<論文>

# Task repetition, clausal complexity and cohesion in second language summary writing*

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**Abstract**

This paper investigated whether task procedural repetition promoted greater grammatical complexity along the developmental trajectories in written narrative production by adult second language learners. The paper also expanded the research by addressing how task procedural repetition made narratives more cohesive by greater use of cohesive devices, in particular additive, temporal, logical, causal and adversative connectives. Twenty-one adult second language learners with lower-intermediate level of English proficiency wrote a summary of the books they read once a month during a semester. The results show that task procedural repetition leads to greater subordination as well as longer sentences but has no effects on coordination, which apparently contradicts the expectation drawn from the participants' location on the developmental trajectories. We also find that task procedural repetition facilitates greater use of logical and causal connectives and such selective effects are due to the nature of the target task.

***Keywords*** *: second language acquisition, task repetition, grammatical complexity, cohesion, written narrative production*

## Introduction

In the task-based language learning literature, effects of manipulating task design or implementation features such as cognitive complexity have been widely examined with relation to second language (L2) spoken production in terms of complexity, accuracy, and fluency (CAF) (see Long, 2015 ; Robinson, 2011 ; Skehan, 2018). Task repetition, or repeated exposure to and implementation of the same or similar tasks with similar procedures and/or contents, is one of these task implementation features and has been shown to promote greater fluency (e.g. Sample & Michel, 2014), complexity (e.g. Dawadi, 2019) and accuracy (e.g. Fukuta, 2016). Its facilitating effects on L2 spoken production have also been attested beyond CAF－lexical sophistication (Gass, Mackey, Alvarez-Torres, & Fernandez-Garcia, 1999), reduction in first language use during task performance (Azkarai & Garcia Mayo, 2017) and cohesion (Bygates, 1996)－and are thus essential for language acquisition (Larsen-Freeman, 2009). Moreover, researchers began to investigate synergy effects with other design features such as planning time (e.g. Ahmadian & Tavakoli, 2010).

However, such facilitating effects have not achieved consistency, and one possible reason for this is the employment of a single index for analyzing the development along a particular dimension (e.g. clauses per sentence for syntactic complexity). Moreover, effects of task repetition have been shown mainly on L2 speech production. Therefore, the present study fills these gaps by investigating whether task repetition promotes grammatical complexity along three dimensions (general length, clausal complexity (coordination and subordination), and phrasal complexity), as proposed by Norris and Ortega (2009), with multiple measures for these in L2 written production. Another issue to be considered is the use of task-motivated specific indices for capturing the development of "task-induced linguistic structure" (Kim & Tracy-Ventura, 2013, p.835), in particular those for cohesion (Halliday & Hasan, 1976), since the target task of the present study is a written narrative summary task where participants are tasked with making the story cohesive using linguistic devices such as connectives in order to make it more understandable.

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## Task Repetition, Underlying Mechanisms and Research Findings

There are two types of task repetition in the literature. *Task exact repetition* refers to repeated implementation of the task with the same procedure and content, while *task procedural repetition* (or *task type repetition* in Bygates, 2001) refers to repeated implementation of tasks with similar but not the same procedure and contents. Bygates (2001) (and the majority of the researchers in the task repetition literature) has recourse to Levelt (1989) and Skehan (2018) as underlying models of L2 speech production.

In Levelt's model of speech production (1989), an utterance is emitted through three modular stages. First, the *conceptualizer* produces preverbal messages, which in turn become input to the *formulator,* where the preverbal messages are grammatically and phonologically encoded via access to mental lexicon and appropriate lemma selection. Resultant output, that is, the phonetic plan successively becomes input to the *articulator,* where the phonetic plan is processed and the utterance is emitted as overt speech. Skehan (2018) assumes that attentional resources which adult L2 learners can allocate to these modular stages are limited, which leads to selective prioritization of one particular CAF dimension over the others. In the case of task exact repetition, Bygates (2001, pp.254-255) assumes that

> part of the work of conceptualisation, formulation and articulation carried out on the first occasion is kept in the learners' memory store and can be reused on the second occasion, thereby freeing up some of the learners' capacity to pay attention to other aspects of the task, particularly in the processes of formulation and articulation.

In the case of task type repetition, schematic knowledge such as narrative structure is shared in memory for the implementation of the tasks belonging to the same task type, and this shared knowledge on the task discourse characteristics, Bygates (2001, *ibid.*) assumes, can reduce demands on conceptualization and make attentional resources available for formulation and articulation.

Bygates (1996) conducted a pioneering case study where one learner narrated the same silent movie orally twice with a three-day gap. The results showed that subordination (syntactic complexity) and lexical variety measured by the type-token ratio increased, whereas disfluencies measured by the number of verbatim repetitions and overall errors decreased. As shown in Table 1, subsequent studies have demonstrated that both task exact and procedural repetitions promoted at least one of the CAF dimensions.

Compared with speaking, effects of task repetitions on L2 written production have scarcely been investigated ; this is a general tendency in studies on L2 narrative production (Kormos, 2011). This could be due to the fact that speaking and writing demonstrate contrastive processing features (e.g. availability of planning time in writing (Ellis & Yuan, 2004)) and because such differences in "modes" are made visible in task performance (see Kuiken & Vedder, 2010, for review). Nonetheless, underlying cognitive mechanisms for written production show similarities as well. In Kellog's influential model of written production (see Kellog, Whiteford, Turner, Cahill, & Mertens, 2013), ideas are generated and organized (called the *planning stage* and roughly corresponding to the conceptualizer), and then grammatically and ortho-phonologically encoded (called the *translating stage* and corresponding to the formula-

**Table 1　A List of Task Repetition Studies that Showed Positive Impacts on Task Performance**

| CAF Dimensions | Complexity | Accuracy | Fluency |
|---|---|---|---|
| Studies | Ahmadian & Tavakoli (2010)<br>Bygates (1996)<br>Dewadi (2019) | Bygates (1996)<br>Fukuta (2016)<br>Kim & Tracy-Ventura (2013) | Ahmadian & Tavakoli (2010)<br>Bygates (1996)<br>Dewadi (2019)<br>Sample & Michel (2014) |

tor) ; this is followed by motor programming and executing (called the *programming* and the *executing stages* respectively and corresponding to the articulator). In addition to these, the reviewing process, especially in the forms of reading and editing the preverbal ideas and the text produced, is added since writing is a recursive process in nature (e.g. authors can and often do review and edit the text during and after text generation). Importantly, these basic processes of written production require working memory resources in Kellog's model, and thus Skehan's argument might be applicable (see Kellog et al., 2013, for how each process demands different components of Baddely's working memory model).

As noted above, empirical studies of task repetition on written production are rare, but Nitta and Baba's (2014) research is a notable exception. They investigated the effects of task exact and procedural repetitions on the development of fluency and complexity in 10 minutes timed writing. More research is needed to clarify whether facilitating effects of task repetitions are also available for L2 written production, and thus the present study investigates the effects of repeating one particular type of written production, summary writing, over a semester.

## Task Repetition, Selectivity in Facilitating Effects, and Grammatical Complexity

With relation to one particular dimension of the CAF, research findings have not been confirmed definitively. For example, syntactic complexity, the target of the present study, was shown to increase in the studies of Bygates (1996, 2001), Dawadi (2019), and Ahmadian and Tavakoli (2010) with repeating tasks, while Fukuta (2016) and Sample and Michel (2014) found null effects. One possibility is that with the aid of repeating tasks, L2 learners can set aside attentional resources but their capacity is still limited. L2 learners might have to prioritize one dimension (e.g. accuracy) at the expense of the others (i.e. complexity and fluency), which results in a trade-off among the CAF. This is what Skehan's limited attentional capacity model would predict and what the majority of the researchers in task repetition literature (e.g. Bygates, 1996, 2001 ; Sample & Michel, 2014) assume.

However, such a "capacity" view of attention remains disputed and goes back to Kahneman's single model of attention (see Robinson, 1995, 2003 ; Robinson, Mackey, Gass, & Schmidt, 2012, for detail). Kahneman (1973) proposes a single capacity model and asserts that difficult tasks require greater attentional effort and capacity. Skehan's limited attention model is a variant of this. Wickens' multiple resource model of attention (see Wickens, 2007, for a concise introduction to his model) assumes several attentional "resource pools" distinguished for input modality (visual vs. auditory), output modality (manual vs. vocal), etc. to explain the fact that dual tasks that require attention in the same resource pool are much harder than those that require attention in different resource pools. Such single (Kahneman, 1973) and multiple (Wickens, 2007) capacity models of attention have been criticized. Robinson (2003) distinguishes three aspects of attention – attention as selection, capacity, and effort – and, following Allport (1987), Gopher (1992), Navon, (1989), Neumann (1996) and Sanders (1998), convincingly argued that ascribing performance reduction (e.g. increasing accuracy at the expense of fluency and complexity) to capacity limitations is a "post hoc explanation for breakdowns in attention to speech" (Robinson, 2011, p.12). Instead, Robinson (2003, 2011) argues that reduction in performance is due to "breakdowns in 'action-control,' not capacity limits, lead[ing] to decrements in speech production and learners' failure to benefit from the learning opportunities attention directing provides". (ibid. p.12). Such an action control view of attention is reflected as the central executive in Baddley's model of WM (1996), Norman and Shallice's (1986) supervisory attentional system, and Posner and Snyder's (1975) cognitive control model of attention (see, Goldstein & Naglieri, 2014, for a comprehensive review).

Another possibility, and the target of the present study, is that complexity measures employed in previous studies cannot capture the effects task repetition bring to learners' task performance. The majority of the previous studies employed only a single measure for grammatical complexity, namely subordination. However, Norris and Ortega (2009), on the basis of the developmental trajectories from (1) coordination through (2) subordination to (3) phrasal elaboration found in the literature, argue that researchers should employ indices for grammatical complexity corresponding to these three dimensions in addition to general length-based measures such as Mean Length of T-unit (MLT). These general developmental trajectories were found in both speech and written performance as discussed in Wolfe-Quintero, Inagaki, and Kim (1998, see also Nakamura 2019, 2020, for studies on this), and the underutilization of complexity indices for grammatical complexity in prior studies might hide effects of task repetition on development of grammatical complexity in particular. Therefore, the present study considers whether task repetition promotes greater grammatical complexity in L2 learners' summary writing in accordance with learners' proficiency level on the developmental trajectories, employing multiple measures for these three dimensions.

## Task Repetition, Task-motivated Performance Indices, and Cohesion

The present study employs multiple measures for grammatical complexity along the three sub-dimensions of grammatical complexity Norris and Ortega (2009) identified. The measures such as MLT, dependent clauses per T-unit (DC/T), or Mean Length of Clause (MLC) are general in nature in that they are applicable to analyzing task performance on any task types. As Robinson et al. (2009) admitted, these general indices are necessary for comparability of research findings. However, they argue that specific indices that meet cognitive demands of tasks should also be supplemented for capturing performance changes promoted by tasks which might become obscured in the analyses with only general indices.

Summary writing, the target task of the present study, is one form of written narrative, and for effective comprehensible summaries of a story, simple alignment of complex and longer clauses and phrases is not sufficient : writers should enhance *cohesion* (Halliday & Hasan, 1976) of the text to make the story *coherent* and thus understandable for potential readers. Connectives such as *because* and *but* are important cohesive devices for enhancing text cohesion because connectives denote semantic relations between clauses and "signal" how readers integrate them (van Silfhout, Evers-Vermeul, & Sanders, 2015). Therefore, explicit marking of coherence relations by connectives reduce cognitive complexity (processing loads) in such a way that readers can notice local coherence relations between consecutive sentences signaled by connectives, which results in faster processing of following clausal elements and better comprehension of the information given by them, as van Silfhout et al. (2015) demonstrated.

With regard to the development of grammatical complexity, Bloom, Lahey, Hood, Lifter, and Fiess (1980), based on observational studies of three-year-olds' spontaneous production, propose following developmental acquisition order : from additive (e.g. *and*), through temporal (e.g. *and then*) and causal (e.g. *because*) to adversative (e.g. *but*). The underpinning rationale for the acquisition order is cognitive complexity : children acquire cognitively less-complex connectives before more complex ones (cumulative complexity). Sanders and colleagues (Evers-Vermeul & Sanders, 2008 ; Sanders & Noordman, 2000 ; Spooren & Sanders, 2008) refined Bloom et al.'s (1980) acquisition order in terms of three conceptual primitives : *basic operation*, *polarity* and *temporality*. Basic operation concerns whether connectives denote simple additive or complex causal relations, while polarity is concerned with whether they denote simple positive relations or complex negative relations. Temporality concerns whether they denote a simple non-temporal or a complex temporal order of events.

In the task repetition literature, only Bygates' (1996) case study provided empirical investigation into the development of cohesion, whereby he demonstrated that task exact repetition promoted greater use of cohesive devices such as *then* and *because,* as reflected in increases in cohesion ratio at the second task execution. Bygates (1996), however, only provided descriptive statistics of the single learner's production and did not analyze the development of different types of cohesive devices separately. Therefore, this study aims to delve further in this regard by employing the Coh-Metrix, an automated analyser of text cohesion (McNamara, Graesser, McCarthy, & Cai, 2014), since it provides several useful indices for evaluating text cohesion and thus has been widely used in the literature (e.g. Kormos, 2011).

### Research Questions and Hypotheses

RQ (1) : For which dimensions of grammatical complexity does task procedural repetition promote the development?

Hypothesis (1) : As described below, since the majority of the learners in the present study are at the lower-intermediate level, task procedural repetition will lead to increases in coordination as predicted by the developmental trajectories from coordination through subordination to phrasal elaboration.

RQ (2) : Does task procedural repetition promote greater use of cohesion?

Hypothesis (2) : Based on Bygates' (1996) findings, the present study predicts greater use of cohesive devices. Although specifying exactly which types of connectives will be promoted is impossible since correspondence between the acquisition order and learners' proficiency level is not available, task repetition will promote production of more complex (causative, temporal and adversative) connectives.

## Methods

#### *Participants.*

21 Japanese EFL freshmen (male=10, female=11) were informed of the research purposes, filled in a consent form and agreed to enroll in the present study. Originally 24 participants agreed to participate in the research, but three participants did not submit tasks and thus their data were excluded from the analyses. Participants belonged to a university in an urban area in Japan and participated in a TOEIC preparation class once a week. According to the university manual, their English proficiency was evaluated as lower intermediate (at A2 level on the Common European Framework of Reference) based on the placement test (GTEC College Test Edition, Benesse Corporation). The majority of participants in the task repetition literature had low to high intermediate proficiency levels (e.g., Ahmadian & Tavakoli, 2010, Fukuta, 2016, van de Guchte et al., 2016). The present study therefore targeted the participants with similar proficiency levels for increasing the comparability of study results.

As a course requirement, the participants in this study had to read graded or leveled readers such as the Oxford Reading Tree series (typically the "Explore with Biff, Chip, Kipper" series and Disney works) totalling 30,000 words during a semester in 2017. All books targeted in the present study were graded according to their level of difficulty in advance. The participants could choose books freely, starting on those at the easiest level, so books and their order of reading were different per participant, but their level of difficulty was not.

#### *Writing tasks.*

The participants in the present study were asked to write summaries of the books they read in around 150 words once a month over a semester (four times in total), with approximately three-week intervals. Prior studies employed various time intervals ranged from three days (Bygates, 1996) through four weeks (Van de Guchte, Braaksma, Rijlaarsdam, & Bimmel, 2016) to three months (Azkarai & Garcia Mayo, 2017) with different amounts of task repetition. Since the study reported here was of a classroom second language acquisition type and experimental intervention, specifically that placing high demands on students was inevitably restricted, a three weeks interval was employed. No feedback on vocabulary choice or grammatical accuracy was provided.

#### *Grammatical complexity indices.*

For addressing RQ (1), the following six indices of grammatical complexity were taken from, and their analyses were run by, the L2 Syntactic Complexity

Analyzer component (Lu, 2010) of the Tool for the Automatic Analysis of Syntactic Sophistication and Complexity (TAASSC, version 1.1) developed by Kyle (2016). The following indices were selected in order to analyse grammatical complexity by overall length, clausal and phrasal complexity as in Nakamura (2019, 2020) (see Nakamura, 2019, for how to calculate these in TAASSC) :

| | | |
|---|---|---|
| Overall length | (a) | Mean Length of Sentence (MLS) |
| | (b) | Mean Length of T-unit (MLT) |
| Coordination | (a) | T-units per Sentence (T/S) |
| Subordination | (a) | Dependent Clauses per Clause (DC/C) |
| | (b) | Dependent Clauses per T-unit (DC/T) |
| Phrasal complexity | (a) | Mean Length of Clause (MLC) |

***Cohesion indices (connectives).***

Connectives such as *because* and *moreover* can connect ideas provided in clauses (and thus clauses themselves) in such a way that readers are able to notice text organization (McNamara et al., 2014). As in Kormos (2011), the following indices were taken from, and their analyses were run by, the Coh-Metrix (McNamara et al, 2014) in order to investigate RQ (2).[1] Table 2 provides a list of connective indices used in the present study.

## Results

Since some data did not show normal distributions and the number of the participants in the present study was relatively small (N=21), nonparametric Friedman's ANOVAs and subsequent paired comparisons were conducted on the data. As the lack of significant differences shows, participants produced similar amount of words across four time points ($X^2$ (3)=3.10, $p$=.378).

***RQ (1) : For which dimensions of grammatical complexity does task procedural repetition promote the development?***

Figure 1 provides mean rank orders of six grammatical complexity indices as a function of four different time points, and Table 3 shows the results of inferential statistics. First, task repetition had significant main effects on complexity by overall length ($X^2$ (3)=11.81, $p$=.008 for MLS, and $X^2$ (3)=10.90, $p$=.012 for MLT). Subsequent paired comparisons demonstrate that participants produced longer sentences and T-units at Time 3 compared with Time 1, as revealed by significant differences between them (MLS Time 1<MLS Time 3, $p$=.03, and MLT Time 1< MLT Time 3, $p$=.03). For MLS, there were also significant differences between Time 1 and Time 4 in that participants produced longer sentences at Time 4 than at Time 1 ($p$=.011).

Second, task repetition had no effects on the amount of coordination, as revealed by the lack of significant main effects ($X^2$ (3)=1.70, $p$=.64, for T/S).

Third, task repetition lead to the greater amount of subordination. Two of the subordination measures showed significant main effects of task repetition : $X^2$ (3)=10.87, $p$=.012 for DC/C, and $X^2$ (3)=9.69, $p$=.021 for DC/T, respectively. Learners produced a greater number of dependent clauses per clause or per T-unit at the final time point (DC/C Time 1<DC/C Time 4, $p$=.006, and DC/T Time 1<DC/T Time 4, $p$=.014, respectively).

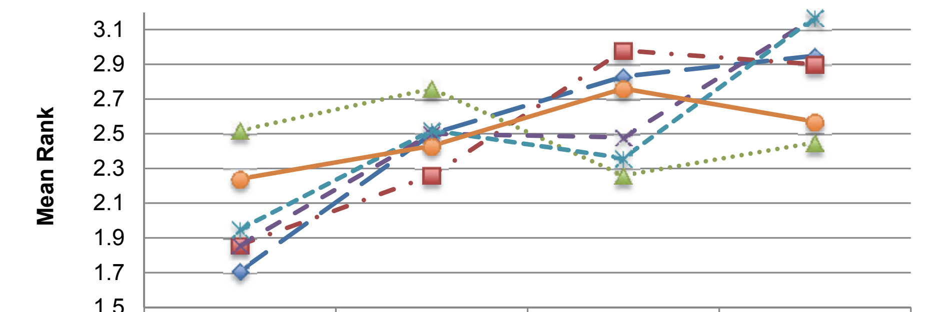
Finally, task repetition did not lead to greater complexity by phrasal elaboration. Friedman's ANOVAs showed the lack of main effects of task repetition on MLC : $X^2$ (3)=1.86, $p$=.603.

In sum, the participants in the present study produced longer sentences and T-units at Time 3 and this was followed by significant increases in the amount of subordination in Time 4. Since task repe-

**Table 2 A List of Cohesive Indices**

| Types | Calculations | Examples |
|---|---|---|
| Summed total | Occurrences per 1,000 words | |
| Causal | | *because* |
| Logical | | *and* |
| Adversative/contrastive | | *although* |
| Temporal | | *first* |
| Temporal expanded | | |
| Additive | | *moreover* |

*Note*. All examples were taken from McNamara et al. (2014).




| | Time 1 | Time 2 | Time 3 | Time 4 |
|---|---|---|---|---|
| MLS | 1.71 | 2.5 | 2.83 | 2.95 |
| MLT | 1.86 | 2.26 | 2.98 | 2.9 |
| T/S | 2.52 | 2.76 | 2.26 | 2.45 |
| DC/C | 1.86 | 2.5 | 2.48 | 3.17 |
| DC/T | 1.95 | 2.52 | 2.36 | 3.17 |
| MLC | 2.24 | 2.43 | 2.76 | 2.57 |

Figure 1　Mean Rank Orders of Grammatical Complexity Indices

Table 3　Results of Friedman ANOVAs and Paired Comparisons of Grammatical Complexity

| | MLS | MLT | T/S | DC/C | DC/T | MLC |
|---|---|---|---|---|---|---|
| Friedman ANOVAs | $X^2$ (3)=11.81 $p$=.008 | $X^2$ (3)=10.90 $p$=.012 | $X^2$ (3)=1.70 $p$=.64 | $X^2$ (3)=10.87 $p$=.012 | $X^2$ (3)=9.69 $p$=.021 | $X^2$ (3)=1.86 $p$=.603 |
| Paired Comparisons | T1<T3 $p$=.03 T1<T4, $p$=.011 | T1<T3 $p$=.03 | | T1<T4 $p$=.006 | T1<T4 $p$=.014 | |

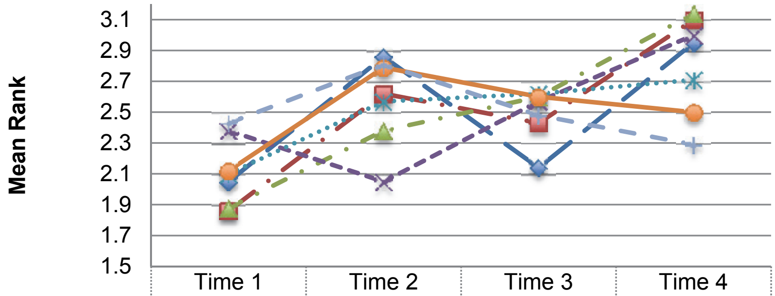
*Notes*. MLS=Mean Length of Sentence, MLT=Mean Length of T-Unit, T/S=T-units per Sentence, DC/C=Dependent Clauses per Clause, DC/T=Dependent Clauses per T-unit, MLC=Mean Length of Clause, T=Time. All $p$ values in the paired comparison columns were adjusted ones.

tition had no effects on the amount of coordination, Hypothesis 1 seems disconfirmed.

***RQ (2) : Does task procedural repetition promote greater use of cohesion?***

As Figure 2 indicates, a greater number of more complex connectives (causal, temporal, adversative, and logical) as well as summed total connectives including all types of connectives were produced as the tasks were repeated, while simpler additive connectives remained the same. These were in the expected directions.

However, as a series of nonparametric Friedman's ANOVAs and subsequent paired comparisons described in Table 4 showed, task repetition significantly promoted productions of summed, causal, and logical connectives only ; for the summed connectives, there was significant main effects of task procedural repetition ($X^2$ (3)=8.371, $p$=.039). However, post hoc paired comparisons showed none of the comparisons reached statistical significance (all adjusted $p$s were beyond .05). For the production of causal and logical connectives, task procedural repetition had main effects ($X^2$ (3)=9.914, $p$=.019 for causal connectives, and $X^2$ (3)=10.378, $p$=.016 for logical connectives, respectively). As Table 4 shows, participants produced a greater amount of causal and logical connectives in the final than in the first writing tasks ($T$=−1.238, $p$=.011 for causal connectives, $T$=




| | Time 1 | Time 2 | Time 3 | Time 4 |
|---|---|---|---|---|
| Summed | 2.05 | 2.86 | 2.14 | 2.95 |
| Causal | 1.86 | 2.62 | 2.43 | 3.1 |
| Logical | 1.88 | 2.38 | 2.6 | 3.14 |
| Adversative | 2.38 | 2.05 | 2.57 | 3 |
| Temporal | 2.1 | 2.57 | 2.62 | 2.71 |
| Temporal expanded | 2.12 | 2.79 | 2.6 | 2.5 |
| Additive | 2.43 | 2.81 | 2.48 | 2.29 |

Figure 2 Mean Rank Orders of Cohesion Indices

Table 4 Results of Friedman ANOVAs and Paired Comparisons of Cohesion Devices

| | Summed | Causal | Logical | Adversative | Temporal | Temporal expanded | Additive |
|---|---|---|---|---|---|---|---|
| Friedman ANOVAs | $X^2$ (3)=8.371 *p*=.039 | $X^2$ (3)=9.914 *p*=.019 | $X^2$ (3)=10.378 *p*=.016 | $X^2$ (3)=6.058 *p*=.109 | $X^2$ (3)=2.971 *p*=.396 | $X^2$ (3)=3.000 *p*=.392 | $X^2$ (3)=1.857 *p*=.603 |
| Paired Comparisons | | T1＜T4 *p*=.011 | T1＜T4 *p*=.009 | | | | |

*Note*. All *p* values in the paired comparisons columns are adjusted ones.

−1.262, *p*=.009 for logical connectives, respectively). Thus Hypothesis 2 was partially confirmed.

## Discussion

### Task procedural repetition and grammatical complexity

Although task repetition had positive effects on other dimensions (overall length and subordination) and thus is consistent with the findings of previous studies (Bygates, 1996, 2001, Dawadi, 2019, and Ahmadian & Tavakoli 2010), it did not lead to a greater amount of coordination expected by the participants' location on the developmental trajectories. One possibility is that the developmental trajectories from coordination through subordination to phrasal elaboration might be invalid, and a recent study by Frizelle, Thompson, McDonald, and Bishop (2018) apparently showed this. They investigated the development of syntactic complexity in oral narrative production by people with a wide age range (from 4 to 64 years old) and found that coordination occupied one third of all multi-clause production across different age bands, suggesting "once children start to combine clauses, they used subordination as well as coordination" (p.1189). However, they counted nonfinite subordination (e.g. she stop *to smoke*) as subordinate clauses and this proliferated the number of subordinate clauses (see Nakamura, 2019, 2020, for discussions of nonfinite clauses). Indeed, one third of all subordinate clauses were nonfinite subordination in Frizelle et al.'s (2018) data. Moreover, the developmental trajectories have been confirmed empirically with various tasks and are motivated functionally

(Halliday & Matthiessen, 1999) and evolutionally (Givon, 2009). Givon (2009) suggests such developmental trajectories from parataxis clause (coordination) to syntaxis (subordinate/embedded clauses) are also found diachronically and phylogenetically (but see also Slobin, 2004). Therefore, the developmental trajectories themselves seem robust both theoretically and empirically.

Another possibility is that participants in the present study were actually learners on the next proficiency level, i.e. intermediate, where subordination, but not coordination, is a responsible subset of grammatical complexity. One potential piece of evidence for this interpretation, albeit a rather crude way for inferring learners' proficiency which should thus be interpreted with caution (see Nakmaura, 2020 and papers cited there), is that the participants were allocated to the upper English class according to the placement test. Future studies should employ more objective ways for measuring participants' proficiency, such as the cloze test, and consider procedures for deducing their positions on the developmental trajectories.

### Task procedural repetition and cohesion

The present study found that repeating tasks with similar procedural contents promoted use of cohesive devices, i.e. linguistic connectives. Although descriptive statistics provided in Table 3 shows this is the case for the majority of the connectives investigated in the present study, only causal and logical connectives, as well as summed total connectives, reached statistical significance. The nature of the target task and cognitive complexity of connectives (Bloom et al., 1980) corresponding to levels of reasoning (Taylor, Lawrence, Connor, & Snow, 2019) will shed light on such findings.

Taylor et al. (2019) explored the relations between levels of complexity in the reasoning students applied and the cognitive complexity of connectives (additive, causal, temporal, and adversative) in argumentative essays written by $6^{th}$-$8^{th}$ graders in middle schools. They found that additive connectives, the earliest acquired connective in the acquisition order, were related to the least complex reasoning of "no argument", i.e. just providing an own opinion without any support. Moreover, the most complex level of reasoning, namely "integrative perspective" where participants conceded negative points in their own arguments or positive ones in opposing positions, was associated with the use of the most cognitively demanding, adversative connectives.

In the case of additive connectives such as *and*, the reason for the lack of significant differences in the present study seems rather clear : additive connectives are concerned with just adding information without necessarily providing complex reasoning about the events connected with them (Taylor et al., 2019), and are thus the least cognitively demanding (Bloom et al., 1980 ; Evers-Vermeul & Sanders, 2008 ; Spooren & Sanders, 2008). Such basic cognitive operations are a minimum requirement for event sequencing in narrating a story no matter how many times participants repeat tasks. Therefore, there were no significant differences among different time points for the use of additive connectives.

In narrating a story, a causal or logical chain between consecutive events and between a protagonist's motive and an actual action can be marked explicitly using causal and logical connectives, or connoted implicitly using additive ones. Both are possible options, but the former is more complex than the latter according to Sanders' cumulative cognitive complexity theory. Repeating a task procedurally indeed stretches a learner's cognitive system to employ more complex operations, which results in greater use of causal and logical connectives.

Why then did task procedural repetition not promote the use of temporal connectives? Considering the fact that temporal ordering between events can also be marked explicitly by temporal connectives, or implicitly by simpler additive ones as in the case of causal and logical connectives just described above, the null effects revealed by the lack of significant main effects of task repetition are rather surprising. In other words, task repetition should also have stretched learners' cognitive system in such a way that more complex operations and their consequent greater use of temporal connectives were promoted. This remains fixed in further studies.

Finally, the lack of significant main effects of task repetition on the use of adversative connectives can be ascribed to the nature of the task. The writing task in the present study is a descriptive one, where enforcing own opinions by contrasting with, concurring with, and attacking opposing perspectives is not required ; thus, adversative connectives which have these functions were not used and promoted much. In other words, when a task itself does not require use of a particular cohesive device, then its procedural repetition has no promotive roles in its production.

## Conclusion

The present study investigated effects of task procedural repetition on the development of grammatical complexity in L2 written narrative production and found that repeating summary writing led to greater subordination as well as longer sentences. The majority of the prior studies have investigated effects of task repetition on L2 speech production, and since speaking and writing, taking into account obvious differences such as online planning time, also show some similarities in message conceptualization, formulation, and articulation stages (Kellog et al., 2013 ; Levelt, 1989), accumulations of research findings on L2 written production and comparative studies with spoken correspondences are clearly needed for clarifying "robustness" of task repetition.

Another important aspect of the present study is the inclusion of multiple measures for investigating development of grammatical complexity, and the finding that subordination, but neither coordination nor phrasal complexity, was promoted by task repetition indicates that if we employ only measures along one particular subdimension, we may hide the (null) effects task that repetition has on the other subdimensions.

The present study also expanded the research from basic CAF dimensions to more "applied" areas, here cohesion, and showed task procedural repetition promoted greater use of causal and logical connectives. These were essential for successful task completion in the present study. As Robinson (2007, Robinson et al. 2009) has repeatedly suggested and demonstrated, more specific indices in conjunction with general ones are needed for capturing learners' development of and thus task potentials for "task-induced linguistic structure" (Kim & Tracy-Ventura, 2013).

### Notes

* Part of this paper was presented at TBLT in Asia 2018, the fourth biennial conference presented by the JALT TBL SIG at Ryukoku University, Kyoto, Japan, in June 2018.

[1] The Coh Metric can also calculate the amount of positive (e.g. *also*) and negative (e.g. *however*) connectives, but their data were omitted from the analyses : since the Coh Metiric cannot distinguish them into subcategories (e.g. positive causative) which are necessary for data interpretation along Sanders and colleagues' cognitive complexity theory of connectives, they cannot be located on the acquisition order easily.

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