Improved Fluency through the Timed-pair-practice Framework

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Abstract
Determining proficiency of students by one type of fluency measures is insufficient. By using a triad of fluency measures, two cohorts of low-intermediate Japanese students (N=12) were continuously analysed over one year in which a noticeable improvement in fluency occurred as a result of the inclusion of the Timed-Pair-Practice framework into the classroom. Furthermore, it was observed that certain patterns emerged in relation to speech production and the proficiency of the speaker. First, it became apparent that less proficient learners generally paused more repeatedly and had longer periods of silence while speakers who progressed in their fluency, seemed to increase the number of filled pauses to maintain their utterances and relied less on repeating phrases. Second, less proficient speakers paused more frequently at within-clause boundaries as they formulated their sentences while speakers who improved their speech production, naturally altered the pause location to between-clause boundaries to reflect a more native-like speech production. This would suggest an improvement in the quality as well as the quantity of speech output as the students progressed. However, when compared to native speakers (N=13), there were two noticeable differences in regards to pause location. At the between-clause boundary, non-native speakers clearly paused before pronouns while native speakers paused before conjunctions. At the within-clause boundary, non-natives paused predominantly before noun phrases while native speakers paused more on adverbial phrases. To further improve fluency, this paper recommends teaching that incorporates activities that encourages parallel processing (Levelt, 1989) to reduce the grammatical challenges faced by the L2 speakers.

Keywords: Fluency, Pause, Breakdown, Repair, Parallel Processing, Timed-Pair-Practice

Intorduction

Measuring fluency has always been an important aspect of determining student proficiency (Fulcher, 2003) and heavily researched as it is an essential component of communicative language ability (Tavakoli, 2016) as well as an important descriptor of L2 development (de Jong et al., 2012). In a broad sense, this concept can be seen as an equivalent to overall speaking proficiency (Chambers, 1997). In a narrow sense, fluency considers more concrete and measurable features such as breakdown, speed and repair (Tavakoli & Hunter, 2018). This paper considers the broad definition of fluency as being the ability of producing language at an adequate speed with relative ease and less hesitation (Tavakoli et al., 2020) but also follows a narrow sense for research purposes.

When understanding how L2 fluency should be analysed and represented, it is necessary to make the distinction between cognitive, perceived and utterance fluency. As this paper looks closely at Japanese students' fluency over one year, research follows the widely investigated third domain known as utterance fluency (Segalowitz, 2016). This would relate to the acoustically measurable aspects of fluency in uttered speech such as speed, pausing (breakdown), and repair (Kahng, 2014; Kormos, 2006). Fluency in this paper has been evaluated through a combination of these measures (Tavacoli et al., 2020) to determine fluency over one academic year and how this changed with proficiency over the year.

To determine utterance fluency, it was essential that students made every effort to maintain conversation in their English classes. A new and bold framework, Timed-Pair-Practice (TPP), was introduced into the classroom to re-orientate students in performing their paired-tasks and thereby stretching their English abilities lexically, morphosyntactically and phonologically and build their repertoire of resources to manage in paired conversation. Furthermore, the repetitious nature of the tasks performed through this framework follows research as to having the most robust effects on L2 fluency (Lambert et al., 2017; Wang, 2014). However, despite the advantages of this framework, up to now, there has been no study on fluency development through the TPP framework. This study, therefore, looks closer at how students' proficiency progress through speed, breakdown, repair, and composite measures.

To unpack, understand and appreciate the complexities of speech production and the conceptualizing of fluency for non-native speakers, Levelt's (1989) four-stage speech model illustrates how language is processed and produced (Kormos, 2006; Segalowitz, 2010; Tavakoli et al., 2020). L1/fluent speakers focus on the first stage in which speech is conceptualized through planning the upcoming utterance. For the lower leveled L2 speakers, however, sizable processing resources are required for three other stages: the formation, articulation, and self-monitoring stages. The formulation stage draws attention on lexical, grammatical, morphophonological and phonetic encoding; the articulation stage refers to the linguistic planning of the actual speech within the constraints of the targeted language; and the self-monitoring stage checks for accuracy, clarity and appropriacy (Tavakoli *et al.*, 2020). Dysfluencies occur during these latter stages as the speaker's utterance moves through this slow and conscious *serial processing* system to find the appropriate phrasing to match the original intention, form or sound required and thus resorting to pausing, slowing down of speech or using filled pauses to maintain conversation (Tavakoli, 2011).

With the inclusion of TPP in classes, it is hoped that students will begin to develop strategies to automate their speaking production when stretching themselves to communicate in their

conversation. For L2 learners, their lexical, syntactic and phonological knowledge is still emerging and therefore, cognitively demanding. With effective preparation, repetition of tasks and format used in TPP, students will develop the notion of *parallel processing* (Kormos, 2006, Lambert et al., 2020, Skehan 2014). This processing is where students become able to work on two or more stages of speech production simultaneously as one aspect of production, such as the conceptualization and formulation stages or the automation of encoding processes. This progression in L2 proficiency will hopefully lead to less frequent pausing and other dysfluencies while encoding utterances in real time (Lambert et al., 2020).

Previous research informs us that L2 learners generally speak slower and with more effort than when conversing in their native tongue (Derwing et al, 2009) and unsurprisingly lower leveled L2 speakers are less fluent and often dysfluent in speak production (Kormos, 2006; Mora & Levkina, 2017; Segalowitz, 2010). Skehan et al. (2016) go further to suggest that the pause location reflects the stages of Levelt's model of speech processing and production. In other words, the less proficient speakers have more mid-clause pauses (non-clausal boundaries) in their conversations as this would be typical behavior at the formation stage while end-clauses (between-clausal boundaries) occur more often from the more proficient speakers as they need to consider speech production mainly at the conceptualization stage (Kormos, 2006; Lambert et al. 2017; Saito et al., 2018; Skehan & Shum, 2017; Tavakoli & Wright, 2019). This paper looks closer at the accuracy of this hypothesis.

However, there would appear to be some gaps in the research that this paper attempted to address. Previous research mainly provided non-longitudinal evaluations to determine fluency of student proficiency by sampling their communicative tasks over a short period of time (e.g. Lambert et al., 2017; Saito et al., 2018; Tavakoli et al., 2020). There is little information regarding how the above hypothesis holds true over a longer period of time. Would there be a movement on pausing from non-clause boundaries to between-clause boundaries as the student improves their level of speech processing and production? Nor has there been research that investigated how the students will use repair strategies to maintain conversation when they start to gain confidence and become more proficient in exploring and experimenting in their spoken language discourse. Finally, to the best of our knowledge, there is little data on the locations of pauses in terms of syntactic structures (e.g., between- or within-phrase boundaries) or on the parts-of-speech of the lexical items that follow the pauses. To fill in these gaps, the present study attempted to focus on the following specific research questions:

1. How did the utterance fluency (i.e., speed, breakdown, and composite measures) improve among the L2 speakers of English over the academic year?

2. As L2 learners became more proficient, did they rely less on pauses and use more repair in their spoken utterances?

3. Did lower L2 learners generally pause more repeatedly in the middle of clauses than more proficient speakers who paused more often between clauses and did this change as the student became more proficient?

4. Were there significant differences in the syntactic locations of between-clause and within-clause pauses among the more/less proficient speakers and native speakers, and how did the result change over time?

5. Were there significant differences in the proportion of parts-of-speech of the lexical items following between-clause and within clause pauses among the more/less proficient speakers and native speakers, and how did the result change over time?

Fluency Measures

The fluency measures (Appendix 1) used in the present study consisted of speed measures (i.e., articulation rate, the mean length of runs), a composite measure (i.e., speech rate), breakdown measures (the level of pausing which disrupts the flow of speech), and repair (strategies used to correct or reformulate the speech). These measures served to investigate the complex nature of fluency (de Jon et al., 2012; Kahng, 2014; Kormos, 2006; Skehan, 2015), and provided not only an informed perspective of the underlying speech production processes but a more reliable understanding of the underlying characteristics of fluency at the varying proficiency levels of students (Tavakoli et al., 2020).

In the present study, a pause was defined as a silent period of 250ms or longer. Pausing varies between speakers (Derwing et al. 2009) but in relation to second language acquisition, there is a clear distinction between pauses made by L1 and L2 speakers. L2 speakers would make within or non-clausal boundary (NCB) pauses so as to monitor and reformulate their message during the formulation stage (Skehan & Shum, 2017; Tavakoli & Wright, 2019) while L1 speakers tend to make between-clausal boundary (BCB) pauses as they generate a pre-verbal message (Kormos, 2006; Lambert et al. 2017; Saito et al., 2018; Skehan & Shum, 2017; Tavakoli & Wright, 2019). Appendix 2 provides the formulae to determine the mean length and frequency of NCN and BCB. In addition, to raise further awareness of the cognitive demands the L2 speaker faces of these aspects of L2 language production at the formulation stage, this paper will attempt to look closer at these encoding issues by analyzing the pause types within the sentence (Table 1).

Table 1: Frequency of Pause Types within the Sentence

Pause Type	Details	Examples
Clause Boundary (PS) (Freq of PS/100 Syllables)	The clause ends … pause … another clause, conjunction, adverbial phrase	I went to a restaurant … I had dinner. The other day … I went to work. I like working … because I get money. … and … I went to school.
Between Subject and Verb (PR) (Freq of PR/100 Syllables)	Before the Predicator, but following subject or other initial items	I … drove the car. The man in a car … called me . I … seldom … use a mobile phone. I wanted to study but … went out instead.
Phrase Boundary (P) (Freq of P/100 Syllables)	At group-boundaries elsewhere within the clause	I watched … a movie. I listened … to a story. I like to play … baseball.
Within-Phrase Boundary (PW) (Freq of PW/100 Syllables)	Noticeable pausing within phrases after PR	I have a beautiful … cat. This book is very … good.
Within-Prepositional Phrase Boundary	Noticeable pausing within prepositional	I went to…the shops. I waited for …. 2 minutes.

(WP) (Freq of WP/100 Syllables)	phrases after PR	

Methodology and Methods

Participants

The participants were 12 first year students from a private university in Tokyo. Their English ability was categorized as low-intermediate to intermediate despite having a minimum of six years of learning. These participants were divided into two groups depending on their initial speaking ability during the interview and TOEIC scores. The fast group demonstrated greater confidence and fluency while the slow group had less experience in conversational English. Both sets of data were contrasted with a control group of Japanese students who attended a general English communication class which did not include instruction using TPP and a native group of English speakers.

Timed-pair-practice Procedure

The students were required to prepare 20 questions on a topic chosen by themselves and a 250-word response to this topic. The aim was to provide topics that students genuinely had an interest in (Porter, 1999) so that they would be more motivated to invest their time and converse their ideas with their peers in the classroom. These students were then expected to ask these questions in pairs in the practice stage. After subsequent rounds, the students became able to ask more appropriate questions and maintain longer conversations. After sufficient practice, students were then evaluated in the testing stage in which two students, picked at random, would be asked to provide another conversation on the same topic chosen.

Data Elicitation

In total, the data of 20 recordings were obtained during the academic year consisting of two semesters. Students performed a weekly narrative production task which consisted of a one-minute spontaneous monologue explaining what happened in each student's week. Dialogue recordings were not considered due to issues arising over the complex pragmatics involved in measuring the interactive aspect of dialogues such as unclaimed pauses between turns, overlap, and interdependence of the interlocutor's performances (Tavakoli, 2016). Due to simplicity and reliability, it would, therefore, be prudent to analyse individual narratives to measure each student's spontaneous speaking ability.

All student utterances were recorded at a resolution of 16 bits with a sampling rate of 44.1 Hz by a PCM recorder through a high-quality microphone placed approximately 20cm from the mouth of the speaker. This data was transferred to a computer in which the recorded sounds were low-pass filtered at 8,000 Hz, normalized, and analyzed by sound analysis software, *Praat* (Boersma & Weenink, 2014).

Analysis Procedure

For expediency, only the recordings taken from the odd weeks were analysed. These recordings were transferred onto a digital format, in which the second author transcribed a sampled one-minute speech and match each lexical item to the recording on the software,

Praat. Then, the acoustic data were segmented into consonants, vowels, and pauses, and duration of each portion was measured.

Results

Speech Rate

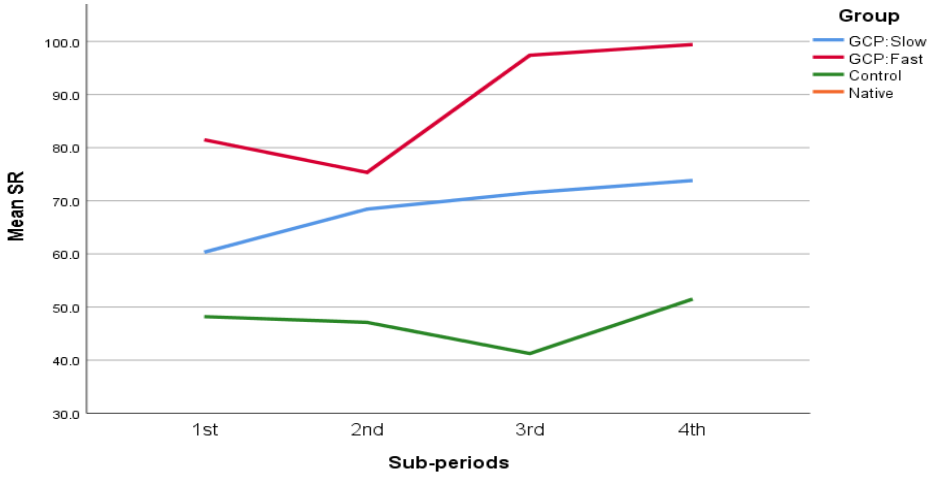

Figure 1: Speech Rate of Slow, Fast and Control Groups

As is shown in Figure 1, both the slow and fast groups showed fair gains (60.3 syllables/min to 73.8 syllables/min and 81.5 syllables/min to 99.4 syllables/min respectively. One the other hand, the control group showed no clear improvement by fluctuating from 48.2 syllables/min to 51.5 syllables/min. However, despite such progress, the native group spoke at a much faster rate of 200.8 syllables/min.

Articulation Rate

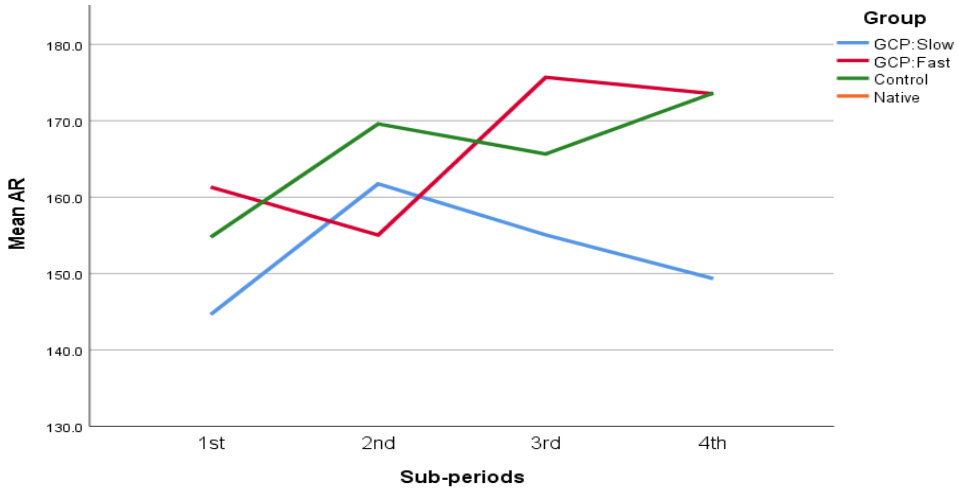

Figure 2: Articulation Rate Performance of Slow, Fast and Control Groups

As shown in Figure 2, however, articulation rate shows a less clear picture. The slow group showed strong improvement from the first quarter of 144.6 syllables/min to 161.7 syllables/min in the second quarter but then continued to drop to a level of 149.3 syllables/min by the final quarter which indicates only a marginal improvement overall. The control group, however, was able to increase their articulation rate from 154.8 syllables/min

to 173.6 syllables/min over the academic year. Although this would imply improvement, it also enlightens us on the fact that the control group used longer pauses in their utterance to formulate and plan their utterances (as reflected in their lower speech rate). The fast group, on the other hand, was able to improve their articulation rate as well as their speech rate from 161.3 syllables/min to 173.5 syllables/min. However, compared to the native group's data of 256.7 syllables/min, articulation rate for the non-native groups was considerably lower.

Mean Length of Runs

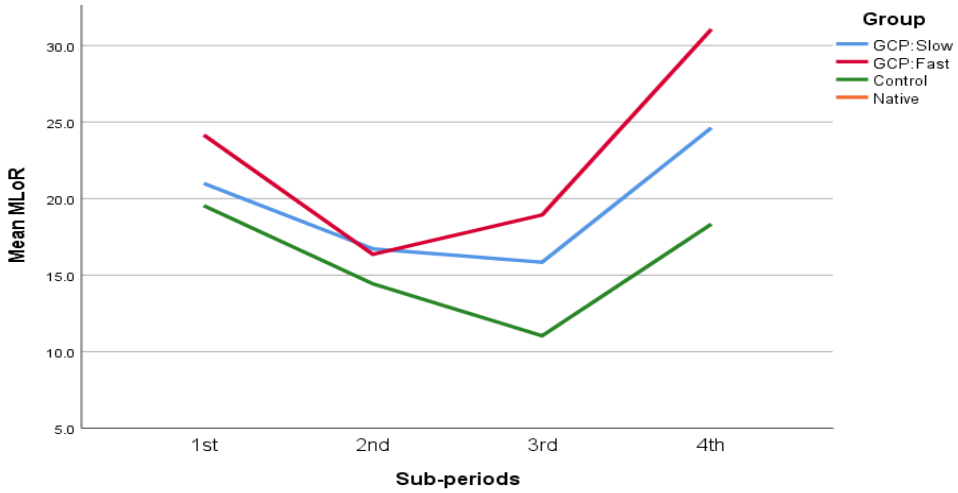

Figure 3: Mean Length of Run of Slow, Fast and Control Groups

Figure 3 indicates a u-shaped curve in which all groups in fact reduced the length of their runs initially to maintain their speech production. Data from the first quarter recorded artificially longer monologues due to unnatural formulaic expressions to maintain utterances. These runs shortened by the second quarter as students searched their limited language resources to express themselves. However, as students developed their English abilities and absorbed language taught in class in their courses, their length of runs rapidly improved. The fast group dropped from 24.2 syllables/run in the first quarter to 16.4 syllables/run but made increasingly lengthier runs afterwards resulting in 31.1 syllables/run in the final quarter. Both the slow and control groups reduced their speech runs at a diminishing rate from the first quarter to the third quarter, 21.0 syllables/run to 15.8 syllables/run and 19.5 syllables/run to 11.0 syllables/run respectively. In the final quarter, both groups, however, showed rapid improvement with 24.75 syllables/run for the slow groups while the control group reached run of 18 syllables/run. However, despite improvement by all groups in the latter half of the year, the native group's mean length of run was longer at 35.3 syllables/run.

Pause Ratio

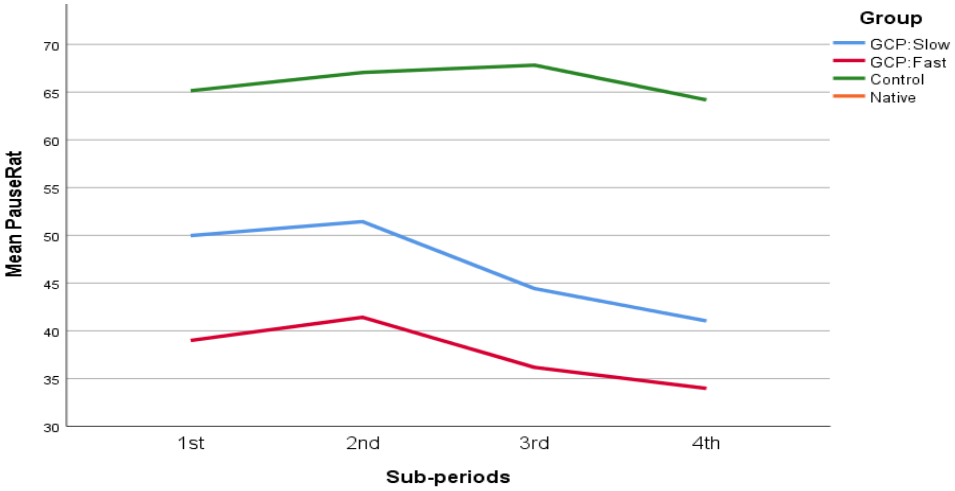

Figure 4: Mean Pause Ratio of Slow, Fast and Control Groups

As shown in Figure 4, pause ratio would also appear to indicate a clear progress by both the slow and fast groups from the second quarter onwards, despite slight gains at the beginning. The slow group's mean pause ratio began at 50% and increased to 51% by the second quarter and then fell to 41% by the end of the final quarter. The fast group showed a similar pattern with an initial mean pause ratio of 39%, jumping up to 41% in the second quarter and then dropping over the next two quarters to reach 34% by the end of the fourth quarter. However, despite progress made by the slow and fast groups, the rate of pausing was much higher than the native group of 14%.

Repairs

1. Filled Pauses

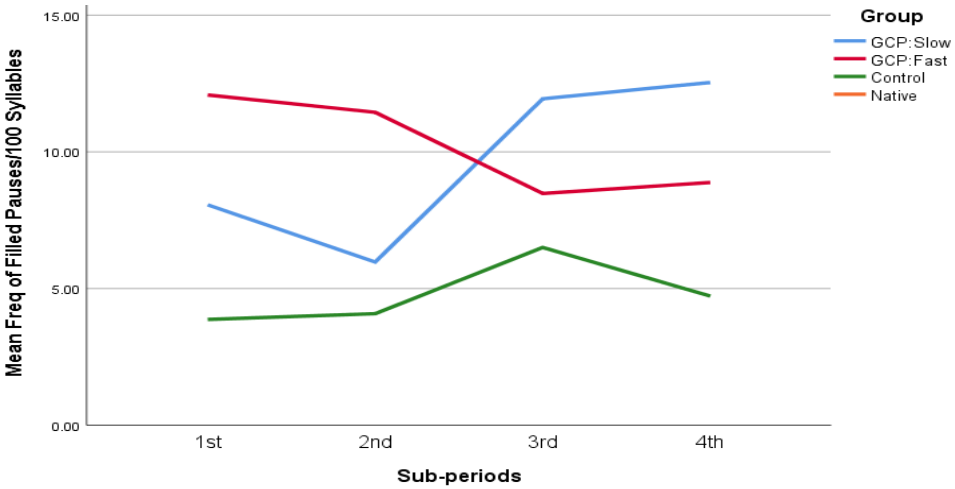

Figure 5: Multiple Line Mean of Frequency of Filled Pauses/100 Syllables of Slow, Fast and Control Groups

It is noted that the control group relied on filled pauses to maintain their monologues the least throughout the whole period (see Figure 5). The fast group used this strategy the most in the first half of the year but relied increasingly less on using it. In the first quarter, this group

averaged 12.1 filled pauses/100 syllables and this fell to 8.9 filled pauses/100 syllables by the end of the fourth quarter as this group became more proficient in their English and, therefore, able to communicate more expediently their point of view. The slow group, on the other hand, became the dominant user in this strategy, using 8.1 filled pauses/100 syllables at the beginning of the year but 12.5 filled pauses/100 syllables by the fourth quarter. There would seem to be a clear indication that both the slow and control groups used this strategy increasingly more due to limitations in their spoken English. The native group relied seldomly on this strategy using 4.9 filled pauses/100 syllables.

2. False Starts

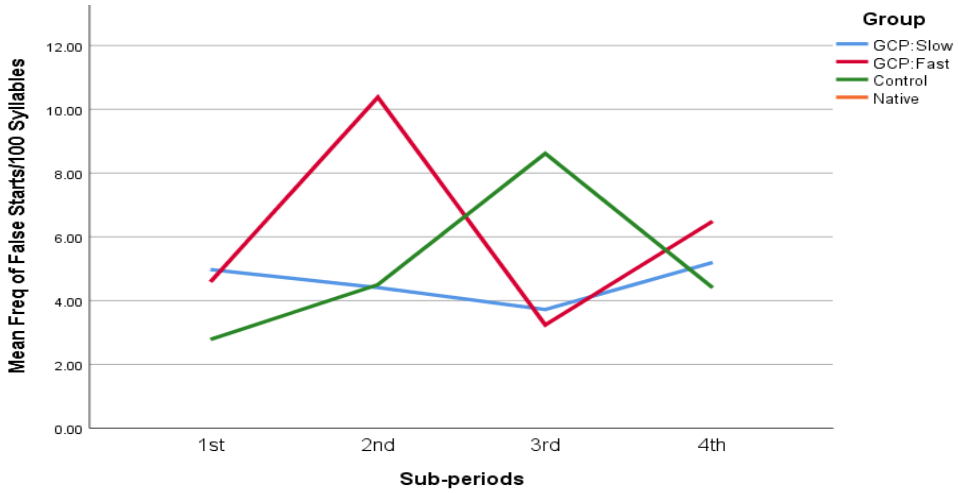

Figure 6: Multiple Line Mean of Frequency of False Starts/100 Syllables of Slow, Fast and Control Groups

As shown in Figure 6, false starts would seem to be less insightful as each group, overall, made about the same number of mistakes. The slow group would appear to have been the most consistent in their use of false starts with the least marginal changes: 3.72-5.20 false starts/100 syllables. The marginal changes of the other groups were considerably higher: the fast group ranged 3.24-10.38 false starts/100 syllables, and the control group ranged 2.78-8.62 false starts/100 syllables. We can infer that none of the groups have strong control over their accuracy or appropriate vocabulary choice and this would be due to individual differences. This can be confirmed by looking at the results of the native group which had greater control in their utterances spoken and, therefore, made an average of 1.3 false starts/100 syllables.

3. Repeated Words

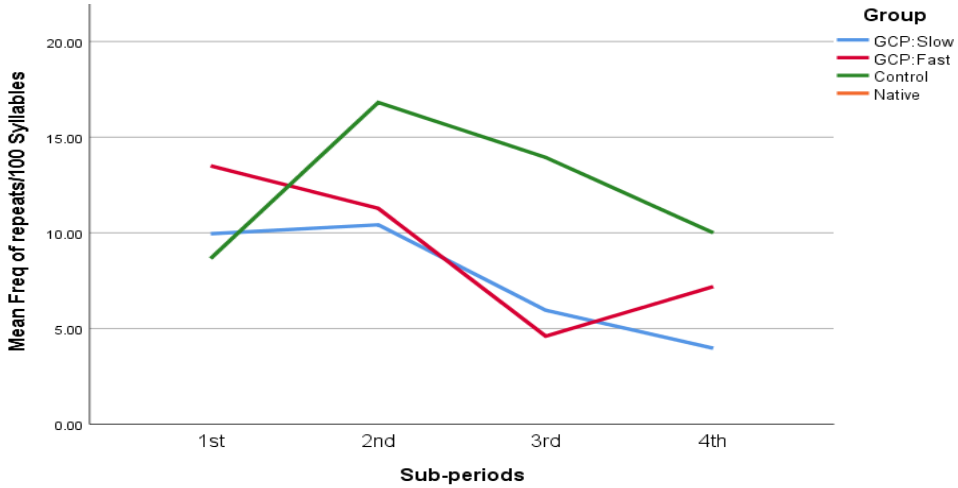

Figure 7: Multiple Line Mean of Frequency of Repeats/100 Syllables of Slow, Fast and Control Groups

Finally, despite slight relapses, there would appear to be less reliance by the slow and fast groups to repeat words to maintain their fluency (see Figure 7). The fast group used 13.5 repeats/100 syllables in the first quarter, and this fell to 7.2 repeats/100 syllables by the final quarter. The slow group made 10.0 repeats/100 syllables at the first quarter and this dropped to 4.0 repeats/100 syllables by the fourth quarter. Despite the reduction in repeated words, native speakers hardly used this strategy with only 1.30 repeats/100 syllables.

Pause Location within the Unit of Spoken Language

1. Pauses at Non-clausal Boundaries

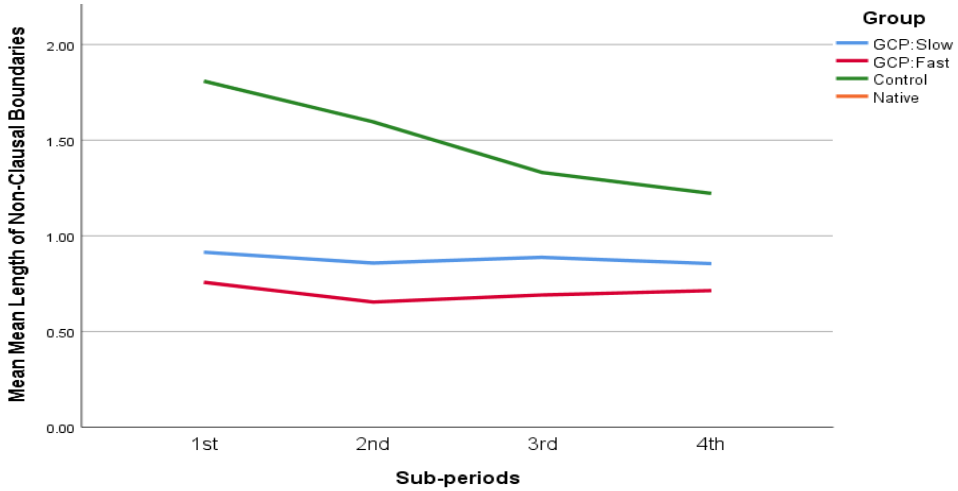

Figure 8: Multiple Line Mean of Length of Non-clausal Boundaries Pausing of Slow, Fast and Control Groups

As Figure 8 shows, the control group made constant progress by reducing the length of pausing at the non-clausal boundaries (NCB) from 1.81 seconds in the first quarter to 1.22 seconds by the fourth quarter. The slow and fast groups seemed to have made no improvement in the length of NCB, from 0.91 secs to 0.85 seconds and from 0.76 seconds to

0.71 seconds, respectively. However, the mean pause length of the control group was around double that of the other groups and so a reduction was expected. The native group length of NCB pausing was at 0.55 seconds.

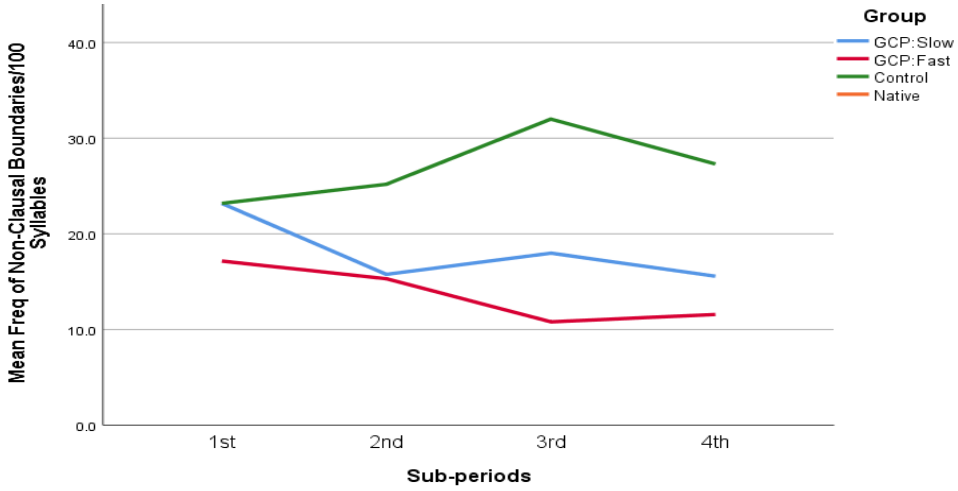

Figure 9: Multiple Line Mean of Frequency of Non-Clausal Boundaries Pausing/100 Syllables of Slow, Fast and Control Groups

However, unlike the control group, both the slow and fast groups managed to reduce the number of NCB pauses (from 23.2 to 15.6 pauses/100 syllables and from 17.2 to 11.6 pauses/100 syllables, respectively (see Figure 9). The control group, however, increased their average overall from 23.2 pause/100 syllables to 27.3 pauses/100 syllables. The native group was considerably lower at 2.5 pauses/100 syllables.

2. Pauses at Clausal Boundaries

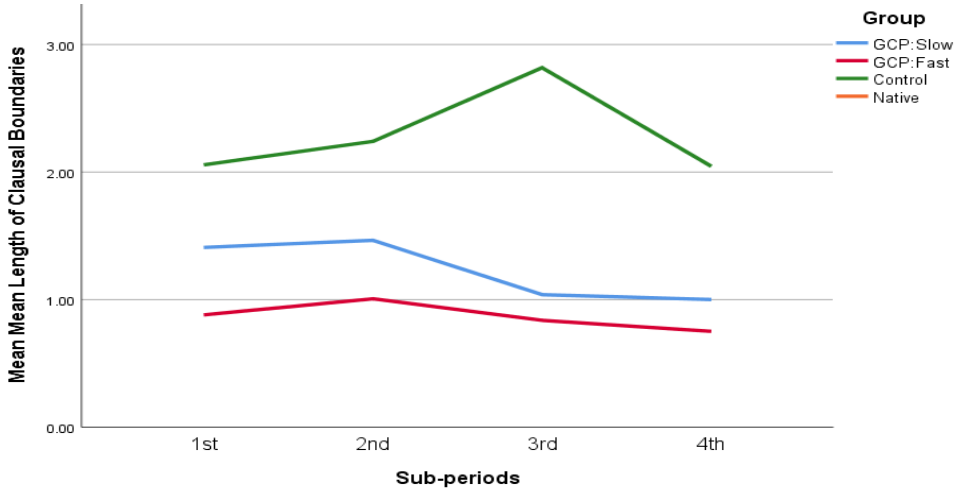

Figure 10: Multiple Line Mean of Length of Clausal Boundaries of Slow, Fast and Control Groups

As shown in Figure 10, while it is inconclusive to determine any improvement in the mean length of pause at between-clausal boundary (BCB) for the control group, both the slow and fast groups showed slight improvement (1.41 - 1.00 second and 0.88 - 0.75 seconds respectively). It might be deduced that the slow and fast group were becoming slightly

quicker at formulation stage of speech production. However, there would seem to be some way to go to match the fluency of the native group with BCB pauses of 0.62 seconds.

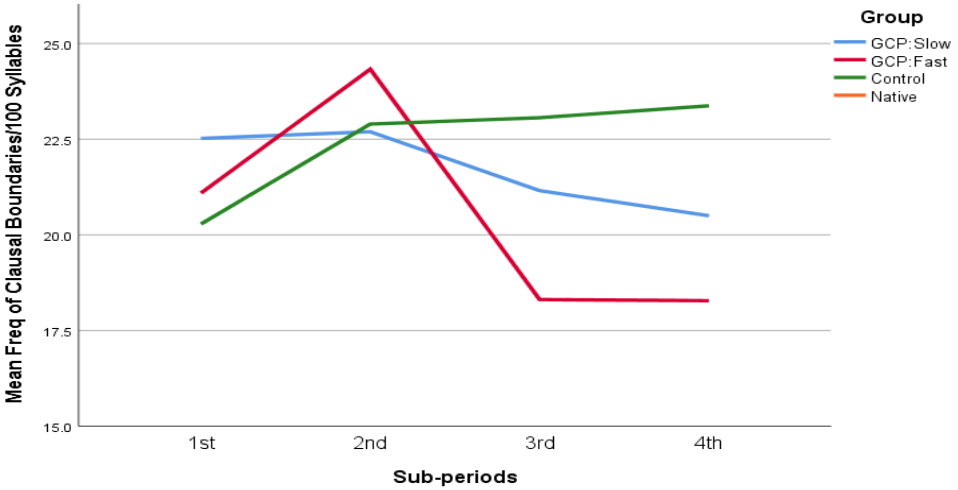

Figure 11: Multiple Line Mean of Frequency of Clausal Boundaries /100 Syllables of Slow, Fast and Control Groups

However, an interesting pattern emerged regarding the frequency of BCB pauses (Figure 11). Initially, the frequency of these pauses increased for all groups from the first to second quarter: the control group from 20.3 to 22.9 pauses/100 syllables, the slow group from 22.5 to 22.7 pauses/100 syllables and the fast group from 21.1 to 24.3 pauses/100 syllables. This trend may be as a result of a reduction in the frequency of NCB in the first half of the year. However, as the year progressed, the slow and fast group used BCB pauses less, resulting in 20.5 pauses/100 syllables and 18.3 pauses/100 syllables respectively by the end quarter. The control group showed continued to rely further on BCB pauses (as well as the NCB), ending at 23.4 pauses/100 syllables. It must be noted that the native group seldomly paused at BCB with a rate of 4.7 pauses/100 syllables.

3. Syntactic Locations of Pauses

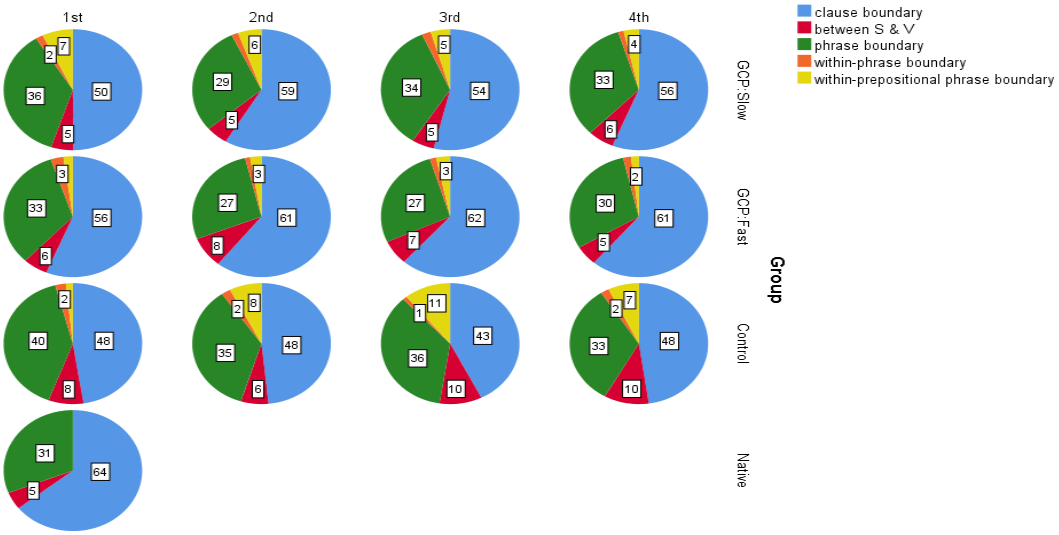

Figure 12: Percent of Pause at Sentence Level for Slow, Fast, Control and Native Groups

As shown in Figure 12, the proportion of the clause boundary was highest in the native group (64%), followed by the fast group (60.0%), the slow group (54.8%) and the control group (46.8%). This finding was consistent with the hypothesis that the less proficient speakers make more pauses in the non-clause boundaries. It is notable that the control group showed relatively high proportion of non-clause pauses at phrasal boundaries, between subject and verb, and within-prepositional phrases. These results indicate less control and more dysfluency among the less proficient speakers.

4. Parts-of-Speech of the Lexical Items Following Pauses

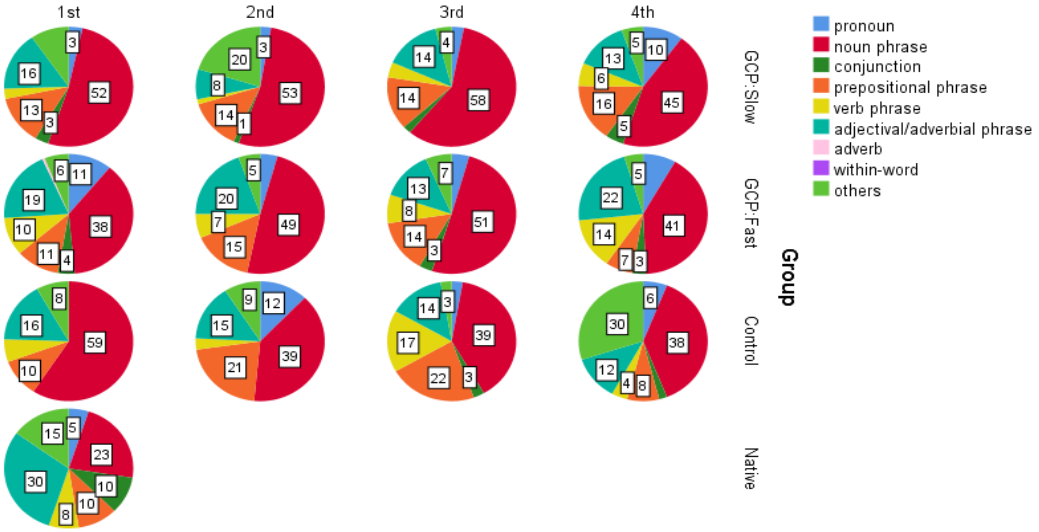

Figure 13: Parts-of-Speech of the Lexical Items Following the Non-clause Pauses for Slow, Fast, Control and Native Group

As shown in Figure 13, the fast, slow and control groups paused predominantly before noun phrases, averaging 38.2%, 48.7%, 42.5% respectively, as compared with native speakers (18.4%), suggesting that the L2 speakers had greater difficulty accessing the target noun within a verb phrase, noun phrase, or prepositional phrase.

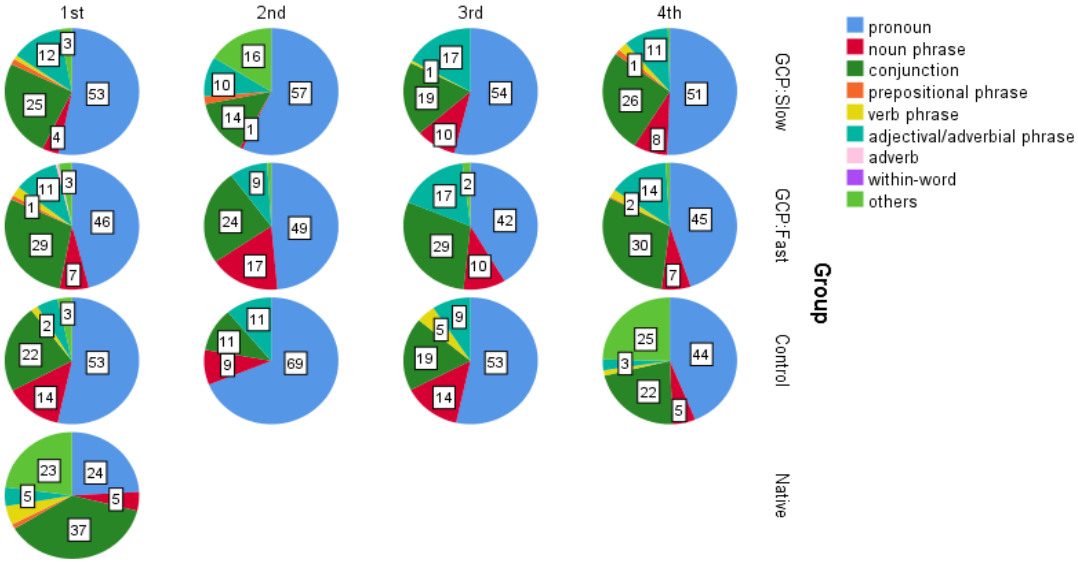

Figure 14: Parts-of-Speech of the Lexical Items Following the Clause Pauses for Slow, Fast, Control and Native Group

As shown in Figure 14, the fast, slow and control groups clearly paused before pronouns, especially the word "I", averaging 45.5%, 53.8%, 54.8% respectively, while native speakers paused more often before conjunctions at 37%.

Discussion

The first research question examined whether utterance fluency improved over the academic year. The results clearly showed that the fast group progressed in their fluency in terms of speech rate, articulation rate, length of runs, pause ratio, and repeated words. The slow group also made modest gains with improved speech rate, but only slight gains in the articulation rate. Despite increasing their reliance on filled pauses, this group managed to increase their length of runs, reduce pause ratio, and repeated words. The control group, on the other hand, showed little improvement overall. However, although encouraging, compared to the native group, there is still much needed to match native fluency.

The second research question examined whether the learners produced fewer pauses and used more repairs as they progressed in speaking. Our initial findings would suggest that less proficient speakers of English are less efficient in encoding syntactic, lexical, and phonological structures (Mora & Levkina, 2017). These learners generally paused more repeatedly and had longer periods of silence (de Jong, 2016). However, by applying this triad of fluency measures, we can also appreciate that particular aspects of performance were more relevant to differentiate particular levels of proficiency than others (e.g., Iwashita et al., 2008; Nakatsuhara, 2014). The control group, for example, seemed less phased to speak at a low articulation rate as a compensatory strategy to maintain fluency. However, as the learners became more proficient, there was a noticeable reduction in pausing. The more proficient slow and fast groups certainly reduced the pause ratio while improving their speed in their spoken English. Effective preparation, repetition and testing of tasks in TPP encouraged students to become more adept to conceptualizing and formulating their messages. Furthermore, as students developed confidence to stretch their language in the practice rounds of TPP, real improvement occurred in students expressing themselves with lengthier and more complex sentences which can only indicate greater proficiency in their English abilities.

Drawing our attention to the second part of the second question, it becomes less apparent whether more proficient groups relied more on repair in their spoken utterances. Looking at repeated phrases, as the student became more proficient, students relied less on this strategy (Tavakoli *et al.*, 2020). However, when focusing on filled pauses, there would seem to be a clear indication that both the slow and control groups used this strategy increasingly more due to limitations in their spoken English. In contrast, the fast group, although they initially used filled pause the most during the first half of the academic year, relied actually less on this strategy in the latter half due to a greater improvement in the proficiency in their English to maintain their utterances. As students' second language ability developed during the year when engaging in their English-speaking activities, they had to constantly draw on their lexical resource at the formulation stage to complete the recorded data. It would appear that the fast group demonstrated greater improvement in the cognitive demands in retrieving lexical/grammatical items while the other group relied more on serial encoding to express their ideas succinctly. However, this varying range of repairs used by each group would suggest individual preference in their cognitive efforts to process grammatical speech plan is unpredictable and affected by their motivation in the tasks.

The third research question examined how the frequency and length of between-clause and within-clause changed in the higher-leveled and lower-leveled speakers. It was shown that the less proficient speakers paused more frequently in the middle of the clauses while the more proficient groups showed some reduction in the number of NCB pausing. Due to their improved fluency in formulating their sentences, the slow and fast decreased their use of BCB pauses too. However, it is also important to note that NCB pausing was less than BCB (except the first quarter for the slow group) which would suggest a more natural level of chunking, better parallel processing and greater success in managing speech production. Again, due to effective preparation, repetition and testing of tasks in TPP, students developed better control in their capabilities to conceptualize and formulate their messages more simultaneously at the clause level (Kormos, 2006; Skehan, 2014). Furthermore, as students developed confidence to stretch their language in the practice rounds of TPP, real improvement occurred in students expressing themselves with lengthier and more complex sentences which can only indicate greater proficiency in their English abilities.

The fourth question asked whether there were significant differences in the syntactic locations of between-clause and within-clause pauses among the more/less proficient speakers and native speakers. It would appear that all groups seemed to predominantly pause at the clause boundary, followed by pausing within prepositional phrases and finally within-phrase boundaries despite the contrasting rate of pausing rate by each group (control 64%, slow 41%, fast 34% and native 14%). Only the control group paused less than half of the total number of pauses which indicated their hesitancy compared to the other groups. Overall, this would imply that there is some consistent cognitive delay in natural development of sentence planning by each group. However, unlike native speakers, all non-native groups paused at prepositional phrases or within-phrase boundaries. Pausing in these two categories indicate the challenges for non-natives to phonological encoding collocative phases to provide chunking aspects to their speech production, a quality automative for a native speaker.

The final research question examined whether there were significant differences in the proportion of parts-of-speech of the lexical items following between-clause and within-clause pauses among the more/less proficient speakers and native speakers. The results showed that there was no clear pattern among the non-native groups but a marked difference between native and non-native. Looking closer at parts of speech used at NCB (Figure 13), overall, the fast, slow and control groups paused predominantly when deciding noun phrases but varied in level of complexity due to proficiency. Native speakers, on the other hand, paused more on adverbial phrases in order to conceptualize their message. Focusing on BCB pausing (Figure 14), the non-native groups clearly paused before predominantly on pronouns, especially about conveying information about themselves (i.e. “I”, “my”) due to a limitation in grammatical encoding, and thus preferring simpler sentence constructs. Native speakers paused more often before conjunctions, such as “so” and “and” as there was a willingness to produce longer runs with hesitancy in conceptualizing their message. As a result, despite the improvement in proficiency for the slow and fast groups with a clear shift in change at NCB and BCB and a pausing sequence to match natives at the sentence level, there would still seem to be a certain time lag in the formulation stage of particular lexical items.

Conclusion

On the whole, by applying a combination of speed, breakdown, repair and composite measures, the wider aspect of the meaning of fluency could be observed and the characteristics of fluency could be better understood at different levels of proficiency

(Nakatsuhara, 2014; Tavakoli et al., 2017). One can appreciate that fluency does not simply concentrate on how fast a speaker can produce their utterances but also on whether the utterances are made with relative ease and less hesitancy (Tavakoli et al., 2020). This paper recognized that the rate of progression in English fluency was reflected not only by the speed of the delivery but by their level of pausing and, to some extent, repair.

The changes in pause length, frequency and location over the academic year as well as level of repair also provided invaluable insight into the cognitive processes that underlie a lower-level student's development in speaking a second language. For students to better reflect fluent speakers speaking production, they needed to become more efficient and automatic (Kormos, 2006) in how they draw on lexical, grammatical, morphophonological and phonetic encoding. Unlike the control group, the slow and fast groups benefited from the repetition of tasks in TPP by creating opportunities to extend their range of lexical and grammatical knowledge (Kormos, 2006) and enabling them to subconsciously *parallel process* aspects of their spoken language (Kormos, 2006, Lambert et al., 2020, Skehan 2014) which would be reflected in better chunking. There was also greater fluency in their speak production, reduction in repair (Tavakoli et al., 2020) and altered pause location between clauses to reflect improved speech processing and production due to clearer monitoring of how the output is formulated (Skehan et al., 2016).

Finally, most of the findings of the present study have supported the hypothesis that improved fluency of the slow and fast groups can be attributed to the successful application of the TPP framework. Both the slow and fast groups built up their sociolinguistic/pragmatic competence by being encouraged to speak up individually, to contribute to their communicative strengths, to experiment with their understanding of their English abilities and to encourage better comprehensibility to the listener in tasks. In turn, this led to less processing time on the formulation, articulation, and self-monitoring stages of these aspects of the spoken language in an effort to maintain their utterances. With widely acknowledged research that students in Japan find it challenging to converse in their English (Maeda, 2010), this paper would recommend that the TPP framework become an additional asset in the EFL classroom to re-orientate students to conversational English and improve their fluency.

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Appendices

Appendix 1: Composite Measures

1. Speed

Formulae for Speech Rate, Articulation Rate and Mean Length of Run

Speech Rate (SR) (syllables/min)	$\frac{\text{Total number of syllables produced from entire narrative}}{\text{The total time (in minutes) required to produce the speech sample}}$
Articulation Rate (AR) (syllables/min)	$\frac{\text{Total number of syllables produced from entire narrative}}{\text{The total time of speech sample excluding pause time of 300ms or above}}$
Length of Runs (MLoR) syllables/utterance)	Average mean of all syllables between pauses of 250ms or above

2. Pausing

Pause-time Ratio

Pause Ratio (PauseRat) (%)	$\frac{\text{Length of total pauses}}{\text{Time taken to produce the narrative}} \times 100$

3. Repair

Filled Pauses, False Starts and Repeats

Filled Pauses Frequency (per 100 syllables)	**False Starts** Frequency (per 100 syllables)	**Repeats** Frequency (per 100 syllables)
$\frac{\text{Total number of filled pauses}}{\text{100 syllable utterance}}$	$\frac{\text{Total number of false starts}}{\text{100 syllable utterance}}$	$\frac{\text{Total number of repeats}}{\text{100 syllable utterance}}$

Appendix 2

Non-clausal and between Boundaries Formulae

	Non-Clausal Boundaries (NCN)	Between-Clausal Boundaries (BCB)
Mean length (secs)	$\frac{\text{Total length of non-clausal pause}}{\text{The frequency of non-clausal pauses}}$	$\frac{\text{Total length of clausal pause}}{\text{The frequency of clausal pauses}}$
Frequency (per 100 syllables)	$\frac{\text{Total number of non-clausal pause}}{\text{100 syllable utterance}}$	$\frac{\text{Total number of clausal pause}}{\text{100 syllable utterance}}$

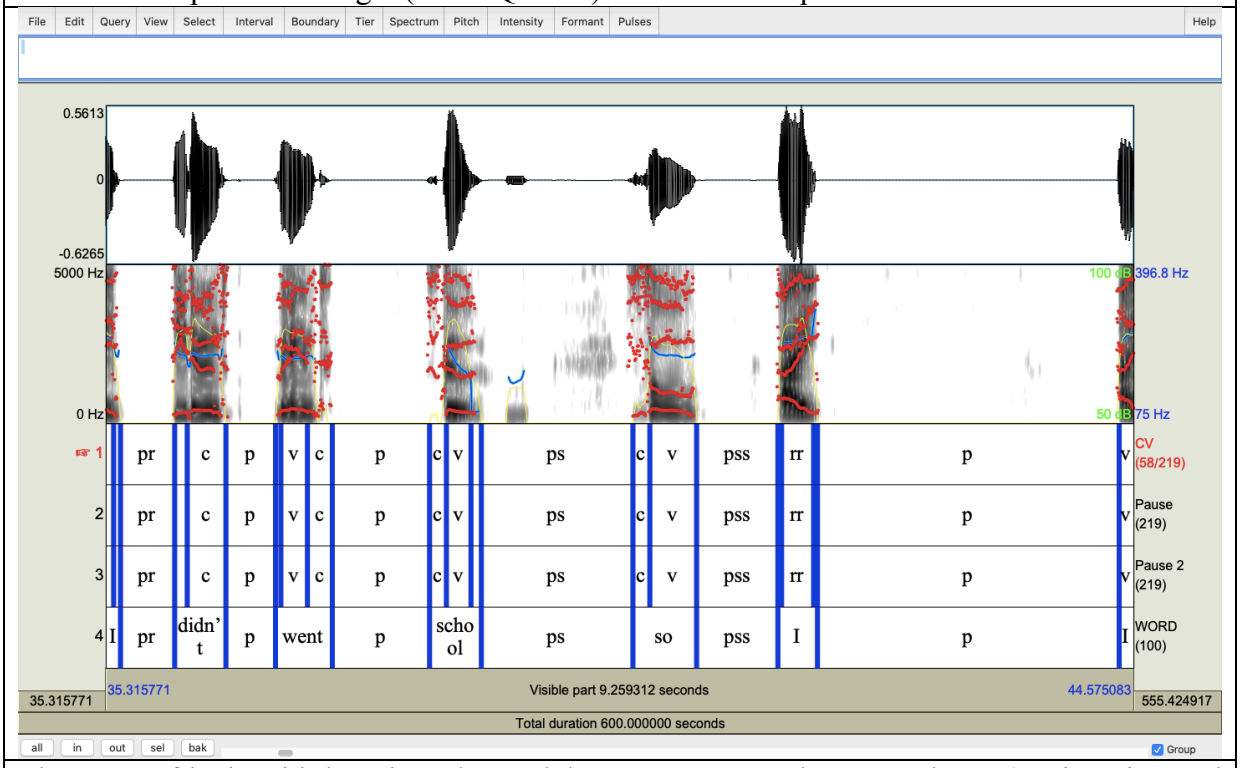
Appendix 3

Example Summary of Each Group's Performance and Comparison with Native Group

Although it can be seen that progress was made by the slow and fast groups, there still hangs the question regarding fluency at native level. Below is a summary of a typical performance by one member of each group by the third quarter of the academic year.

Reflection on Fluency of control, slow, fast and native groups

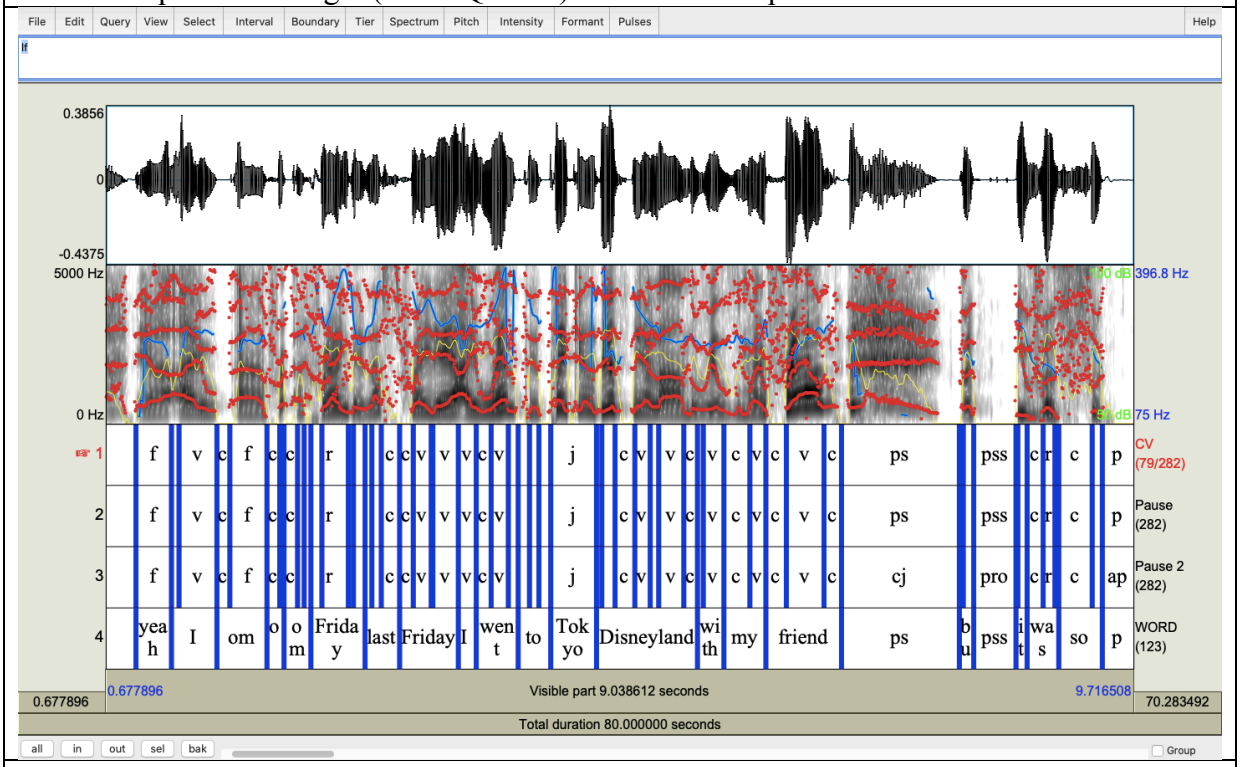
Control Group – Recording 9 (Third Quarter) 9 second excerpt



Slow rate of lexis with lengthened sounds/ Frequent pauses between clause (conjunction and pronoun) and within clauses (subject - verb and clause boundary) / Short length of runs / Repeat of pronoun "I"

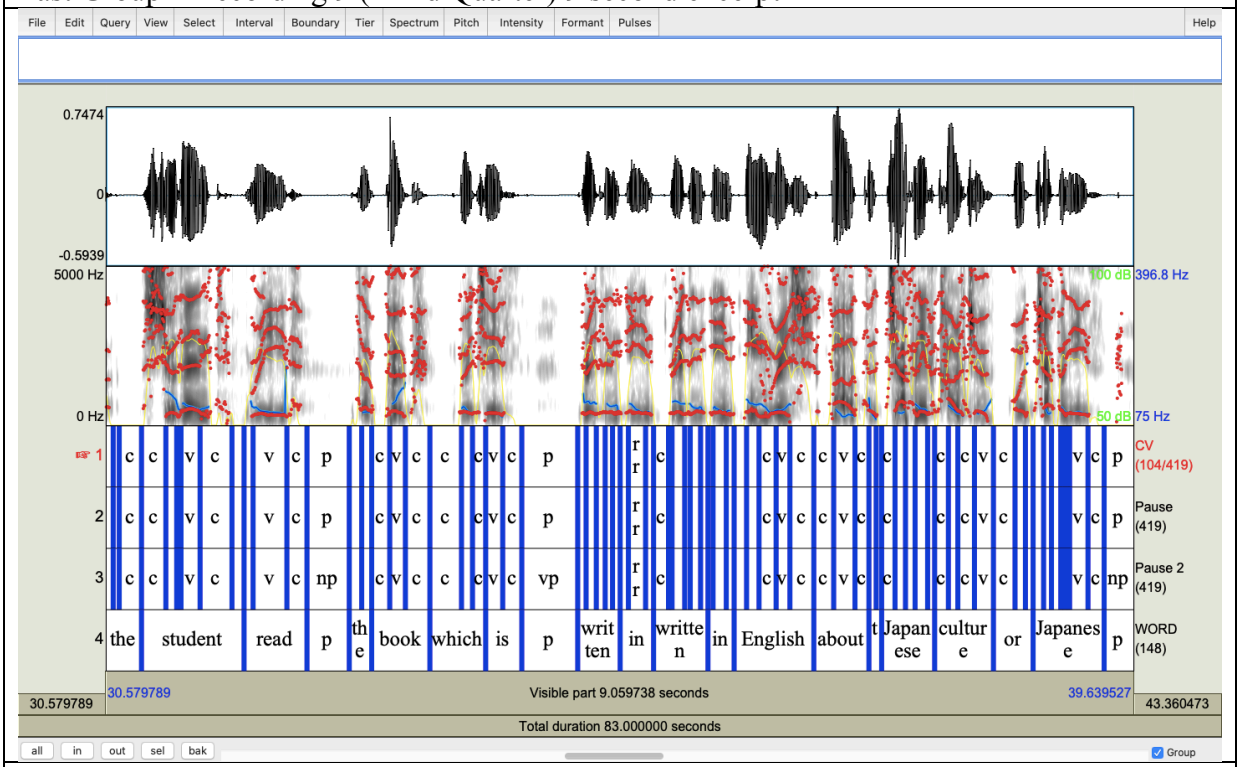
Conclusion: Dysfluency with low SR, moderate LR, no filled pause but repeat

Slow Group – Recording 9 (Third Quarter) 9 second excerpt



Compared to the control group, slightly longer runs and lexis was spoken at a faster rate with shortened sounds but infrequent pausing between clause (before the conjunction “but” and the pronoun “it”). No pausing within clauses but effort to express ideas as repeated (“I” and “Friday”) to fine-tune the message of time and the fillers (“yeah” and “om”)

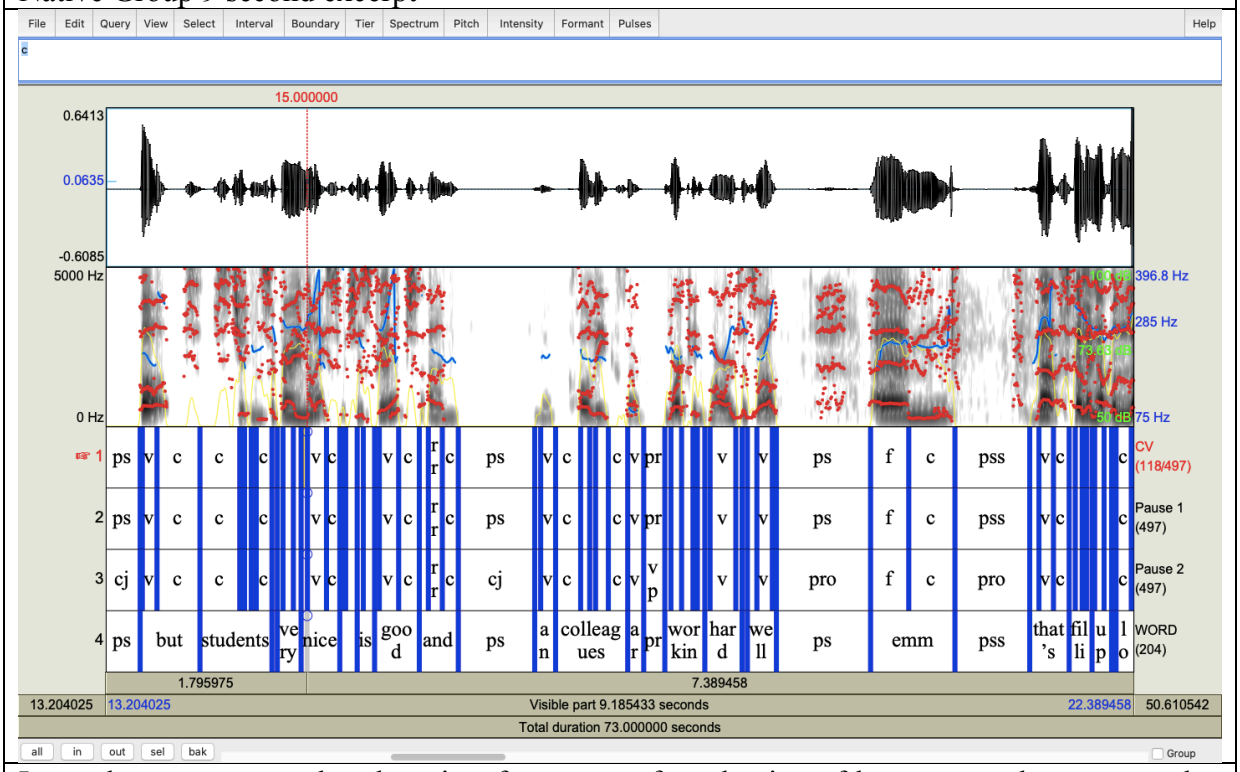
Fast Group – Recording 9 (Third Quarter) 9 second excerpt



Compared to the slow group, slightly longer runs with more complicated use of a dependent clause. Lexis spoken is at a similar rate to the slow group but this is maintained throughout

the recording. With longer runs, there are infrequent pausing between clause (not in above example) but pausing within clauses to express ideas using more challenging grammatical structures: before a noun (“the book”) and verb phrases (“”written in”) as well as the repair: repeated (“written in”) to fine-tune the message of the kind of book read

Native Group 9 second excerpt



Instantly, one can see that there is a faster rate of production of language and more complex grammar with longer runs of speech. There is only pausing between clauses (before the conjunction “and” and pronoun “that’s”) as the speaker takes time to consider content for the message. There is one use of the filler “emm” to consider the message while maintaining fluency.

It can, therefore, be concluded that while progress was made by the slower and faster groups, to reach the level of fluency of native speakers requires still greater development in the formulation, articulation and self-monitoring stages. Native speakers focus purely on conceptualization of speech through planning the upcoming utterance. This is indicated by the much faster rate of speech production, slight pausing between clauses, and the seldom application of filler repairs in the monologues. The non-native groups clearly relied, although at varying degrees depending on proficiency, on the other stages in their speech production.

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