Drag or Type, But Don't Click:
A Study on the Effectiveness of Different CALL Exercise Types

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This paper reports on the comparative effects on learning outcomes and learner behaviour noted using three different CALL exercise types for German word order practice: multiple-choice (click), re-ordering (drag), and completion (type). Twenty-seven students of introductory German participated. For all exercise types students received error-specific feedback. Results indicate that students using the drag-and-drop interface performed significantly better than those using multiple choice, and marginally better than the typed-entry group. The more flexible word-order practice afforded by the drag-and-drop interface in addition to other benefits such as eliminating typing errors and ease of use may argue in its favour.

Le présent article est un rapport de recherche ayant pour but de comparer les résultats d'apprentissage et les comportements des apprenants face à trois types d'exercices assistés par ordinateur (choix multiples, glisser-poser et réponses tapées par l'apprenant) pour l'enseignement de l'ordre des mots dans la phrase allemande. Vingt-sept étudiants d'allemand au niveau débutant ont participé à cette étude. Dans les trois types d'exercices, les étudiants recevaient des commentaires spécifiques sur leurs erreurs. Les résultats nous montrent que les étudiants utilisant l'interface glisser-poser ont beaucoup mieux réussi que les étudiants ayant recours aux exercices à choix multiples et qu'ils ont réussi seulement un peu mieux que ceux qui tapaient leur réponse. Ce résultat peut s'expliquer de la façon suivante : dans le cas des exercices glisser-poser, le maniement des mots permet de jouer plus facilement avec l'ordre des mots dans la phrase. Ce type d'exercices permet aussi d'éliminer les erreurs d'orthographe tout en étant très facile à utiliser.

Introduction

A recent survey on CALL exercise types concluded that current technology provides 16 distinct tasks to support second language acquisition ranging from typing in words or sentences, clicking or dragging objects, to speaking words and phrases (Schulze, p.c.). For example, *Italia 2000*, a CALL program that features digital video, contains 10 different exercise types for vocabulary, grammar, comprehension, and dialogue practice (Burnage, 2001). In these exercises

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students need to identify and transcribe words, evaluate statements, re-order sentences, answer questions, etc. Even CALL authoring tools nowadays contain a large variety of exercise types that can be conveniently generated and implemented in the language learning classroom. For instance, in a recent software review of the authoring tool *Interactive Language Learning: The Authoring System*, Goulding (2002) notes that, due to the use of JAVA applets as opposed to a scripting language, the computer program provides a set of 12 templates for authoring interactive exercises. Due to ongoing technical advancements in multimedia development, more exercise types are likely to become available in the near future. From a pedagogical point of view, two central questions arise: are some exercise types inherently more suitable than others for practicing certain grammatical structures; and, how can instructors and/or CALL designers determine the appropriateness of an exercise type for a given task?

The present study takes the example of German word order and examines three different exercise types: multiple choice (click), re-ordering (drag), and completion (type). These exercise types were chosen because they provide a variety of tasks learners perform to complete the exercise. In the following section, we discuss the different skills and levels of interactivity for the three distinct exercise types.

Some Distinctions and Definitions

In what follows, *task* is used to refer to what learners do (click, drag, type), while *type* (that is, exercise type) is used to differentiate between multiple choice, re-ordering, and completion exercises.

The multiple-choice exercise type presents a word-order pattern recognition task (click) that does not entail linguistic output. In contrast, the re-ordering and completion exercise types emphasize productive skills. Re-ordering presents a word-order pattern manipulation task (drag) that requires physical manipulation of an existing word string. Since re-ordering can only be used for word-order practice, it eliminates many distractions caused by unrelated errors that may occur with the completion exercise (e.g., spelling). In the completion exercise type, words are given in scrambled order and students need to enter (type) the sentences in the correct word order. The latter task draws on more skills (linguistic and keyboarding) and would thus seem to be the most demanding.

With respect to level of interactivity, Laurel (1991) provides a useful definition by making a distinction between *frequency*, *range*, *significance*, and *participatoriness*. With respect to frequency and range, we may count the number of times a user can interact with a system and how many choices are available, respectively. Accordingly, the two output-focused exercise types, re-ordering and completion, provide a higher degree of interactivity given the

inherent limitations of a multiple-choice task. Significance and participatoriness both require a qualitative analysis to determine how the user's choices affect the system and to what degree the user is participating in ongoing system decisions (Ashworth, 1996). In this respect, the exercise types as implemented are very similar. For all three types, the system provides error-specific feedback and students can try as often as needed to achieve a correct answer. Other system decisions are not affected by a user's choice since, for the sake of this study, the exercises and their presentation order were carefully chosen.

In the following section, we first discuss the theoretical issues surrounding our study. We then provide a brief description of the constraints on verb positions in German, followed by a description of our study. We then present and discuss our results, concluding with questions for further research.

Theoretical Background

While the literature on the use of different CALL exercise types is still sparse, there has been some focus on output vs. input practice. In one of the studies on input- vs. output-focused exercise types, Nagata (1998) found that the output-practice group performed significantly better than the input-practice group in the production of Japanese honorifics. In the output-focused task students had to construct entire sentences, while in the input-focused task students solved multiple-choice questions. The benefits of output-focused tasks, however, seem to be dependent on the complexity of the structure in question. DeKeyser and Sokalski (1996), for instance, found that although the output-focused group outperformed the input-focused group with the Spanish conditional in both comprehension and production tasks, this was not the case with Spanish direct object clitics, which present less of a challenge (DeKeyser and Sokalski, 1996; see also Lapkin and Swain, 2000).

The studies cited above support theories from second language acquisition that describe factors that have been shown to foster language learning in form-focused L2 classroom learning. For example, according to Swain's Output Hypothesis (1985, 1993) language learning may occur through language production, either in the form of spoken or written language. She noted that "The importance of output to learning could be that output pushes learners to process language more deeply — with more mental effort — than does input" (1993:99). However Swain asserted that simply speaking and writing the language without making learners reflect on their output is not sufficient. Learners ideally need to be encouraged to reprocess their initial output. According to Pica (2000), this is achieved by corrective feedback on their production so that learners can modify their output toward greater comprehensibility, appropriateness, and accuracy (see also Long, 1996; Lightbown and Spada, 1990). Pica claims that "without an appropriate model, they [learners] may simply repeat

themselves, make the same errors, or come up with new ones, and find that their experience of L2 learning is even more frustrating and complex than they thought it could be" (2000, p. 6).

In our approach to CALL, we draw students' attention to their mistakes. Our CALL program provides error-specific feedback that explains the source of the error. Following Lyster's (1993) analysis of effective feedback to spoken learner output, the corrective feedback in our system provides opportunities for learners to consider ways of modifying their output by guiding them toward the correct answer. Students can revise and resubmit their answer as often as needed.

Another factor relevant to our study is the hemispheric involvement in language tasks. According to Danesi and Mollica (1988) and Danesi (1994), language learning is fostered when both learning modes are activated, the left hemispheric (L-mode) and the right hemispheric (R-mode) mode. Based on experimental research by Goldberg and Costa (1981), instruction should move from the concrete, exploratory stages (R-mode) to the more formal, mechanical procedures (L-mode). In their study with learners of Italian, Danesi and Mollica (1988) found that bimodality is most effective in classroom learning. Students trained in a bimodal fashion were far superior in both proficiency and creativity although they attained the same level of grammatical skills as the L-mode trained group. Our study emphasizes form-focused instruction thus fostering the L-mode. The interest here is whether different tasks performed in the L-mode are equally effective.

The purpose of the present study is two-fold: first, we examine input- vs. output-focused exercise types with respect to German word order, and, second we investigate the merits of two distinct output-focused tasks, drag-and-drop vs. typed-entry. Specifically, the study pursues the following research questions:

1. Given the variety of CALL exercises, are some of them more effective than others for practicing German word order?
2. Does student corrective behaviour during practice vary for each exercise type? If so, how does it affect the learning outcome?

Word order in German has been chosen as the practice structure because it typically provides a challenge for learners of German. In addition, the results might be more readily transferable to other languages.

The Study

During the spring semester 2001, 27 students from two second-semester university classes of German participated in the study. The grammatical focus of the study was word order of finite and non-finite verbs in main, coordinate and subordinate clauses. Three different exercise types were employed in the study:

multiple choice, re-ordering and completion. Students were instructed to work on each exercise until they provided the correct answer. For each exercise type, students received intelligent, that is, error-specific feedback.

The re-ordering and completion exercise types are part of an Intelligent Language Tutoring System, a parser-based CALL system that contains a variety of exercise types for both vocabulary and grammar practice. For all exercise types, the *German Tutor* provides error-specific feedback suited to learner expertise.[1] The multiple choice exercises were produced in HotPotatoes, an authoring tool that allows course designers to create different learning tasks and encode custom-made feedback for Web-based teaching material.[2] The intelligent feedback for the multiple choice exercises was manually encoded to be identical to that of the re-ordering and completion exercise types. Identical feedback for all exercise types was mandatory for the present study because Nagata (1993, 1995, 1996) found that intelligent feedback that explains the source of an error is more effective than traditional feedback. Thus any differences in the findings of the present study should not be due to differences in feedback but rather to difference in exercise types.

Word Order in German

Finite Verbs

In German, verb position plays a pivotal role in sentence structure. German word order is complex as it allows three principal word orders of the basic elements in the sentence (Hammer, 1971; Fox, 1992).[3]

I. Subject + Verb + (if any) complements, objects, adverbial limitations

This word order is often considered the most common pattern (Hammer, 1971). It occurs in a main clause beginning with the subject. An example is given in (1):

  (1) Ich schenke ihm ein Buch zu Weihnachten.
         I   give-FUT him a book   for Christmas
         'I will give him a book for Christmas.'

SVO word order also occurs in main clauses beginning with interjections and exclamations (2a), after a coordinating conjunction (2b), in indirect statements and other noun clauses if *dass* 'that' is not used (2c).

  (2)   a. Ja, ich schenke ihm ein Buch zu Weihnachten.
            Yes I   give-FUT him a book   for Christmas
            'Yes, I will give him a book for Christmas.'

       b. Ich schenke ihm ein Buch zu Weihnachten und ich kaufe   mir eine Kamera.
          I   give-FUT him a book   for Christmas   and I   buy-FUT me a camera
          'I will give him a book for Christmas and I will buy a camera for myself.'

    c. Sie sagte,   ich schenke ihm ein Buch zu Weihnachten.
        she say-PAST I   give-FUT him a book   for Christmas
        'She said (that) I will give him a book for Christmas.'

II. Inversion

A second possible word order in German is the inversion of subject and verb. It is used in interrogative yes/no questions (3a) and imperatives (3b).[4] The distinction between an interrogative and imperative clause is indicated by punctuation or, in spoken German, by intonation.

(3) a. Gehen   Sie   gern   ins Kino?
        Go-PRES you-FORMAL gladly into movies
        'Do you like going to the movies?'

      b. Gehen   Sie   ins Kino!
        Go-PRES you-FORMAL into movies
        'Go to the movies!'

Inversion also occurs in a main clause beginning with something other than the subject, where it generally has a pragmatic function. It is used to emphasize the part of the sentence that is placed at the beginning.[5] In German a wide range of items may occur at the beginning of the sentence. Among the most common, we find an adverb (4a), a prepositional phrase (4b), an indirect (4c) or direct object (4d), an infinitive, past participle, etc. The verb can also be preceded by an entire subordinating clause (4e).

(4) a. Morgen   gehe   ich ins Kino.
        Tomorrow go-FUT I   into movies
        'Tomorrow I will go to the movies.'

      b. Zu Weihnachten schenke ich ihm ein Buch.
        For Christmas   give-FUT I   him a book
        'I will give him a book for Christmas.'

      c. Ihm schenke ich ein Buch zu Weihnachten.
        Him give-FUT I   a book   for Christmas
        'I will give him a book for Christmas.'

      d. Ein Buch schenke ich ihm zu Weihnachten.
        A book   give-FUT I   him for Christmas
        'I will give him a book for Christmas.'

      e. Weil   er gern liest,   schenke ich ihm ein Buch zu Weihnachten.
        Because he gladly read-PRES give-FUT I   him a book   for Christmas
        'Because he likes to read I will give him a book for Christmas.'

III. Verb in sentence-final position in subordinate clauses

A third position of the finite verb in German is found in subordinate clauses that contain a subordinating conjunction or a relative pronoun. Here the finite verb

occurs sentence-finally. An example of a sentence containing a subordinate clause is given in (5).

(5) Ich schenke ihm ein Buch zu Weihnachten, weil   er gern   liest.
       I   give-FUT him a book   for Christmas   because he gladly read-PRES
       'I will give him a book for Christmas because he likes to read.'

Nonfinite Verbs

In contrast to the three possible positions for finite verbs, the non-finite portion of compound tenses is assigned to the end of the sentence, following any other components that may be there. For instance, example (6) illustrates the past participle in sentence-final position while the finite verb, the auxiliary, follows the subject.

(6) Ich habe   ihm ein Buch zu Weihnachten geschenkt.
       I   have-AUX him a book   for Christmas   give-PPT
       'I gave (have given) him a book for Christmas.'

An exception to the rule is made with subordinate clauses. Here the auxiliary comes last following the non-finite portion of the compound verb. An example is provided in (7), with the relevant clause underlined:

(7) Ich habe   ihm ein Buch zu Weihnachten geschenkt, <u>weil</u>   <u>er</u> <u>schon</u>
       I   have-AUX him a book   for Christmas   give-PPT   because he already
       <u>immer</u> <u>gern</u>   <u>gelesen hat.</u>
       always gladly read-PPT has-AUX
       'I gave (have given) him a book for Christmas because he always liked to read.'

In the following section we discuss the subjects in our study and the procedures followed.

Subjects and Procedure

The 27 subjects who participated in our study were in their second semester of an introductory German course at the university level. There were 17 female and 10 male students ranging from 19 to 26 years old. From their first semester, students were familiar with the positions of finite and non-finite verbs in main and coordinate clauses. However, they had not learned the verb positions in subordinate clauses prior to this study.

     The study was conducted over two weeks. During the first hour of the first week, students practiced German word order with their instructor in class. The instructor first reviewed constraints of German word order in main and coordinate clauses and then explained the position of finite and non-finite verbs in subordinate clauses. For initial practice, students completed a number of oral exercises with the instructor, which were provided in the textbook. During the second hour of the first week, students took a pre-test.

Pre-Test

The purpose of the 50-minute pre-test was to assess students' prior knowledge of German word order and to form equally balanced groups for the study. The pre-test was a pen-and-paper task where students were given a worksheet with a total of 20 scrambled sentences exemplifying the various types of sentences presented in the section "Word Order in German". Students were asked to rewrite the sentences in the correct word order. An example is given in (8).

(8) wir / diesen / Sommer / ohne / die / Kinder / gereist / sind
   Correct answers:
   Diesen Sommer sind   wir ohne die Kinder   gereist.
   This summer   be-AUX we without the children travel-PPT

   Wir sind   diesen Sommer ohne die Kinder   gereist.
   We be-AUX this summer   without the children travel-PPT

   Wir sind   ohne die Kinder   diesen Sommer gereist.
   We be-AUX without the children this summer   travel-PPT

   Ohne die Kinder   sind   wir diesen Sommer gereist.
   Without the children be-AUX we this summer   travel-PPT
   'This summer we traveled without the children.'

For most sentences, there was more than one possible answer. All possible answers were rated equally, and one point was deducted for each wrong answer. In the event that a sentence contained more than one mistake, additional points were deducted. Example (9) illustrates an instance where the student placed both the auxiliary and the past participle in the wrong position and hence two points were deducted.

(9) ich / habe/ gesessen / gestern / im / Garten
   Student answer:
    *Gestern   ich habe   gesessen im Garten.
     Yesterday I   have-AUX sit-PPT   in the garden
   Correct answers:
   Gestern   habe   ich im Garten   gesessen.
   Yesterday have-AUX I   in the garden sit-PPT

   Ich habe   gestern   im Garten   gesessen.
   I   have-AUX yesterday in the garden sit-PPT

   Im Garten   habe   ich gestern   gesessen.
   In the garden have-AUX I   yesterday sit-PPT
   'Yesterday I sat in the garden.'

After the pre-test, students were assigned to one of three groups, each using a different exercise type during the practice phase. The groups were equally balanced with respect to their means and standard deviations. Table 1 indicates that Groups 1 and 2 made an average of 9.4 mistakes on the pre-test. The mean for Group 3 was 9.2.

Table 1: Results of the pre-test for each group

	Mean	SD
Group 1 (Multiple Choice: click)	9.375	2.8256
Group 2 (Reordering: drag)	9.375	2.8256
Group 3 (Completion: type)	9.222	2.8588

We also applied a one-way balanced ANOVA which indicated no significant difference between the three groups ($F(2, 24) = .1591$, $p < 0.5$). Detailed results are displayed in Table 2.

Table 2: One-way balanced ANOVA analysis

Source of variance	SS	Df	MS	F Ratio	F_{crit}
Between Groups	4.7407	2	2.3704	.1591*	3.40
Within Groups	357.5556	24	14.8981		

Note: *$p < .05$

Practice Phase

The practice phase consisted of two class hours and was conducted in a computer lab equipped with 30 IMacs. Students practiced 60 sentences similar to the ones provided in the pre-test. The sentences addressed the word order constraints of finite and non-finite verbs in main, coordinate and subordinate clauses. Students were instructed to continue trying until they achieved the correct answer.

Group 1 used the multiple choice exercise type created in HotPotatoes. For each incorrect answer, however, error-specific feedback was manually encoded. An example is given in Figure 1.
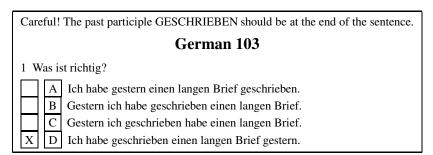
Careful! The past participle GESCHRIEBEN should be at the end of the sentence.

German 103

1 Was ist richtig?

☐	A	Ich habe gestern einen langen Brief geschrieben.
☐	B	Gestern ich habe geschrieben einen langen Brief.
☐	C	Gestern ich geschrieben habe einen langen Brief.
X	D	Ich habe geschrieben einen langen Brief gestern.

Figure 1: Feedback for multiple-choice exercises

Group 2 used the re-ordering exercise type. The student's task was to drag words into a word box in the correct order. The feedback was identical to that in the multiple choice exercise type. An example is given in Figure 2.

Guten Tag, John!

Drag the following words into the correct order:

	RELOAD
Anne hat gekauft gestern ihrem Bruder eine Jacke.	CHECK
Careful! The past participle GEKAUFT should be at the end of the sentence.	ANSWER
	NEXT

Figure 2: Feedback for drag-and-drop exercises

Group 3, used the completion exercise type given in Figure 3. Here words were given in scrambled order and students typed out the sentences in the correct word order. Due to the nature of this task, errors unrelated to word order occurred. For example, some students made spelling/typing errors or left out entire words. In these instances, the students also received error-specific feedback.
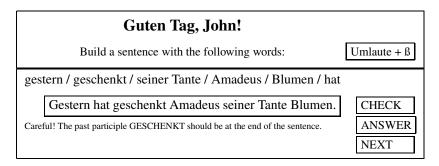

Guten Tag, John!

Build a sentence with the following words: Umlaute + ß

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gestern / geschenkt / seiner Tante / Amadeus / Blumen / hat

Gestern hat geschenkt Amadeus seiner Tante Blumen.	CHECK
Careful! The past participle GESCHENKT should be at the end of the sentence.	ANSWER
	NEXT

Figure 3: Feedback for typed-entry exercises

At the end of the practice session, students filled out a short questionnaire in which they rated the exercise type they used during practice. Students were asked to comment on the following three questions:

1. Do you think that the exercise type you used is well suited to practicing word order in German?

2. What did you like most about the exercise type you used?

3. What did you like least about the exercise type you used?

In the second week, students were given a post-test which we discuss in the following section.

Post-test

Like the pre-test, the post-test was a pen-and-paper task where students were given a worksheet with a total of 20 scrambled sentences. The sentences were very similar to the ones provided in the pre-test except that, overall, the sentences were more challenging: 13 out of the 20 sentences consisted of more than one clause type, and a variety of subordinating and coordinating conjunctions were used in the test. Thus, although the results in the pre- and post-tests were not completely comparable, the increased task difficulty in the post-test can be interpreted as support for highly significant diference between the groups, since pre-test scores showed no significant differences between the groups. In addition, each sentence contained an adverbial of time, manner or place, or negation, all of which trigger subject-verb inversion if placed sentence-initially. In contrast, the pre-test containing only five sentences consisting of more than one clause type, and there were fewer sentences containing adverbial phrases. For some sentences, we also indicated on the post-test that the adverbial phrase had to be used sentence-initially to trigger subject-verb inversion. The same grading criteria as for the pre-test were applied.

Results

Comparison of the three exercise types

For a comparison of the three exercise types, we applied a one-way balanced ANOVA which indicated a significant difference between the groups ($F(2, 24) = 8.3863, p < 0.5$). Results are displayed in Table 3.

Table 3: One-way balanced ANOVA analysis

Source of variance	SS	Df	MS	F Ratio	F_{crit}
Between Groups	94.8889	2	47.4444	8.3863*	3.40
Within Groups	135.7778	24	5.6574		

Note: *$p < .05$

To determine inter-group variation, we applied a follow-up Tukey-B test with the significance level set at .05. The results in Table 4 indicate a significant difference between Groups 1 and 2 and between Groups 1 and 3 while Groups 2 and 3 formed a homogenous subset. The mean scores displayed in Table 4 refer to the average number of errors made on the post-test.

The results displayed in Table 4 indicate that students who used the re-ordering exercise type did marginally better than the typed-entry group. Both groups, however, outperformed the multiple-choice group significantly with a mean of 4.1 for the drag-and-drop group, an average of 5.9 for typed entry and a mean of 8.7 for multiple choice.

Table 4: Results of Tukey-B test with significance level 0.5

Mean	Groups	Group 1	Group 2	Group 3
8.6667	Group 1 (Multiple Choice: click)		*	*
4.1110	Group 2 (Reordering: drag)			
5.8889	Group 3 (Completion: type)			

Note: $*p < .05$

It is interesting to note that the multiple-choice group's post-test showed only slight improvement over their pre-test scores with an average of 9.4 errors in the pre-test and 8.7 errors in the post-test. In contrast, the drag-and-drop and typed-entry groups improved their scores considerably. Table 5 compares the pre- and post-test scores (number of errors) for the three groups.

Table 5: Mean Scores on Pre- and Post-Tests

	Mean on Pre-Test	Mean on Post-Test
Group 1 (Multiple Choice: click)	9.375	8.6667
Group 2 (Reordering: drag)	9.375	4.111
Group 3 (Completion: type)	9.222	5.8889

Error Distribution During Practice

Of additional interest in this investigation was the learners' behaviour while using the three different CALL exercise types for German word order practice. In studying this behaviour, we tracked the number of errors that occurred for each of the three exercise types by maintaining a computer log during practice sessions. Table 6 indicates that the drag-and-drop group had the most errors with an average of 42.3 errors per student for the 60 exercises followed by the typed-entry group with a mean of 23.4 errors. It is interesting to note that the two output-focused exercise types, in which students ultimately scored significantly better, also showed the highest number of errors during practice. The multiple choice group made an average of only 4.1 errors per student for the 60 exercises.

Table 6: Number of mistakes per exercise type during practice

	Number of Mistakes	Mean per Student
Group 1 (Multiple Choice: click)	37	4.1
Group 2 (Reordering: drag)	381	42.3
Group 3 (Completion: type)	211 (97 in word order)	23.4 (10.8)

Table 6 indicates that for typed-entry a total of 211 errors (23.4%) occurred. In examining the computer log, we separated errors in word order from other mistakes and found that only 97 errors (10.8%) were due to a wrong choice in word order. The remaining mistakes were due to incorrect punctuation, missing words and spelling mistakes.

Table 7: Error distribution for typed-entry

	Number of Mistakes	% of Total
Word Order	97	45.97%
Spelling	67	31.75%
Missing Words	25	11.85%
Punctuation	22	10.43%
Total	211	100.00%

The error breakdown provided in Table 7 indicates that most errors occurred with word order (46%) followed by spelling (31.8%), missing words (11.9%) and punctuation (10.4%). The higher number of errors unrelated to word order is not surprising given the additional opportunities for mistakes using typed entry.

However, from the log we were unable to assess whether some of the errors were in fact not due to more general keyboarding errors although with respect to errors in word order, keyboarding skills are probably less applicable.

Discussion

The study indicates that the output-focused exercise types, specifically re-ordering and completion, were significantly more effective for practicing German word order than the multiple-choice type despite the fact that all exercise types provided error-specific feedback. Our results support previous findings by Nagata (1996, 1998) who also found that the output-focused group performed significantly better than the input-focused group in the production of Japanese honorifics. In addition, we confirm DeKeyser and Solinski's (1996) study on the Spanish conditional.

From a more theoretical point of view, the results also support Swain's (1993) Output Hypothesis, that is, that language learning may occur through language production. The two output-focused groups outperformed the multiple-choice group significantly. The study also confirms the findings by Danesi and Mollica (1988) that students' grammatical skills can improve by just fostering the L-mode. Our study, however, suggests that there is variation between different tasks performed in the L-mode: the three exercise types considered in our study are not equally effective.

Of further interest, however, is the fact that there was no significant difference in the present study between the two output-focused groups, suggesting that both exercise types are equally well suited for practicing German word order. Yet, although the drag-and-drop group performed only slightly better than the typed-entry group, a number of other benefits might argue for its use:

1. Our log of the three groups indicates that students committed the most errors with drag-and-drop during practice. A possible explanation is the amount of risk versus damage. Unlike the completion exercise type, using drag-and-drop students do not need to retype any words, phrases or the entire sentence to correct a mistake; they merely drag words into a new location. Thus they might be more open to risking a wrong answer by trying out a larger variety of possible word orders. Whether this behaviour leads to better performance has to be confirmed by further investigation.

2. It is likely that the typed-entry exercise type is more distracting because, in addition to errors in word order, students also need to pay attention to other mistakes and their correction. Due to the design of the drag-and-drop task, errors are limited to word order only. At the same time, typed-entry is also the most challenging task. Students need keyboarding as well as linguistic skills.

3. Finally, for practicing word order, the drag-and-drop task is less time-consuming and possibly less tedious than the typed-entry, in particular for students with few or no typing skills. This was confirmed by students who used the completion exercise type. In the questionnaire, students commented that they did not like having to retype the entire sentence if the verb in the main clause was incorrect. The questionnaire further indicated that all students in the drag-and-drop group thought that the exercise type was well suited for practicing word order. In contrast, some of the students in the multiple-choice group commented that they felt that the task was mindless and boring.

Conclusion

In this study we investigated the comparative effects on learning outcomes and learner behaviour using three different CALL exercise types for German word-order practice: multiple-choice, re-ordering and completion. Twenty-seven students of introductory German participated. For all exercise types students received error-specific feedback. The results indicate that students using the drag-and-drop interface performed significantly better than those using multiple choice, but only marginally better than the typed-entry group. The more flexible word order practice afforded by the drag-and-drop interface in addition to other benefits such as eliminating typing errors and ease of use argue in its favour.

The results of our study also show that learner behaviour during practice varied greatly: students committed the most errors with the drag-and-drop task, although they outperformed the other two groups in the post-test. It remains to be investigated, however, whether the higher performance of the drag-and-drop group was due to their explorative behaviour during practice.

Given the results of this study, we recommend that in designing tasks, CALL course developers give sufficient consideration to exercise types. Given previous research as well as our current findings, it seems that the more complex the structures are, the more beneficial the output-focused exercise types would be. While the merits of the drag-and-drop over the typed-entry tasks were not significant, the drag-and-drop group was able to focus on errors in word order exclusively, while at the same time exploring a variety of answers in a convenient way. However, good variety is also central to language practice and, in a regular classroom setting, a combination of the different output-focused exercises might thus be beneficial to the learners.

Further Research

A number of intriguing questions remain open, however, or tentative: for instance, from our study we cannot accurately determine whether the results might not be affected by the duration of the study and/or even by the medium itself. The results presented in this paper apply to short-term learning only and any conclusions on long-term learning are speculative at this point. Computer and task familiarity might also be important variables. For instance, we did not assess students' keyboarding skills and familiarity with computer use in general. Although the students in our study had performed drag-and-drop and typed-entry tasks the semester prior to the study and thus were probably thoroughly familiar with the exercise types, a more reliable assessment of their computer skills in a subsequent study might be appropriate.

Notes

[1] For a detailed description of the system, see Heift (2001, 2002) and Heift and Nicholson (2001).

[2] See `http://web.uvic.ca/hrd/halfbaked/`.

[3] For brevity, we only discuss word order constraints for verb positions. For further constraints on German word order, see Helbig (1979) and Hammer (1971).

[4] Note that the subject is omitted with the plural and singular familiar forms of the imperative:

(i) Geht   ins Kino!
    Go-PL-FAM into movie theatre
    'Go into the movie theatre!'

(ii) Geh(e)   ins Kino!
      Go-SG-FAM into movie theatre
      'Go inside the movie theatre!'

⁵ There are, however, a number of restrictions that apply to inversion. For examples,
  see Hammer (1971).

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