No quick fix: The effects of awareness-raising and machine translation on error recognition and written accuracy for Japanese EFL learners

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Abstract

The role of the mother tongue in the production of a second language has long been established. In particular, raising awareness of the similarities and differences between L1 and L2 has been given increasing credence as a means of improving grammatical accuracy. In this study of Japanese university EFL learners (N=33), an experimental group was sequentially exposed to a crosslinguistic intervention and compared with a control group to determine whether the combined use of (1) an awareness-raising checklist (that empha-

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sized grammatical differences between Japanese and English) and (2) machine translation (aimed to facilitate the accuracy of written output) would help them to report the recognition of errors in a reading task and reduce the number of errors produced in a writing task. The study also investigated participant orientations towards the intervention itself. The results indicated that, for the most part, the control and experimental groups did not display any significant differences in terms of performance in both recognition and production, although some positive attitudes were observed towards the intervention. Various implications, as well as considerations for future research avenues, are explored.

1. Introduction

The varying roles that a learner's native tongue (L1) may play in the learning of a second language (L2) have been widely documented. This study examines the potential for cross-linguistic awareness-raising practices to be implemented in a Japanese context, using error awareness-raising techniques and machine translation as a possible basis to improve error recognition and written accuracy.

2. Literature review

2.1 Background and context

In an attempt to improve grammatical accuracy, many have advocated explicit L1-referencing in the classroom. Atkinson (1987; 1993), for example, claimed that such referencing is required for accuracy-orientated tasks, while Butzkamm (2003, p. 38) argued that appropriate L1-referencing is a necessary part of the second language acquisition process. Some argue that L1-

referencing demands a more explicit means of implementation (e.g., Copland & Neokleous, 2011), although such an approach seems to be absent in general classroom practices (Laufer & Girsai, 2008). The influence of L1 may also be one of several contributing factors towards L2 errors (e.g., Zobl, 1980). Further to this, Selinker (1972) pointed out that L1 transfer and overgeneralizations have the potential to become fixed—or "fossilized"—and therefore require due attention. One way of applying such attention is through cross-linguistic awareness-raising. This is addressed by Lakkis and Malak (2000, p. 26), who investigated the influence of L1 on L2, and concluded that where there exists "no equivalent in one of the languages, instructors should point out these differences to their students." Thus, there appears to be justification for the explicit referencing of the similarities and, especially, the differences between L1 and L2.

The subsequent question arises as to which parts of L2 need to be specifically referenced in relation to L1. In the case of Japanese learners of English, the literature cites various problematic areas. We selected five of the most pertinent categories of errors owing to their ease of being both clearly identifiable and quantifiable. The first category is articles. Whereas English requires the use of both definite and indefinite articles, Japanese contains none, which may influence L2 production. Many researchers (e.g., Izumi, Uchimoto, Saiga, Supnithi, & Isahara, 2003; Kawai, Sugihara, & Sugie, 1984; Nagata, Morihiro, Kawai, & Isu, 2006) have pointed out that Japanese EFL learners' production commonly reflects this linguistic difference in that articles are omitted or used erroneously. For the sake of research manageability, article omission (both definite and indefinite) was selected as the specific focus for this first category. An example sentence containing typical article omissions of

a Japanese learner is: There is convenience store next to station. The second category of error is omission of plural suffixes. Iwasaki, Vinson, and Vigliocco (2010) explained that a major obstacle for Japanese speakers is misdetection of countability, while Kobayashi (2008) noted that Japanese learners of English tend to have a fixed conceptualized notion that specific nouns, especially abstract nouns, are uncountable. These points may be contributing factors as to why plural suffixes might be frequently omitted by Japanese learners of English. An example of plural omission is: That convenience store sells sandwich. The third category of error is verb tense. Bryant (1984) reported that difficulties associated with using verb tense correctly could manifest in a number of ways, ranging from misapplication of tense (e.g., I'm usually going there on my way home or I go there yesterday) to failure to inflect or modify correctly (e.g., My sister live in Tokyo or If I had enough money, I travel around the world). Since verb tense is easily identifiable, any verb-related error was included within this category. The fourth category is prepositions. De Felice and Pulman (2009) claim that prepositions are a significant problem for EFL learners in general and form up to 12% of all grammatical errors. Within a Japanese context, Izumi, Uchimoto, and Isahara (2004) analyzed a corpus of transcripts and found a variety of issues related to the usage of prepositions including omission (e.g., I want buy magazines) and misapplication (e.g., I'm interested for music). Owing to their ease of identification, any form of error associated with prepositions was included within this category. The final category of error is pronouns. Thompson (2001; as cited in Swan & Smith, 2001) identified that, although implied, possessive pronouns in Japanese generally remain unexpressed. An example of this is: She washed face and cleaned teeth. In a study of pronoun comparisons between English and Japanese, Warnick

(1991) stated that due to cultural factors, a reduction of utterances tends to be favoured and, as a result, may account for why pronouns are often omitted. For instance, *I like them* may simply become *I like*, or *I gave it to him* may be expressed as *I gave*. Any pronoun-related error was included within this category.

2.2 Steps in error awareness-raising

Our study attempts to measure the effects of intentional awareness-raising of the similarities and differences between Japanese and English in a two-step process. The first step sets out to determine whether awareness-raising practices affect the recognition of errors associated with the five above-mentioned language items when they are encountered and what this effect might be. This may be regarded as "instances of recognition." The second, more cognitively demanding step, aims to establish how this recognition may affect production, here in the form of written output. Errors may be quantified and regarded as "instances of error," and self-correction during the awareness-raising process may be regarded as "instances of repair."

Previous research into explicit L1 and L2 comparisons and contrasts has yielded promising results in terms of improved error recognition and written performance. Lucas (2012) found that in-class quizzes relating to L2 error identification and L1 to L2 translation quizzes were effective for Japanese learners in improving article and plural omissions, not only in the subsequent recognition of such L2 errors, but also in the reduction of the same errors produced in L2 writing. Similarly, Kupferberg and Olshtain (1996) demonstrated that L1 Hebrew speakers who were exposed to contrastive linguistic input outperformed their counterparts who were not exposed to any such input for

both recognition and production tasks. Norris (1992) reported a reduction in production errors relating to articles and object pronouns for Japanese learners through awareness-raising techniques that incorporated the use of coloured rods. More recently, Hosseininik (2014) compared and contrasted Persian L1 and English L2 through explicit oral explanation and found that post-treatment test scores in recognition, translation, and written production were all significantly higher than those from pre-treatment, as well as a control group who received no such explanation. Additionally, Morgan (2012) conducted an extensive study in a Japanese context and found it highly beneficial for both learners and EFL professionals alike to explicitly focus on selected crosslinguistic aspects of L2 learning.

2.3 The possible role of machine translation

While a large proportion of awareness-raising practices tend to be teacherfronted, learners may benefit by becoming more autonomous in their language learning. Using checklists is one method (e.g., Rushidi, 2009), while real time machine translation (MT) is another.

Various studies within the last ten years have investigated the role of MT in language learning. Garcia and Pena (2011) used MT as a means of facilitating the writing process in beginner and lower-intermediate learners. Participants were asked to write directly in L2, and then with the assistance of real time translation software. The results indicated that for these low-level learners, MT offered a way to communicate more effectively and in greater quantities. The authors concluded that, despite the very small sample size, MT can be a useful way to assist with learners' written output. However, it is important to note that it might not necessarily encourage learning on a deeper

linguistic level since MT tends to carry much of the cognitive burden.

In another study, Niño (2008) focused on the process of post-editing (PE) a machine-translated text, essentially using MT as the basis for translation. This was compared with a traditional "from scratch" translation activity in order for the number of errors between the two modes to be compared. Learners of Spanish at an advanced level were split into two groups and asked to translate a text directly or to use an MT version as a basis for editing. The results showed that, although there were no significant differences in the number of errors made by each group, the MT group generally produced a final text with fewer errors in the lexical and grammatical domains, but slightly more in the discursive one. Niño concluded that MT output is a suitable source for "raising language awareness through error detection and correction" (p. 45). However, one weakness of this study is the lack of followup work to demonstrate whether any possible gains in language awareness were maintained. Therefore, further enquiry is required in order to establish whether any useful strategies or language awareness is sustained from MT post-editing, particularly strategies that might be applicable to a regular translation activity.

Kliffer (2011) explored error recognition and correction in translations that incorporated MT as a basis for PE. The participants were language major students who were studying to become professional translators. According to Krings (2001), post-editing MT offers economies of time: 20% faster than revising human translation with less cognitive effort required to process the text. Kliffer studied the performance between both human and MT translations with PE, comparing 14 categories of language for errors such as tense, preposition, and punctuation. The results of the raw MT translation compared

to straight human translation were 92 errors in total for MT, as opposed to 45 for humans. The PE results, obtained after participants had edited the MT raw output, showed only 30 errors. However, the difference between the PE and human versions was not statistically significant.

Although the studies outlined above are illuminating insofar as they indicate the possible role of MT in language learning, there currently remains very little research investigating how it may be utilized to complement other crosslinguistic awareness-raising practices to improve written accuracy, particularly within a Japanese context. Owing to this gap in the literature, the present study's research questions were devised.

3. Research questions

Our study investigates three strands of research: the effects of cross-linguistic awareness-raising practices on L2 error recognition in reading, the effects of such practices on the accuracy of L2 written production, and learner attitudes towards these practices. In relation to these strands, three research questions were formulated:

- Does written L2 (English) being compared and contrasted with written L1 (Japanese) through the combined use of an awareness-raising checklist and machine translation improve the subsequent recognition of L2 errors?
- 2. Does the combined use of such an awareness-raising checklist and machine translation subsequently reduce the number of L2 errors in written performance?
- 3. What are the orientations of the participants in the experimental group

towards the use of an awareness-raising checklist and machine translation in improving their L2 written accuracy?

These three research questions are each accompanied by an *a priori* hypothesis. The first is that the awareness-raising treatment will help participants increase the instances of recognition with regard to their own L2 errors. The second posits that the intervention will improve L2 written accuracy, observable through a reduction in the instances of errors produced. Finally, the third hypothesis is that participant attitudes towards the intervention will be favourable.

4. Method

4.1 Participants, sampling, and design

The participants were all native Japanese second-year university students (between the ages of nineteen and twenty) in the faculty of International Studies and Liberal Arts at Momoyama Gakuin University. Opportunity sampling was used with a total of 33 students (19 female and 14 male) across two EFL writing classes estimated by the university to be at the CEFR A1 level. Half of each of the two classes was randomly divided into a control group (N=17) and an experimental group (N=16) to both maximize homogeneity and reduce any potential bias (although both of the researchers knew about the groupings). The study employed a quasi-experimental mixed methods design of both quantitative and qualitative data to strengthen validity (Greene, Caracelli, & Graham, 1989). Only data obtained from participants who provided written consent was placed for inclusion in the analysis.

4.2 Instrumentation

The quantitative data was collected from two primary sources: (1) two diagnostic tests to measure reception (see Appendix A) and (2) writing samples from authentic classwork to measure production.

The two diagnostic tests were a way of measuring error recognition with regard to the five selected language items (i.e., articles, plural suffixes, verbs, prepositions, and pronouns) before and after the intervention. The tests comprised a narrative totalling twelve sentences: two erroneous sentences per language item (i.e., ten sentences), plus two correct sentences. A continuous discourse was used since a semantic framework is less cognitively demanding, and therefore easier to process (Kaplan & Grabe, 2002). Additionally, a variety of affirmative and negative sentences were also incorporated into the tests in a further attempt to reduce bias (Grinstead & Snell, 1997). Each recognition test was administered on paper to both control and experimental groups simultaneously through standardized instructions with a time limit of four minutes.

The productive data was recorded directly online using the learning platform "Moodle" (Dougiamas, 2002) owing to the fact that the lessons were conducted in a computer-assisted language learning laboratory.

Supplementary quantitative data was collected using an online exit survey through the website, "Survey Monkey" (https://www.surveymonkey.com) upon completion of the treatment period from both control and experimental groups (see Appendix B).

Qualitative data was gathered using guided questions (see Appendix C) in focus group interviews, both prior to and after the intervention, also from both groups.

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4.3 Procedures

The experimental group was exposed to a combined treatment of (1) an awareness-raising checklist (herewith "ARCL," see Appendix D) and (2) cross-linguistic input via the MT website "Google Translate" (https://translate.google.com). Class meetings were twice-weekly, and the treatment period spanned a total of four weeks (i.e., eight exposure sessions in total). The treatment was administered at the same time as participants were engaged in a systematic series of free writing composition tasks using topics from a prescribed coursebook. The control group completed identical writing tasks as the experimental group, except continuing without any such treatment. Although the control group was given an equal amount of feedback as the experimental group with regard to their writing attempts, it did not feature any explicit cross-linguistic instruction.

The ARCL was provided on paper and its use demonstrated to the experimental group by one of the researchers, during which the control group were simply instructed to continue writing their compositions. The purpose of the ARCL was for the learners in the experimental group to perform a self-check on their own written output. They were asked to carefully scan their writing while consciously attempting to identify errors associated with any of the five language items on the ARCL. They did this by focusing, one by one, on each particular category of errors, which required their work to be re-read a total of five times. To facilitate this process, the ARCL contained five sets of example sentences containing L2 errors with L1 translations for each of the five categories, as well as a box adjacent to each in which to insert tick marks after checking each category.

The writing samples were extracted from two sets of the experimental

groups' compositions over a series of three strictly-timed drafts, each lasting five minutes. The first set of three drafts (i.e., taken from Session 1) was randomly selected from those of the 16 participants in the experimental group who produced a sufficient amount of data to qualify for analysis at the start of the treatment period and the second set at the end (i.e., Session 8). The first five-minute draft was written and saved directly onto Moodle, and participants were asked to refrain from using a dictionary or other learning resources. Participants then copied their first draft into a new text field (by replying to their own initial posting), and edited it while referring to the ARCL in order to check for and correct any errors related to the five language items. After five minutes, participants saved their work and then pasted the second English draft into the MT website so that a Japanese version appeared. They read the Japanese translation to check for errors in the L1, and any errors that had not been originally detected by the learners in the second draft using the ARCL were then to be amended directly in the English version and gauged whether the error in the Japanese version had been resolved. This third English MT draft was then copied, pasted, and saved back into Moodle in a final text field. All three drafts were analyzed for instances of error and repair through careful observation of any differences between them.

The qualitative data was obtained from audio recordings of semi-structured focus group interviews, both before and after the experimental period. Upon the participants' request, the interviews were conducted in Japanese and later translated and transcribed into English by one of the researchers. A total of eight interviewees from the experimental and control groups volunteered to participate. This also served the purpose of avoiding any potential confusion between the two groups (Taggart & Martinez, 2003). Although the inter-

views followed a skeleton outline of predetermined questions, participants were allowed to diverge from the structure if they wished (Wilkinson, 2004). All participation was voluntary and with consent.

In summary, the experimental group was subjected to an intervention comprising the ARCL to check for and correct errors related to five language items empirically shown to be problematic for Japanese learners of English, and to a process of using MT to check for and correct errors in an L1-translated version of their L2 drafts. The control group was not subjected to any of these treatments, but was given regular oral and written feedback for their work. Performance in both groups was measured using error recognition tests and authentic writing samples prior to the commencement and upon completion of the intervention period.

4.4 Data analysis

Data from the recognition instrument was obtained through counting the number of instances an error relating to each of the language items. This process involved participants first placing a cross mark next to an erroneous sentence to indicate the identification of an error, and then writing its correction to demonstrate that the nature of the error had been understood. Thus, a maximum of two points was possible for each item: one for identification and one for correction.

In terms of the production instrument, writing samples were taken both at the start and completion of the treatment period (i.e., Sessions 1 and 8, respectively) and drawn from three separate modes: (1) initial L2 draft; (2) second draft after ARCL corrections; and (3) final draft after MT corrections. Each participant therefore produced six samples (i.e., 2 sessions x 3 modes).

Analysis of each sample followed the same principle of counting the total instances of usage as a base from which to contrast the number of instances where each language item had been appropriately applied. This can be demonstrated using the following authentic example:

I think that keeping my room clean is most realistic goal because I can do it from now on.

In this sentence, the definite article has been omitted from the superlative form. However, after redrafting, the same sentence was corrected to include the article:

I think that keeping my room clean is the most realistic goal because I can do it from now on.

This self-correction was operationalized by assigning a score of one point for this stage of the draft. Thus, an additional point was given for each subsequent correction. Scores from each of the six drafts were then subjected to statistical analysis.

Further quantitative data from the survey was automatically collated by the online source from which it was drawn, and the qualitative data from the focus group interviews was translated and transcribed by one of the researchers in order to inform and supplement the primary data.

5. Results

5.1 Instances of error recognition in reading

The first research question asked whether L2 being compared and contrasted with L1 through the combined use of the ARCL and MT would improve the subsequent recognition of L2 errors. In order to determine this, the results of the pre- and post-treatment diagnostic tests were analyzed in two ways: between and within groups.

The descriptive statistics for between groups are shown in Table 1. Between-group comparisons were analyzed using an independent-samples *t*-test with experimental or control as the grouping variable. The results showed that two variables were significant for the experimental group after the treatment. The first was articles, t(31) = -2.5, p = .018, with a "Large" effect size (d=.86) according to Cohen's (1988) standard criteria, and the second was plurals, t(31) = 2.23, p = .033, also with a "Large" effect size (d=1.8). These findings partially support the first hypothesis since the treatment helped the participants successfully recognize errors relating to article and plural omissions, although not for the other categories of error relating to verb tense, prepositions, and pronouns. Possible reasons for this are addressed in the Discussion section.

Table 2 shows the descriptive statistics for within-group comparisons, and, as can be seen, are almost the same as for the between-group comparisons. A paired samples *t*-test for each group was performed, and the results indicated that, as with the between-groups comparisons, significant differences lay between the pre- and post-treatment groupings for articles, t(15) = -2.42, p = .029, with a "Large" effect size (d = .86) as well as for plurals, t(15) =

| | | | | | 95% | | |
|--------------|--------------|------|------|------|------|------|------|
| Condition | Item | Test | M | SE | LL | UL | SD |
| Control | Articles | Pre | 0 | 0 | 0 | 0 | 0 |
| | | Post | 0 | 0 | 0 | 0 | 0 |
| Experimental | | Pre | 0 | 0 | 0 | 0 | 0 |
| | | Post | .38 | .15 | .08 | .68 | .62 |
| Control | Plurals | Pre | .29 | .11 | .07 | .51 | .47 |
| | | Post | 1.76 | .11 | 1.55 | 1.97 | .44 |
| Experimental | | Pre | .25 | .11 | .03 | .47 | .44 |
| | | Post | 1.31 | .17 | .97 | 1.65 | .70 |
| Control | Tense | Pre | .94 | .16 | .63 | 1.25 | .66 |
| | | Post | 1.17 | .20 | .78 | 1.56 | .81 |
| Experimental | | Pre | .94 | .19 | .56 | 1.32 | .77 |
| | | Post | .94 | .21 | .52 | 1.36 | .85 |
| Control | Prepositions | Pre | .29 | .11 | .07 | .51 | .47 |
| | | Post | .47 | .19 | .09 | .85 | .80 |
| Experimental | | Pre | .38 | .13 | .14 | .62 | .50 |
| | | Post | .63 | .22 | .19 | 1.07 | .89 |
| Control | Pronouns | Pre | .59 | .06 | .48 | .70 | .24 |
| | | Post | .35 | .12 | .12 | .58 | .49 |
| Experimental | | Pre | .25 | .14 | 03 | .53 | .58 |
| | | Post | .19 | .10 | 01 | .39 | .40 |
| Control | All | Pre | 1.59 | .27 | 1.06 | 2.12 | 1.12 |
| | | Post | 6.94 | .78 | 5.40 | 8.48 | 3.23 |
| Experimental | | Pre | 1.81 | .45 | .94 | 2.68 | 1.77 |
| | | Post | 7.06 | 1.44 | 4.25 | 9.87 | 5.74 |

 Table 1. Descriptive statistics for error recognition between groups

| | | | | | 95% | | |
|--------------|--------------|------|------|------|-------|------|------|
| Condition | Item | Test | M | SE | SE LL | | SD |
| Control | Articles | Pre | 0 | 0 | 0 | 0 | 0 |
| | | Post | 0 | 0 | 0 | 0 | 0 |
| Experimental | | Pre | 0 | 0 | 0 | 0 | 0 |
| | | Post | .38 | .15 | .08 | .68 | .62 |
| Control | Plurals | Pre | .29 | .11 | .07 | .51 | .47 |
| | | Post | 1.76 | .11 | 1.55 | 1.97 | .44 |
| Experimental | | Pre | .25 | .11 | .03 | .47 | .45 |
| | | Post | 1.31 | .18 | .97 | 1.65 | .70 |
| Control | Tense | Pre | .94 | .16 | .63 | 1.25 | .66 |
| | | Post | 1.18 | .20 | .79 | 1.57 | .81 |
| Experimental | | Pre | .94 | .19 | .56 | 1.32 | .77 |
| | | Post | .94 | .21 | .52 | 1.36 | .85 |
| Control | Prepositions | Pre | .29 | .11 | .07 | .51 | .47 |
| | | Post | .47 | .19 | .09 | .85 | .80 |
| Experimental | | Pre | .38 | .13 | .14 | .62 | .50 |
| | | Post | .63 | .22 | .19 | 1.07 | .89 |
| Control | Pronouns | Pre | .59 | .56 | .47 | .71 | .25 |
| | | Post | .35 | .12 | .12 | .58 | .49 |
| Experimental | | Pre | .25 | .14 | 03 | .53 | .58 |
| | | Post | .18 | .10 | 01 | .38 | .40 |
| Control | All | Pre | 1.59 | .27 | 1.06 | 2.12 | 1.12 |
| | | Post | 6.94 | .78 | 5.40 | 8.48 | 3.23 |
| Experimental | | Pre | 1.81 | .45 | .93 | 2.69 | 1.80 |
| | | Post | 7.06 | 1.44 | 4.25 | 9.87 | 5.74 |

 Table 2. Descriptive statistics for error recognition within groups

-7.41, p = <.001, also with a "Large" effect size (d=1.8). There were also significant differences across the total of all categories of error between preand post-treatment for both the control group, t(16) = -9.76, p = <.001, whose effect size was "Large" (d=2.21), and the experimental group, t(15) = -5.13, p = <.001, whose effect sizes was also "Large" (d=1.23).

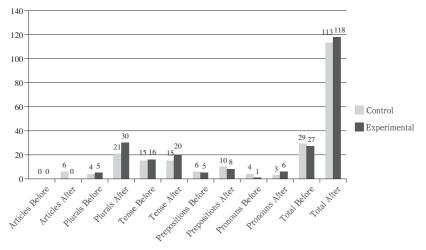


Figure. 1 Error recognition

Figure 1 shows the raw number of instances of recognition in the control and experimental groups. In spite of the first hypothesis being partially supported by the between-group comparisons of articles and plurals, since the within-groups comparisons reveal that both groups displayed an overall collective improvement to statistically the same degree in error recognition, the first hypothesis cannot be supported.

5.2 Instances of error repair in writing

The second research question asked whether the combined use of the ARCL

and MT would subsequently reduce the number of errors in written performance. To establish this, a paired-samples *t*-test was implemented to compare mode of production (i.e., writing directly in L2; writing and correcting with the ARCL; writing and correcting with MT) with time (i.e., Sessions 1 and 8). However, only five sets of participant data were available for analysis as the other 11 did not produce enough errors from each item for comparisons to be possible. Of these five samples, none were statistically significant between the language item and mode of production. From the data analyzed, since a reduction in the instances of errors produced was not observed—meaning that the intervention did not positively affect written accuracy—the second hypothesis is unsupported.

| Item | First draft | | ARCL draf | it | MT draft | | | |
|--------------|--------------|-----------|-----------|---------------------|----------|-----------|--|--|
| | Session 1 | Session 8 | Session 1 | Session 1 Session 8 | | Session 8 | | |
| Articles | 8 | 14 | 2 | 24 | 12 | 25 | | |
| Plurals | 2 | 5 | 1 | 7 | 4 | 7 | | |
| Tense | 0 | 5 | 0 | 7 | 0 | 8 | | |
| Prepositions | 7 | 6 | 12 | 9 | 10 | 9 | | |
| Pronouns | 2 | 3 | 2 | 4 | 4 | 6 | | |
| Total | 19 | 33 | 17 | 51 | 30 | 55 | | |
| Error rate | rate 1.2 2.1 | | .94 | 3.2 | 1.9 | 3.4 | | |
| Wordcount | 38.5 | 30.6 | 50.1 | 46.4 | 59.0 | 55.9 | | |

Table 3. Total raw number of errors

Given that, on an individual basis, there was insufficient data to analyze mean scores, a simple comparison of the total raw number of errors made by all participants in each mode was calculated (see Table 3). The most striking feature of these results is that participants' performance seemed to get worse

after the treatment. The total number of errors per participant increased not only between Session 1 and Session 8, but also between drafts, with the exception of the first session using the ARCL. Possible reasons for this are explored in the Discussion section.

With regard to wordcount, the total number of words written at the first point in the intervention in Session 1 (i.e., the first five-minute draft without any assistance from the ARCL or MT) was 617. At the third point in the intervention in Session 1, this increased to 944. Therefore, over the course of the 15 minutes that the participants were required to write and subsequently correct their output with the ARCL and MT, each participant averaged an increase of 20.43 words. In Session 8, the wordcount rose from 490 in the first draft to 895 in the last with the ARCL and MT. This was an average increase of 25.31 words.

The data shows that although learners increased their relative wordcount throughout the process of drafting, they made more errors and produced less overall work in Session 8 compared to Session 1. A count of instances of repair during the process also showed that learners made more repairs before the treatment began in Session 1 (a total of 4) than in Session 8 (a total of 2).

5.3 Participant orientations towards the intervention

The third and final research question investigated the orientations of the participants in the experimental group towards the use of the ARCL and MT in improving their L2 written accuracy. The qualitative data from the focus group interviews gave an insight into what participants were experiencing, as well as their thoughts and attitudes towards the intervention. Although it seems that, on the whole, the intervention was not very beneficial in terms of language

learning, participants' general responses seemed to be favourable. Three broad categories of interview questions were generated: awareness-raising, MT, and learner autonomy.

In general, participants were positive about the concept of cross-linguistic awareness-raising. Comparing the target language with one's native tongue elicited various agreeable responses. One such example is: *I think it's really good to look at those main points [of differences between languages] and see how you can address things. It's a good way to study, I think.* Another example:

I think that when I write a sentence, I'll now go back and automatically check whether I'm missing any of those important points we were made aware of. It has enabled me to go into the finer grammatical points and check to see how accurately I've written things.

In terms of attitudes towards how useful MT is as a language learning tool, there seemed to be a fairly high level of awareness of the types of errors that can be made. Several participants commented on the unreliability of MT: *I* definitely don't trust Google Translate. I just don't think it picks up on all those points on the checklist. Everything just seems to be a direct translation from Japanese, so it doesn't notice if I forget to add an 's' on plurals and things like that. Another said: Sometimes using Google Translate only confuses things, although one participant found some benefit from MT:

Funnily enough, even though I don't trust Google Translate, there's something psychologically helpful about it. By that, I mean it stopped me worrying about whether what I write is correct or not. So it's given me the confidence

to just write without overcomplicating things too much. I feel more relaxed about writing in English now.

With regard to learner autonomy, there was a general attitude recognizing its importance, as well as an understanding of the limited use a checklist may offer without the learner taking responsibility. For example:

Unless you actively learn those points yourself, I imagine not a lot is going to happen. There's no point in passively looking at a checklist. The only way around that is to take responsibility for ourselves and do lots of practice on our own at home.

In light of the general pattern to emerge from the interviews, the final hypothesis that attitudes towards the intervention would be favourable is supported.

6. Discussion

6.1 Recognition of errors

Although statistical differences were detected between conditions for articles and plurals in the experimental group, since both groups improved their overall recognition of errors during the intervention period to roughly the same degree, it is doubtful whether the intervention itself was efficacious in improving error recognition. Consequently, the first hypothesis is not supported. A possible reason why errors relating to articles and plurals were reduced while the other three categories of tense, prepositions, and pronouns were not might be accounted for by the fact that articles and plurals are perhaps comparatively

more tangible grammatical items — particularly in terms of their omission thus making their errors easier to identify. Since the accuracy of tense, prepositions, and pronouns is affected in numerable ways, it is possible that their errors were more difficult to detect. The general improvement observed in both groups could be attributable to either a natural improvement over the passage of time or, perhaps more likely, to differences in the degree of difficulty between the two diagnostic tests. Limitations with regard to the instrumentation are further discussed below. However, there are also three other important considerations to bear in mind.

Firstly, the sample size was not big enough since only 16 participants were exposed to the treatment.

Secondly, there might not have been enough time for the intervention to take effect. Learning to become reflective about language use is something that requires substantial support. Levy and Kennedy (2004) investigated how "stimulated reflection" activities facilitated learners' reflection on form. Using discussion groups that used recordings of learners' video conferences as material for identifying and correcting errors, they reported that such tasks and discussions helped learners to focus on form, and, in the process of doing so, might have become more reflective. It could be that in the early stages of helping learners to become reflective about their language use, a more intensive and social context needs to be introduced rather than a mere checklist of points to consider without any further discussion. Makino (1993) investigated the way in which teachers' correction hints affected learner error correction and concluded that although learners are capable of self-correction, their level, along with the type of hint the teacher provides, are important factors in whether self-correction is successful. In our study, learners were encouraged

to check their own work against a generic checklist, which might have made the job more taxing since learners might not know where to look for errors.

Thirdly, the intervention itself seemed ineffective in improving error recognition. Given the success of Levy and Kennedy (2004), it is possible that the approach taken here might still warrant some merit. A study by Sotillo (2005), which used text chat between native and non-native speaker combinations, showed that error correction episodes can indeed be taken up by learners. However, this again points towards the likely importance of a more interactive task rather than simply through the passive use of a checklist. Future avenues of research might take the issues mentioned here into account and investigate their effectiveness more thoroughly. This is further addressed below.

6.2 Production and repair

Of the limited data available for analysis, a significant reduction in the instances of errors produced after exposure to the treatment was not observed. Since the intervention did not positively affect written accuracy, the second hypothesis is not supported.

The underlying purpose of this intervention was to promote learner reflection using the two tools of the ARCL and MT. As already outlined, the most surprising aspect of the results was that the participants produced more recorded errors in the last session compared to the first. There might be two possible reasons for this.

First, the frequency of errors naturally increases and decreases over time as learners encounter a new form, attempt to use it, and may apply it incorrectly or even over-apply it. However, over time they are likely to gradually learn its

correct form and absorb it into their interlanguage (Ramscar & Yarlett, 2007). This suggests that a longer treatment period is required, including a further delayed test to ascertain whether any significant improvement in performance is sustained.

Second, the learners lacked sufficient time to learn how to become reflective in relation to their output, as well as not having enough knowledge and exemplars with which to compare for the successful correction of their errors. From these results, both the ARCL and MT do not appear to offer any great advantage to learners. It could be that through their implementation, learners were stretched too far beyond their existing linguistic abilities as far as their written performance was concerned. This relates back to the previously discussed MT research, indicating that the utilization of any translation software is a specific skill appearing to require explicit instruction. Therefore, perhaps MT may only be suitable for learners with a bigger base of existing language upon which to draw for an analysis of errors. Additionally, the level of the learners' language might not have been sufficiently developed enough for them to be able to identify errors in MT, or that the learners uncritically accepted the MT version as correct. One positive factor, however, is that learners were able to slightly improve their wordcounts with the assistance of the checklist and MT. This supports Kliffer's claim (2011) that MT might help improve the quantity of output.

6.3 Participants' orientations towards the intervention

Attitudes observed from the focus group interviews towards the intervention were generally favourable. Some participants were also conscious of the need to take responsibility for their own learning, and the potential usefulness of reflecting upon their second language output to check for errors. This supports the final hypothesis.

However, caution was expressed towards MT, not only in the interviews, but also in the survey data, with only 16.7% of respondents stating that they trusted the accuracy of such translation software. This demonstrates an awareness of the potential for MT to cause problems, even though a combined total of 90.4% of survey respondents either agreed or strongly agreed (58.1% and 32.3%, respectively) that MT is a helpful resource when writing in L2. It seems, therefore, that at the linguistic level of the learners in this study, there is little confidence that they are able to identify MT errors and subsequently repair them independently. This point seems to be the crux of when MT becomes useful as a language learning tool or not, and how it can be used to facilitate reflective learning. Perhaps MT is only beneficial at more advanced levels of language learning, as pointed out by Kliffer (2011). The need for a knowledgeable other was also recognized in the interviews: (I) t's not enough to just have someone remind you of those differences if I can't understand why those particular errors are happening.

In summary, although positive attitudes were expressed by the participants, an awareness of the limitations of MT was also indicated, suggesting that it should perhaps be approached with caution.

7. Limitations and future avenues of research

The overall non-significance of the results may be partly attributed to weaknesses in the study's design. It may be criticized on three main grounds.

Firstly, the study has a serious limitation in the measurement of how learners responded to the intervention since, during the drafting process in the

writing component, exposures to the ARCL and MT were sequential. Therefore, it becomes difficult to determine exactly what effect each has on production. The original intention was to investigate how these methods combined in order to help learners identify errors, but perhaps a clearer picture on the utility of each process could have been gained had they been separated (i.e., that participants did only draft and ARCL, or draft and MT). Further to this, it would have been wiser not to mix the control and experimental groups for the survey and interviews in order to more confidently isolate factors influencing the learning process.

Secondly, the reliability and validity of the diagnostic error recognition tests is questionable since both groups displayed an overall improvement. This could be remedied with more rigorous piloting. For example, although it would make the test lengthy, more than two erroneous sentences per item would be needed to draw both sufficient and more conclusive data. Additionally, a better balance between erroneous and correct sentences could be established. Finally, a Latin square design with regard to how the tests are administered would provide a further improvement.

Thirdly, the quantity of data yielded was insufficient to produce an amount satisfactory for analysis. The sample size was not big enough to produce results that might be considered statistically valid or generalizable. At the very least, 30 participants for each condition is desirable. Furthermore, it seems apparent that deeper cognitive involvement is required to increase the volume of instances of repair. As outlined above, this could be potentially rectified through the provision of in-depth training with higher-level learners over a longer period of time.

In terms of future avenues of research, the role of MT as a valid means of

cross-linguistic awareness raising still appears to have potential. However, much stricter experimental conditions are required to identify the specific ways in which it may prove efficacious. For example, a single independent variable (rather than the combined use of the ARCL and MT as used here), together with a focus on fewer categories of errors with learners whose linguistic abilities are more developed, may indeed prove worthy of further investigation.

8. Conclusion

Our study sought to investigate the effects of cross-linguistic awarenessraising through the combined use of an awareness-raising checklist and machine translation, specifically with regard to three strands of research: (1) L2 error recognition in reading, (2) L2 accuracy in writing, and (3) participant orientations towards the intervention. Each of these three strands was accompanied by an *a priori* hypothesis. The first was that the awareness-raising treatment would help participants increase the instances of recognition with regard to their own errors. The second posited that the intervention would improve written accuracy, observable through a reduction in the instances of errors produced. Finally, the third was that attitudes towards the intervention would be favourable.

Returning to the three research questions, there are some tentative conclusions that can be drawn from the data. The first research question asked whether the combined use of the ARCL and MT would help learners improve their recognition of errors. The results showed that only improvements in recognizing errors related to omissions of plural suffixes and articles were statistically significant, and that both groups showed the same degree of overall

change across the course of the intervention. The raw data also showed some types of errors being recognized more readily by participants without any intervention, and vice versa. Therefore, the first hypothesis stating that the awareness-raising treatment would help participants increase the instances of recognition with regard to their own errors was not supported.

The second research question asked whether the same process of error awareness-raising techniques (through the ARCL and MT) would have an effect when applied to written output. The results were not statistically significant, although a pattern emerged showing an increased number of both errors and words written with each step of the drafting process using the ARCL and MT. Owing to the non-significance of the data analyses, the second hypothesis positing that the intervention would improve written accuracy (observable through a reduction in the instances of errors produced) was rejected.

The third research question enquired about participant orientations towards the intervention, with the third hypothesis stating that attitudes would be favourable. For the most part, this hypothesis was supported since the focus group interviews portrayed the treatment as being helpful, particularly with regard to acknowledging the importance of becoming a reflective and autonomous learner. However, the trustworthiness of MT in terms of its accuracy was generally viewed as unreliable.

On face value, the data seems to indicate that participants were hindered rather than helped by the intervention. However, this could be due to the fact that learning to be a reflective learner, especially with something as complex as learning a language, is likely to take a lot longer than the scope of this study would allow. Although participants acknowledged the potential usefulness of an ARCL, it seems that something less passive is necessary for it to be a

viable learning medium. Our results also mirror other studies that demonstrate how MT can help with the volume of second language production, but that users might need to be trained over an extended period of time for the foibles of software-translated language to be identified and corrected. Therefore, MT's use as a language learning platform needs significant additional research to establish the best ways for each level of learner to use it, and whether it can be employed successfully as a valid pedagogical tool without formal tuition or as part of a curriculum. Other studies have emphasized the need for social interaction as part of developing critical reflection and, in order to be implemented successfully, both the ARCL and MT are likely to require much further investigation before they can be successfully incorporated into a teacher's toolkit.

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APPENDIX A. Diagnostic tests

1 Pre-treatment

My Dislikes

| 1. | I would like to talk about three things I dislike. | \rightarrow |
|----|----------------------------------------------------|---------------|
| 2. | First, one of the thing I don't like is onions. | -> |

| 3. | They are often in hamburgers, so I can't eat it. | \rightarrow |
|-----|-----------------------------------------------------------|-------------------|
| 4. | Second, I don't like getting up early. | \rightarrow |
| 5. | Yesterday, I worked to my part-time job. | \rightarrow |
| 6. | I finished late and get home at midnight. | \rightarrow |
| 7. | This morning I overslept and missed train. | \rightarrow |
| 8. | Finally, I hate mathematics and number. | \rightarrow |
| 9. | When I was at school, I don't like mathematics. | \rightarrow |
| 10. | I'm not good in number puzzles either. | \rightarrow |
| 11. | It is always too difficult for me. | \rightarrow |
| 12. | I hope you can learn couple of things about me from this. | \rightarrow |

2 Post-treatment

My Future Goals

| 1. | I would like to talk about three of my future goal. | | \rightarrow | | | | | |
|-----|----------------------------------------------------------------------|--|---------------|--|--|--|--|--|
| 2. | First, I want to be more punctual. | | \rightarrow | | | | | |
| 3. | I'm often late when I meet to my friends. | | \rightarrow | | | | | |
| 4. | . For example, last weekend, two of my friends have to wait 20 minut | | | | | | | |
| | | | \rightarrow | | | | | |
| 5. | I should check what time it is more often. | | \rightarrow | | | | | |
| 6. | Second, there are a few country I want to visit. | | \rightarrow | | | | | |
| 7. | I especially want to go to France and see Eiffel Tower. | | \rightarrow | | | | | |
| 8. | There are many famous places and I want to see it. | | \rightarrow | | | | | |
| 9. | Finally, when I graduate I want to become business man. | | \rightarrow | | | | | |
| 10. | I'd like to work with Sony or Panasonic. | | \rightarrow | | | | | |
| 11. | Last year, my father retire from Sony after 40 years. | | \rightarrow | | | | | |
| 12. | Although these goals are quite difficult, I hope I can achieve it. | | \rightarrow | | | | | |
| | | | | | | | | |

APPENDIX B. Exit survey

1. I want to learn English.

(英語を習いたいです。)

No quick fix

| Strongly agree | 74.2% | 23 |
|-------------------|-----------------|----|
| Agree | 25.8% | 8 |
| Disagree | 0% | 0 |
| Strongly disagree | 0% | 0 |
| | Total responses | 31 |

2. I enjoy writing in Japanese.

(日本語で文書などを書くことは好きです。)

| Strongly agree | 13.3% | 4 |
|-------------------|-----------------|----|
| Agree | 70% | 21 |
| Disagree | 16.7% | 5 |
| Strongly disagree | 3.3% | 1 |
| | Total responses | 30 |

3. I enjoy writing in English.

(英語で文書などを書くことは好きです。)

| | Total responses | 30 | |
|-------------------|-----------------|----|--|
| Strongly disagree | 0% | 0 | |
| Disagree | 16.7% | 5 | |
| Agree | 80% | 24 | |
| Strongly agree | 3.3% | 1 | |

4. Comparing and contrasting English and Japanese helps my English writing.

(英語と日本語の比較と対比は英作文に役立ちます。)

| Strongly agree | 25.8% | 8 | |
|-------------------|-----------------|----|--|
| Agree | 54.8% | 17 | |
| Disagree | 19.4% | 6 | |
| Strongly disagree | 0% | 0 | |
| | Total responses | 31 | |

5. Checking my work several times when I write for particular grammar points is helpful.

(ある文法をつかって英作文をする時に,正しいかどうかの確認を複数回す ることは役に立ちます。)

| Strongly agree | 35.5% | 11 | |
|-------------------|-----------------|----|--|
| Agree | 58.1% | 18 | |
| Disagree | 6.5% | 2 | |
| Strongly disagree | 0% | 0 | |
| | Total responses | 31 | |

6. Using "Google Translate" is helpful when I write in English.

| (「グ - | - グル | 〃翻訳」 | のホー | ムペー | ジ | は英語を書く | と | き | に役 | こ立 | ち | ます | 。) |
|-------|------|------|-----|-----|---|--------|---|---|----|----|---|----|----|
|-------|------|------|-----|-----|---|--------|---|---|----|----|---|----|----|

| Strongly agree | 32.3% | 10 |
|-------------------|-----------------|----|
| Agree | 58.1% | 18 |
| Disagree | 9.7% | 3 |
| Strongly disagree | 6.5% | 2 |
| | Total responses | 31 |

7. I trust that "Google Translate" is always correct.

(「グーグル翻訳」はいつも正しいと信じます。)

| Strongly agree Agree | 0% 16.7% | 5 |
|-------------------------|-----------------|----|
| Disagree | 63.3% | 19 |
| Strongly disagree | 20% | 6 |
| | Total responses | 30 |

8. I enjoyed participating in this research project.

(この研究に参加してよかった。)

| Strongly agree | 41.9% | 13 |
|----------------|-------|----|
| Agree | 48.4% | 15 |

| Disagree | 9.68% | 3 |
|-------------------|-----------------|----|
| Strongly disagree | 0% | 0 |
| | Total responses | 31 |

APPENDIX C. Focus group interview questions

1 Pre-treatment

- 1. Do you enjoy writing in English? Why? Why not?
- 2. What do you find easy when writing in English?
- 3. What do you find difficult when writing in English?
- 4. In this project we are focusing on accuracy. Which grammar points do you find especially difficult?
- 5. Do you tend to think in Japanese when you write in English? If so, is it helpful? Does it influence your writing?
- 6. Do you think translation helps or hinders your writing?
- 7. Do you find looking at the similarities and differences between English and Japanese helpful?
- 8. Do you prefer writing on paper or on a PC? Why?
- 9. How do you feel about Moodle?
- 10. Any last thoughts about our research project over the next few weeks?

2 Post-treatment

- 1. Are there any differences between your writing now and the start of the research? If so, what are they?
- 2. Was the new teaching method helpful or not? Why/why not?
- 3. Which method between the checklist and machine translation was more help-ful?

(e. g., Is it useful to compare English and Japanese? Do you feel more aware of the five items when you write now? Which ones in particular are you more aware of?)

4. If necessary, refer back to criteria from Interview 1 & review.

5. What were your general feelings about the research? (e. g., focus on accuracy, errors, etc.)

APPENDIX D Awareness-raising checklist (ARCL)

English and Japanese comparisons and contrasts 英語と日本語の比較と対比

| Did you remember…? | Examples | Japanese | Check |
|-----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------|-------|
| a, the 冠詞 | There is convenience store near station. It's best place to buy things. There is <u>a</u> convenience store near <u>the</u> station. It's <u>the</u> best place to buy things. | 駅の近くにコンビニが あります。 物を買うには最高の場 所です。 | |
| plural endings 複数形 | The convenience store sells sandwich. There are many different type. The convenience store sells sandwich<u>es</u>. There are many different types of flavour<u>s</u>. | そのコンビニはサンド を売っています。 いろいろな種類の味が あります。 | |
| verb tense 時制 | × I'm usually going there on my way home. × I go there yesterday. ○ I usually go there on my way home. ○ I also went there yesterday. | 普段は家へ帰る途中に そこへ行きます。 昨日も行きました。 | |
| pronouns 代名詞 | × I saw some magazines there. It was cheap. × I liked. ○ I saw some magazines there. <u>They</u> were cheap. ○ I liked <u>them</u>. | そこでいくつか雑誌を 見ました。 安かったです。 好みでした。 | |

| prepositions 前置詞 | × I was interested for them.× I want buy them. | その雑誌に興味があり ました。 買いたいです | |
|---------------------|----------------------------------------------------------------------------------------------|------------------------------|--|
| | ○ I was interested <u>in</u> them. ○ I want <u>to</u> buy them. | | |