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ABSTRACT

Corpus Linguistics has had major effects on English language teaching and learning in the past few decades. Its influence can be seen, for example, in the development of modern dictionaries, grammars, course books, and testing design. Data-driven Learning (DDL), or learning driven by learner access to language data found in corpora, has seen an increase in research interest, too. This interest in DDL has been accompanied by the development of learner-friendly corpora and corpus tools. This paper describes the integration of one such corpus and tool, the Sentence Corpus of Remedial English (SCoRE), into a college English as a Foreign Language course in Japan. This paper also presents survey results of learner reactions to SCoRE and DDL. Although the survey results cannot provide direct evidence for the efficacy of SCoRE or DDL, the results show that learners generally liked DDL and believed SCoRE was a useful tool.

Note: This research was originally presented at JALT2017 in Tsukuba, Japan. However, it has never previously been written up or submitted for review as a full paper.

INTRODUCTION

In the past few decades, corpus linguistics has had profound effects on several elements of English language teaching and learning (Huang, 2011). For instance, the enhanced capability of linguists to describe real-world language use via corpus research has led to great changes in reference materials for English learners. Now, learner's dictionaries, grammars, and coursebooks regularly tout their 'corpus-based' and 'corpus-informed' characteristics. A pedagogic application of corpora known as Data-driven Learning, or DDL, has also developed over this time period. In DDL, learners interact directly with corpus data; generally speaking, the goal of DDL is for learners to "'discover' the foreign language, and that the task of the language teacher is to provide a context in which the learner can develop strategies for discovery" (Johns, 1991, p. 1), and this may be accomplished by "provid[ing] the evidence needed to answer the learner's questions, and rely on the learner's intelligence to find the answers" (Johns, 1991, p. 2). However, in spite of significant findings of DDL's efficacy across several measures and contexts (meta-analysis),

DDL methods and techniques have not been widely embraced in classrooms (Conrad, 2005; Flowerdew, 2012; Römer, 2006).

Most corpora and tools for analyzing them require special training. A corollary to this point is that there are few corpora and analysis tools designed with language learners, rather than language researchers, in mind. Such a situation contributes to the difficulty of DDL being utilized and exploited in the English classroom. Rather than research-oriented corpora and tools, pedagogic corpora and learner-friendly formats for accessing the linguistic data therein are called for. The Sentence Corpus of Remedial English, or SCoRE, may be one such corpus and package of software tools. This paper describes the integration of SCoRE into a college English as a Foreign Language classroom in Tokyo, Japan. This paper also describes the results of a survey measuring learner evaluations of SCoRE, in which the corpus and software package were generally well-approved.

LITERATURE REVIEW

Data-driven Learning

DDL is usually based on the exploitation of corpus data by language learners themselves, with an aim of 'discovering' aspects of the target language. Corpora (electronically-stored collections of language-in use) contain language data that can be extracted and analyzed for various features such as word and phrase frequency, collocations and colligations, syntactic structures, fixed and semi-fixed phrases, and keyword analyses. Access to this data can 'drive' language learning in the sense that learners can use the data to answer language questions and to formulate new questions. In other words, when learners have access to this data and the tools to exploit it, they can then apply cognitive, pedagogic, and technological strategies that offer learning benefits complementary to, or in some cases superior to, other methods. Smart (2014) characterizes DDL in the following way:

- 1) Real language data are used as sources of language learning materials or reference resources;
- 2) Learning activities are student-centered and focus on language discovery (p. 186).

There is a wide variety of purported benefits of DDL. It has, for example, been suggested as a way of exposing learners to authentic examples of specific linguistic items (Gabrielatos, 2005). Others have noted that DDL can empower learners by allowing them more autonomy and control over how they learn (Mair, 2002) and in addressing errors (O'Sullivan & Chambers, 2006; Tono et al., 2014). DDL approaches have also been applied to the learning of collocations and phraseology (O'Keefe et al., 2007; Römer, 2009; Vyatkina, 2016). Additionally, DDL may aid the development of general cognitive skills such as "predicting, observing, noticing, thinking, reasoning, analysing, interpreting, reflecting, exploring, making inferences (inductively or deductively), focusing, guessing, comparing, differentiating, theorising, hypothesising, and verifying" (O'Sullivan, 2007, p. 277). Still other research suggests DDL may improve retention and recall (Cobb, 1999; Sonbul & Schmitt, 2010).

Furthermore, recent meta-analyses of DDL have shown it to be generally effective for language learning. These meta-analyses include findings from across a broad spectrum of contexts (Cobb & Boulton, 2015; Boulton & Cobb, 2017), and within specific contexts, such as among Japanese learners of English (Mizumoto & Chujo, 2015). While noting that aspects of DDL appear difficult to operationalize, the largest of these meta-analyses concluded that “DDL works pretty well in almost any context where it has been extensively tried” (Boulton & Cobb, 2017, p. 39).

Different goals and instructional objectives have led to DDL approaches sometimes being divided into two broad categories: Direct and indirect DDL (Yoon & Jo, 2016). Direct approaches involve learners using computers and specialized software to explore corpora directly in a ‘hands-on’ manner. Such approaches generally include the use of concordancers, software that can search a corpus for, e.g., particular lexical items, syntactic patterns, parts of speech, or semantic relations. The search output of concordances generally comes in the form of Keyword-in-Context (KWIC) concordance lines, which are lines of text from the corpus with the queried term(s) in the center of the line. The lines are arranged vertically so that the queried term(s) can easily be seen in the center of the screen for each line. This simplifies the process of focusing on and analyzing the queried term(s). Learners can use the KWIC output to think about, reason, and develop understandings regarding the meaning, grammar, and use of the queried term(s).

In indirect DDL, learners are generally at least one step removed from directly consulting a corpus or using specialized software. Thus, while direct DDL approaches exist on a spectrum of autonomy ranging from totally independent, individual activities by learners to instructor-directed, whole group activities, indirect approaches are extremely likely to tend toward the instructor-mediated side of the spectrum. Indirect DDL can involve activities similar to direct approaches where learners examine concordance lines, but the software is handled by the instructor and the concordance lines are provided to the learners. In such cases the instructor might even print out concordance lines for an indirect approach known as paper-based DDL (Boulton, 2010).

Direct and indirect approaches are not always seen as binary approaches. Rather than being separate, they may be viewed as part of a cline of learner autonomy in DDL tasks (Mukherjee, 2006). Thus, indirect approaches can still feature learning based on discovery, and direct approaches may still feature heavily instructor-mediated activities. The key is in what kinds of activities are undertaken rather than whether learners use corpus analysis software themselves.

The differently theorized approaches to DDL have led to several pedagogic DDL methods. One method that has been proposed as an effective strategy for DDL is Guided Induction (GI). Stemming from the ‘triple I’ (illustration-interaction-induction) model of inductive learning described by Carter and McCarthy (1995), Flowerdew (2009) describes a four-step GI model as:

1. Illustration: looking at data.
2. Interaction: discussion and sharing observations.

3. Intervention: optional, mediating step to provide learners with hints or guides.
4. Induction: making one's own 'rule' for a particular feature.

In contrast to pure 'discovery learning' and the criticism it has attracted (e.g. Kirschner et al., 2006), GI is characterized as "an approach that provides a structured, scaffolded framework for inductive learning" (Smart, 2014, p. 187).

Nonetheless, as noted earlier, DDL is sometimes difficult to operationalize. Several factors contribute to this difficulty, including, but not limited to, lack of awareness of DDL or pedagogic DDL strategies, beliefs among instructors that it is too difficult or only for advanced learners, or that the tenets of DDL are unfamiliar to instructors and learners to such a degree and that it is unlikely to be worth the time and effort to become comfortable with it. Addressing such concerns requires access to corpora with level-appropriate language and an interface (paper or electronic) that is simple for learners to use and understand. In other words, a needs-driven corpus is required (Braun, 2007). The following section of this paper discusses the Sentence Corpus of Remedial English, and how it potentially alleviates problems associated with the senses of DDL being too difficult or unfamiliar.

Sentence Corpus of Remedial English

SCoRE (<http://www.score-corpus.org>) is a corpus and web browser-based DDL application specially designed for Japanese learners of English (Chujo et al., 2015). SCoRE consists of thousands of edited sentences taken from a database of 30 million words. The data come from English textbooks used in Asia, graded readers, and children's reading and news websites. The careful selection of sources for linguistic data means that the language found in the corpus is at a level appropriate for English language learners.

SCoRE has several free tools that learners and instructors can use. It has a standard concordancing tool that will output KWIC-formatted concordance lines. Additionally, it has a tool called a Grammatical Pattern Browser that can be used to find sentences in the corpus that exhibit particular grammar structures. Furthermore, the application has Japanese and English-Japanese bilingual versions. The bilingual version operates as a parallel corpus where queries can be conducted in either language and concordance lines (i.e. sentences containing the target item(s)) in both languages appear parallel to one another on the screen. The Japanese sentences in this format are translations of the English source sentences. Finally, the Japanese version also has a cloze quiz generator that tests learners' knowledge of both grammar and lexis.

Since SCoRE was developed specifically for Japanese learners of English, it differs from most other corpora in that it is a pedagogic, rather than a research, corpus. Thus, its contents are explicitly meant to be accessible and level-appropriate for learners at various stages of English language learning, and its format and structure, due in large part to its bilingual capability, is user/learner-friendly. In other words, it is designed to meet the needs of learners and avoid several of the problems of operationalizing DDL.

Pilot Study

The survey research presented in this paper builds off of a previous pilot study (Brown, 2017b). That study involved the integration of SCoRE into multiple sections of a semester-long English as a Foreign Language (EFL) course with Japanese learners of English and investigated whether learners perceived the language of SCoRE as being at an appropriate level and whether the software was perceived as learner-friendly. A coursebook was used to structure the course curriculum and DDL activities were introduced partway through the course in an intentional fashion and according to a pre-set schedule, in some cases supplementing grammar activities from the coursebook, and in some cases replacing the coursebook activities.

The number of participants was 29 across two sections of the course. The institution at which the course was run uses a four-tier in-house proficiency streaming system for English classes, with tier one being the most proficient. This course was for tier three students. This level approximately corresponds to high A2 or B1 on the CEFR scale.

A questionnaire was administered to students in the course toward the end of the semester. The questionnaire collected data related to how learners perceived and felt about DDL activities and using SCoRE in the course, including in comparison to more 'traditional' modes of studying grammar. The survey results showed that, generally speaking, students in the course perceived SCoRE and DDL as interesting and useful. Students' responses also noted that the interface was easy to use.

However, one issue that arose in the pilot study is that the items on the questionnaire did not allow for distinctions in students' perceptions of SCoRE and DDL to be made. This is to say that the survey instrument did not distinguish between how students perceived SCoRE and how they perceived DDL activities; although these perceptions may overlap, they are not the same thing, and this flaw in the instrument negatively impacts the ability to interpret the survey results. One factor motivating the present study is to address this issue with revised questionnaire items that can distinguish perceptions about SCoRE and DDL to a greater degree than in the pilot study.

METHODS

The questions motivating the current study are 1) Do learners perceive SCoRE to be simple to use and understand?, and 2) Do learners perceive DDL to be useful and worthwhile? Similar to the pilot study, the present study also investigated the integration of SCoRE and DDL into multiple sections of a college EFL course in Tokyo, Japan, but, whereas the pilot study used SCoRE and DDL as a supplement and replacement for coursebook grammar activities, the present study involved using SCoRE as a resource for addressing a) grammatical constructions that students were having trouble grasping or controlling (whether in the coursebook or not), and b) common and recurring errors. Thus, the use of SCoRE and DDL differed from the pilot in that this time their use arose out of perceived 'on-the-fly' needs rather than as a part of a pre-set schedule. The instructional approach again utilized GI, with a mix of direct and paper-based activities. At the end of the term, a revised

questionnaire was administered. The questionnaire was administered in both English and Japanese versions.

In this iteration, the questionnaire contained specific questions about the ease-of-use and student comfort using SCoRE tools and SCoRE's bilingual option, and the clarity, helpfulness, and difficulty of the paper-based activities. The questions focusing on SCoRE tool use are meant to allow interpretation of student perceptions of SCoRE; meanwhile, the questions focusing on the paper-based activities are meant to allow interpretation of student perceptions of DDL activities. The revised questionnaire contained ten items. The English versions of the items can be seen in Table 1 in the Results section. Responses to each item were measured using a six-point Likert scale. An even-numbered scale was chosen in order to avoid 'middle' responses (Dörnyei & Taguchi, 2010). It was administered via Google Forms. Although this design is not perfect, it is believed to be an upgrade on the questionnaire used in the pilot study, at least in respect to disentangling some perceptions of SCoRE and general DDL activities. The English versions of the questionnaire items can be seen in the Results section.

The participants in this study have similar characteristics to participants in the pilot in regard to their proficiency levels, meaning that they were approximately A2 to B1 on the CEFR scale. However, while the pilot study involved two sections of the course, and participants were $n=29$, the present study involves four sections of the course. This means a much larger pool of participants, $n=74$.

RESULTS

Two sets of descriptive statistics of the survey are presented here. *Table 1* contains simple frequency counts of the Likert scale responses to each survey items. *Table 2* contains a simple percentage comparison of 'disagree' responses with 'agree' responses for each item. A 'disagree' response is one in which the response corresponds to one of the three options on the left side of the Likert scale, while an 'agree' response is one that corresponds to one of the three options on the right side of the Likert scale.

Table 1

Item	Completely disagree	Mostly disagree	Disagree a little	Agree a little	Mostly agree	Completely agree
1. SCoRE is easy to use	2	3	3	33	22	11
2. I can use the concordancer well	1	4	1	19	48	1
3. I can use the pattern browser well	2	6	4	33	25	4
4. The worksheets	0	3	6	7	52	6

were helpful						
5. The worksheets were clear	2	6	6	26	30	4
6. The worksheets were challenging	0	1	9	13	46	5
7. The worksheets improved my grammar understanding	0	2	7	7	52	6
8. I prefer the bilingual version of SCoRE	0	0	14	39	14	7
9. I would like it if SCoRE were used in other classes	0	3	16	37	26	2
10. I would like it if similar worksheets were used in other classes	2	1	12	45	13	1

Table 2

Item Number	'Disagree' responses	'Agree' responses
1	11%	89%
2	8%	92%
3	16%	84%
4	12%	88%
5	19%	81%
6	14%	86%
7	12%	88%
8	19%	81%
9	26%	74%
10	20%	80%

DISCUSSION

The descriptive statistics obtained from this survey indicate that the participants perceive both SCoRE to be easy to use and DDL tasks to be beneficial. For items evaluating perceptions of SCoRE (items 1, 2, 3, and 9), 'agree' responses indicate positive perceptions of SCoRE, and the average rate of 'agree' responses across these items is 84.75%. For items evaluating perceptions of DDL (items 4, 5, 6, 7, and 10), 'agree' responses indicate positive perceptions of DDL, and the average rate of 'agree' responses across these items is 84.6%. Furthermore, item 8 indicates that the participants in this study preferred, or at least greatly appreciated access to, the bilingual version of SCoRE. This is an interesting finding, and worthy of further exploration, however it is not central to this paper's focus.

Despite SCoRE and DDL both being viewed quite positively, these perceptions are not entirely coextensive. For instance, although the average percentage of 'agree' responses is slightly higher for the SCoRE-focused items, a finer-grained look at the items reveals that one could interpret that DDL, or at least the version of it evaluated here (paper-based DDL via GI) is viewed more positively than SCoRE itself. Items 9 and 10 are direct comparisons of participants' opinions about whether SCoRE and/or the DDL worksheets would be good to use in other classes; in this case, the DDL activities (80% 'agree') are perceived to be of more value than SCoRE (74% 'agree') itself. This could mean that these types of activities, which use GI to help learners make sense of instructor-prepared concordance lines, may be useful even without introducing learners to SCoRE in a 'hands-on' fashion.

It remains difficult, however, to fully recommend such an approach. Although the data show differences in perceptions between SCoRE and DDL, participants' perceptions of SCoRE may still be colored by the DDL activities, and vice versa. Moreover, there were several aspects of both SCoRE and DDL that were not covered by the survey. In effect, the survey instrument might be better at disentangling some perceptions of SCoRE and DDL than the pilot survey, but it remains exploratory and probative in its depth.

Another issue is that this study, like the pilot, only looks at perceptions, not efficacy. It is possible that learners perceive SCoRE and DDL as good tools and instruments, but in actuality they are not so useful, or not as useful as other tools for language learning. This might matter greatly in a time-cost/benefit analysis of using SCoRE and DDL, affecting decisions about if or when to use such tools and methods. Similarly, the instructor might be a major factor in how this study's participants experienced and perceived SCoRE and DDL. Since the instructor and researcher are the same individual in this case, a framework that takes their experience with SCoRE and DDL, style of instruction and engagement with students, and personal beliefs about teaching methods into account is needed before broader conclusions are made.

Nonetheless, the basic data gleaned from this survey support and extend the findings from the pilot study, even if only slightly. SCoRE is viewed by Japanese college-aged learners of English (at approximately A2-B1 CEFR levels) as easy to use and helpful. Additionally, GI-based DDL activities are viewed very positively by the same group. Further investigation could include refinement of the survey instrument(s) for both precision and depth, exploring SCoRE usage and DDL with other types of learners (e.g. learners at different

proficiency levels, learners in different programs or at other institutions), and more fine-grained statistical analysis of data obtained (i.e. analyzing the internal range of responses for any given item to measure the variability of perceptions).

CONCLUSION

S_{Co}RE and GI-based DDL are both viewed very positively, at least by this set of participants. S_{Co}RE is perceived as easy-to-use and the GI paper-based DDL activities are perceived as useful. However, these perceptions are not entirely coextensive, and are still not entirely disentangled because it is not clear whether learners distinguish between the corpus itself and the activities that take advantage of the corpus. In addition, it remains to be seen how well the findings with these types of learners would extend to others. Moving forward, refined research and measurement procedures would be beneficial, as well as new research questions that delve beyond learners' perceptions into efficacy and effects in other populations.

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