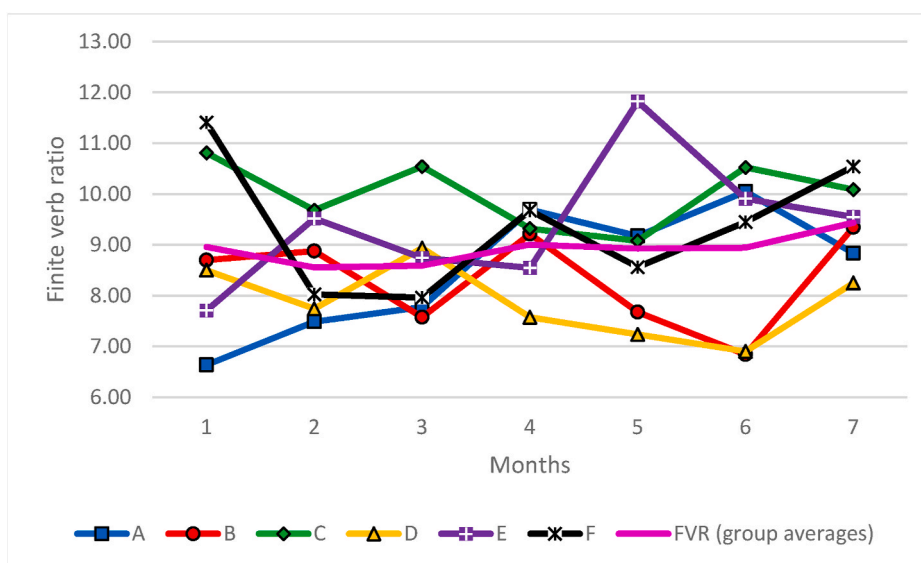


Fig. 6. Finite verb ratio (inter-individual).

five students (A, B, C, E and F) and negative for only one participant (D).

However, it is important to note that the results of the correlation analyses should be interpreted with care due to the limited number of participants and data points.

5. Discussion

This multiple case-study explored the dynamics of the extent of engagement in self-reflection and linguistic complexity over a seven-month period. RQ1 investigated the dynamics of the EESR and linguistic complexity indices as a group data. In contrast, RQ2 looked at the micro processes of self-reflection and L2 writing by investigating inter- and intra-individual variability, while RQ3 investigated the interactions between self-reflection and linguistic complexity.

5.1. Group averages

The six participants became more engaged in self-reflection over the 7 months as demonstrated by the upward trend of the extent of engagement in self-reflection (EESR) index. In other words, the participants became cognitively more engaged in self-reflection and tended to provide self-generated feedback in more areas (e.g., vocabulary, grammar) over the seven months. The increase in the EESR index implies that the six participants tended to become more self-regulated L2 writers. The increase in self-regulatory processes is not surprising since [Nitta and Baba \(2018\)](#) also found that one of their two focal learners tended to engage more in self-regulation over time. Likewise, [Teng and Zhang \(2020\)](#) also found that learners who received self-regulated learning strategies-based writing instruction used strategies more actively than learners in the control group. However, [Teng and Zhang's \(2020\)](#) study could not reveal the dynamics of self-regulation. Conversely, in this study the dynamics of self-reflection or self-regulation was explored by showing the nonlinearity of the EESR index.

Both the average word length (AWL) and the finite verb ratio (FVR) indices showed upward trends over time indicating that the learners tended to use more academic vocabulary and more noun phrases in their essays over the seven months. This finding is not surprising because several previous studies found that as learners progress from B2 to C1 CEFR level and shift from general to academic writing, more academic words and noun phrases are used ([Penris & Verspoor, 2017](#); [Verspoor et al., 2017](#)). Similar to the trajectory of EESR, the trajectories of the AWL and FVR indices showed nonlinear development over time corroborating the findings of [Verspoor et al. \(2017\)](#).

5.2. Inter- and intra-individual variability

In order to illustrate inter-individual variability, the three indices (EESR, AWL, and FVR) for the six participants were plotted in one figure. Although there was a clearer correspondence among the six trajectories of the EESR index, the trajectories of the AWL and FVR indices showed highly dissimilar trajectories. Furthermore, the trajectories of the EESR, the AWL and the FVR indices displayed dissimilar trends for each learner. There were no two figures which showed identical patterns. These results corroborate the findings of previous studies on intra-individual variability ([Larsen-Freeman, 2006](#)). The findings that linguistic complexity indices showed inter- and intra-individual variability are in line with previous studies ([Larsen-Freeman, 2006](#)). However, no previous study has

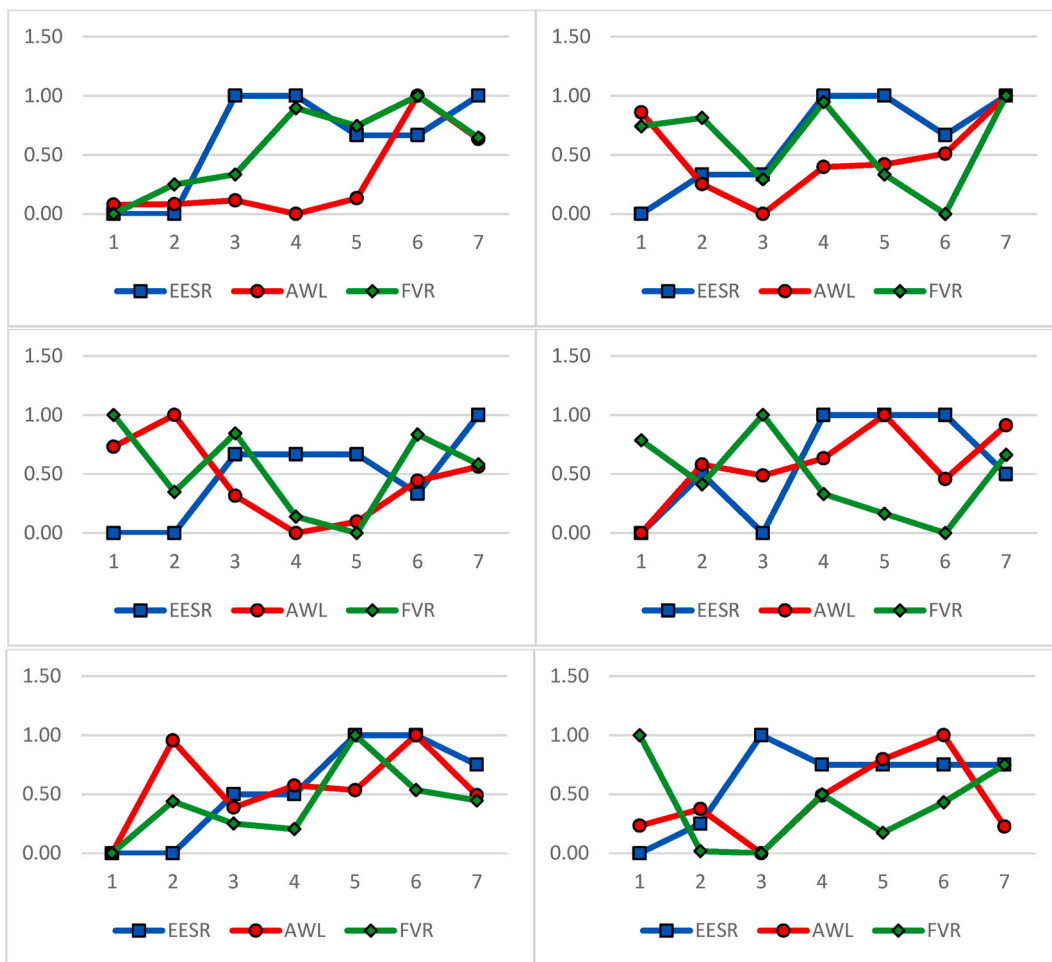


Fig. 7. Intraindividual variation for the six participants.
 Note. (top left: participant A; top right: participant B; centre left: participant C; centre right: participant D; bottom left: participant D; bottom right: participant E).

demonstrated inter- and intra-individual variability in self-reflective processes. Development in self-reflection and L2 writing is an individual and emergent process. This study shows that every individual’s trajectories are different even in the same context.

5.3. Interactions between self-reflection and linguistic complexity

In order to explore the relationship between the extent of engagement in self-reflection (EESR) and L2 writing, the EESR indices were correlated with the two linguistic complexity indices (AWL and FVR). The relationship between the EESR and AWL indices was predominantly positive indicating the co-development of self-reflection and vocabulary. In a dynamic parlance, the association between self-reflection and vocabulary might be supportive (Verspoor et al., 2011). Conversely, the relationship between EESR and the FVR was mixed. In other words, the relationship between self-reflection and syntactic complexity was both supportive and competitive (Verspoor, 2011). Nitta and Baba (2018) also found that as one of their two focal learners, Yuto, engaged more in self-reflection, improvements in lexical and syntactic complexity were detected. Conversely, Nitta and Baba (2018) also showed that limited engagement in self-reflection led to limited improvements in lexical and syntactic complexity.

Although the group averages showed an almost gradual increase for the EESR, the AWL, and the FVR indices, the individual trajectories of these indices (EESR, AWL, and FVR) showed that none of the six learners went through the same developmental path. Large-scale studies on self-reflection (Birjandi & Tamjid, 2012) might be helpful to understand the macro processes. However, in order to gain insights into the micro processes and understand the ‘behavioural changes’ over time, a CDST approach might be more fruitful (Thelen & Smith, 1994, pp. 97–98).

Although the time-series research design with participants is not new to SLA research (Larsen-Freeman, 2006), no previous studies have explored how the extent of engagement in self-reflection changes over time. The findings of this study add further knowledge to the large body of research on self-reflection by showing the micro processes involved in self-reflection. While previous large-scale

Table 5
Correlation matrixes.

Participant		A			B			C		
		EESR	AWL	FVR	EESR	AWL	FVR	EESR	AWL	FVR
EESR	ρ	1.000	.139	.472	1.000	.206	.356	1.000	-.58	-.337
	Sig. 2-tailed		.777	.284		.658	.434		.172	.46
	N	7	7	7	7	7	7	7	7	7
AWL	ρ		1.000	.429		1.000	.286		1.000	.464
	Sig. 2-tailed			.337			.535			.294
	N		7	7		7	7		7	7
FVR	ρ			1.000			1.000			1.000
	Sig. 2-tailed									
	N			7			7			7
Participant		D			E			F		
		EESR	AWL	FVR	EESR	AWL	FVR	EESR	AWL	FVR
EESR	ρ	1.000	.491	-.945	1.000	.349	.826	1.000	-.089	-.512
	Sig. 2-tailed		.263	.001**		.443	.022*		.849	.240
	N	7	7	7	7	7	7	7	7	7
AWL	ρ		1.000	-.286		1.000	.5		1.000	.018
	Sig. 2-tailed			.535			.253			.969
	N		7	7		7	7		7	7
FVR	ρ			1.000			1.000			1.000
	Sig. 2-tailed									
	N			7		7	7			7

Note. *Correlation was significant at the 0.05 level (2-tailed); **Correlation was significant at the 0.05 level (2-tailed).

quantitative studies (Birjandi & Tamjid, 2012; Teng & Zhang, 2020) give us a picture of the ‘grand sweep of development’ where holistic structure and similarities across learners are shown (Larsen-Freeman, 2006, p. 613), this study, by looking at the fuzzy details, clearly shows that human behaviour, such as self-reflection, is variable and context dependent (van Dijk, 2003).

6. Conclusion

This study investigated the dynamic changes in the engagement in self-reflection and L2 writing by adopting a time-series analysis. Although the group averages of the six participants indicated an almost gradual increase in the extent of engagement in self-reflection, the individual trajectories displayed different pictures showing inter- and intra-individual variability.

There are several limitations of this study. First, since this study adopted a multiple case study research design, the results should be interpreted with care. Consequently, the findings of this study cannot be generalized to a larger population. Second, the possible positive relationship between the extent of engagement in self-reflection and lexical complexity should also be interpreted with care. More data points would be necessary to make the correlation analyses more robust.

Future studies should investigate the changes in the engagement in self-reflection and L2 writing by collecting both quantitative and qualitative data from a larger group of participants. In addition, the inclusion of more data points might help to provide more robust results on the interaction of the engagement in self-reflection and L2 writing and confirm the possible positive relationship between the development of self-reflection and vocabulary. Future studies should also investigate the extent of engagement in self-reflection over extended periods (for example over one year).

This study has shown that the self-reflection might play an important role in L2 writing development. Therefore, teachers should encourage their students to engage in self-reflection. The findings of this study suggest that learners become more engaged in self-reflection over time. It could be hypothesised that the more engaged the students become in self-reflection, the more they can improve their L2 writing. Obviously, large quantitative studies would be necessary to strengthen the hypothesised link between engagement in self-reflection and L2 writing development.

CRediT author statement

Attila M. Wind: Conceptualization; Data curation; Formal analysis; Investigation; Methodology; Project administration; Resources; Supervision; Validation; Visualization; Roles/Writing - original draft; Writing - review & editing.

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