Instructional Effects of Communication Strategies

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This study discusses the pedagogical issue of communication strategies (CS), which has split CS researchers' views into two opposing groups. In this paper, CS are investigated from (1) an intraindividual perspective and (2) an interindividual perspective. In each of these studies, an experimental CS training program was administered to Japanese college EFL learners. Combining the major findings, this study concludes that intraindividual and interindividual perspectives of CS are complementary rather than exclusive as some researchers (Kellerman, 1998) propose. Furthermore, this study argues that it is premature to determine the pros and cons of the CS teachability issue without making adequate attempts to create a feasible strategy for strategies, including production of teaching materials and appropriate teaching methodology.

要旨　本研究は、研究者の意見を二分しているコミュニケーション方略（ＣＳ）指導について考察する。この問題を学習者内部の視点　(intraindividual perspective) と学習者外部の視点 (interindividual perspective)　の両面から観察しようというのが研究の中心的課題である。これらの視点にそって、本研究では日本人大学生英語学習者に対して個別に行われた２つの実証研究について言及する。それぞれから得られた主な研究結果に基づき、例えば Kellerman (1998)　が主張するように、２つの視点は対立的というよりも補完的であることを論じる。さらに、十分なＣＳ教材の作成や指導方法の構築を経ないでＣＳ指導の是非を結論づけることは時期尚早であることを論じている。

Introduction

This study is concerned with the pedagogical issue of communication strategies (CS). Reflecting two contrastive theoretical frameworks (product- versus process-oriented theories), researchers' views on teaching CS are split into two seemingly opposing camps—one that endorses strategy instruction (Yule & Tarone, 1997), and another that rejects strategy instruction (Bialystok, 1990).[1] Proponents of CS instruction postulate that it facilitates not only L2 learners' strategic competence but also their linguistic competence as a consequence of structural change in their interlanguage system over time. Opponents of CS instruction, however, argue that it is unnecessary since strategic competence is acquired through L1, and this instruction does not help L2 learners acquire the target language. This pedagogical issue, whether teaching CS in the L2 classroom brings about desirable outcomes, is generally referred to as a teachability issue of CS (Dörnyei, 1995).

Objectives of this study

Although both claims sound persuasive, the opposing views mentioned above are theoretical in nature. Despite some marginal empirical evidence supporting CS teachability (Dörnyei, 1995), understanding of this issue is still too limited to make any definite conclusions. In order to settle the issue, vigorous attempts to implement and assess CS instruction have to be made (Iwai, 2001) in terms of *intraindividual* and *interindividual* perspectives of CS use (Kasper & Kellerman, 1997). The former perspective concerns how an individual language user internally processes intended concepts and encodes them linguistically when encountering a communication problem. This perspective is related with recent psycholinguistic studies of mental lexicon and information processing (Levelt, 1993; Henriksen, 1999). The latter perspective emphasizes reciprocal attempts of problem solving in communication, which reflects the sociolinguistic, variationist (Tarone, 1995) and interactionist viewpoints (Pica, 1996).

This study deals with these two pedagogical perspectives. To clarify our concerns, first we describe two empirical studies that reflect these perspectives (*Study One and Study Two, hereafter). These two contrasting perspectives could actually be complementary rather than exclusive as Kellerman (1998) underscores. With this emphasis in mind, we will discuss the importance of investigating 1) whether L2 learners' language competence (Bachman & Palmer, 1996) can be improved by CS instruction, and 2) how we can make best use of CS instruction while taking individual and external factors into consideration. Combining findings from these two studies, we hope to highlight important implications for future CS studies and the pedagogical applications of CS.

Study One

Research questions

The purpose of this study was to investigate the effects of teaching EFL learners intraindividual, lexical CS, which have been intensively examined in past CS studies (Poulisse, 1990). Lexical CS are employed to cope with unfamiliar vocabulary; such as when L2 learners do not know the word *ostrich*, they may use a hypernym, *bird*, to compensate for their lexical problem (approximation) or may paraphrase like *a big bird that can't fly* (paraphrase). To look into the teaching effects of lexical CS, the following two research questions were addressed:

1. Can intraindividual lexical CS instruction improve not only learners' descriptive performance in terms of message and strategic qualities but also their linguistic competence in terms of temporal (processing speed) and linguistic factors (accuracy, fluency, utterance complexity, and lexical knowledge)?
2. If the answer to the first question is positive, do different effects emerge from different teaching methods of CS?

To answer these questions, an experimental study was conducted from June to November, 2002, during which an intensive CS training program was held for a period of 1 to 2 weeks.

CS training program and data collection method

Prior to the CS training program, CALL-based self-training material to study and practice CS use, named ENGEL (English Generative Learning), was produced by one of the researchers. Production was based on baseline data collected from 454 native English speakers (Iwai, 2002), and the instructional contents were prepared on the basis of accumulation of past CS studies (Iwai & Konishi, in press).

This material is aimed at facilitating L2 learners' use of lexical CS, and it has the following three features. First, explicit explanations of CS are presented to the trainees prior to exercises, so the material is explicit and deductive rather than implicit and inductive. Second, ENGEL consists of step-by-step buildups ranging from a practice of superordinate terms (approximation) to that of lengthy expressions (paraphrase), through which learners are directed to learn how their lexical deficits can be complemented by alternative means. Learners are required to correctly answer more than 80% of the questions in a short achievement test in order to go on to the next step. Third, the material controls learners' response speed to lessen the time they need to encode their intended concepts.

For experimental purposes, two ENGEL versions were prepared. One with the features just mentioned (ENGEL-full or E-full), and the other with no explicit explanations on CS and with a central practice focus on grammatical exercises such as sentence combining (ENGEL-half or E-half). The E-full group also had the same grammar exercises, so the fundamental difference between the two versions is that the E-full received explicit CS instruction, while the E-half did not.

The participants in this study were 75 Japanese college EFL learners at a lower intermediate level (TOEIC scores below 600). They were divided into 1 control (C) group (N=15) and 4 balanced-experimental groups (N=15 each originally: one outlier was eliminated from each of the two E-half groups prior to analysis) according to two experimental conditions (length of training: 1 vs. 2 weeks; and the material: E-full vs. E-half).

Intensive CS training was administered by using the two ENGEL versions at the beginning of the summer vacation. The training program was scheduled at that time to minimize possible influences of other English classes. The program was also given in a computer-assisted format to reduce any possible effects from teacher variables, such as instructional skills (Chapelle, 2001). The participants used the material for about an hour each day and completed all the practice menus by the end of the training period. To encourage serious participation, they were paid.

Oral data were collected from all the participants in a picture description task as well as in other test formats (a vocabulary test and two grammar tests) before (Test 1) and immediately after (Test 2) the training program, and from the participants of the four E-groups 2.5 months after the program (Test 3). This study reports only the results from the picture description task, in which the participants described a set of 20 pictures (e.g., acupuncturist, porcupine, and Ferris wheel). These pictures displayed images whose English names the participants did not know and thus, they had to rely on CS to explain them.[2] The description time was restricted to 15 seconds for each picture, and the entire oral test was controlled by a computer. All utterances were recorded digitally to examine temporal features, and subsequently transcribed for in-depth analyses.

The elicited data were analyzed in terms of seven variables including:

1) overall message quality (*mq*: assessed by two raters on a 6-point scale ranging from 0 points for a complete failure to 5 points for excellent description)
2) response time (*res*: from the moment that a task image appeared on a screen to the time that a test-taker initiated an essential description, excluding false starts and filled pauses)
3) complexity (*cplx*: overall ratios of complex verb clauses or phrases including relative clauses, infinitives, and participles on the basis of the Analysis of Speech (AS) units proposed by Foster et al.(2000)
4) accuracy (*acc*: overall ratios of accurate use of verbs)
5) fluency (*flu*: total counts of pruned words, i.e., repeated segments, hesitations, and pause fillers were excluded)
6) strategies used (*cs*: frequency counts of avoidance, approximation, and paraphrase, each counted separately)
7) lexical varieties in terms of *lexical types* (*tf*: for function words; and *tc*: for content words, each counted separately)

Due to space restrictions, only the results of the descriptive statistics and statistical tests are shown in the tables below.

Results

First, a longitudinal comparison was made for the entire E-group ($N = 58$) and the C-group ($N = 15$) separately by a paired *t*-test (for normally distributed variables) or a Wilcoxon Signed Ranks test (for not-normally distributed variables). The results are shown in Table 1.

The pre-post comparisons were obviously in favor of the E-group. This group marked significant gains in the variables of *mq*, *res*, *acc*, *flu*, *cs*, and *tc*, while the control group showed no substantial gains at all. In contrast to these variables, no significant change was observed in either group for two variables, namely, *cplx* and *tf*.

Next, the four experimental groups were compared in terms of the two experimental conditions (the length of the training program and the material). The analyses were both cross-sectional (across groups) and longitudinal (Tests 1, 2, and 3), and a repeated measures of analysis of variance (ANOVA) was run for each variable if its normality was assumed, or a Mann-Whitney U test if it was not. The results are summarized in Tables 2 and 3, respectively.

Regarding the *week* factor (1 vs. 2 weeks), no significant interaction effect with repeated tests was observed for any of the seven variables. Thus, the 1-week difference in training length was not influential at all.

The *material* factor (E-full vs. E-half), on the other hand, triggered a significant group difference between the E-full condition and the E-half condition in three variables, namely *mq*, *res*, and *cs* (avoidance and paraphrase, but not approximation).[3] More importantly, these significant differences were longitudinally maintained at Test 3 in two of these variables, *mq* and *res*, but not in *cs*.[4]

Table 1. Comparison between the ENGEL group and the control group

			M				SD	
			ENGEL (*n*=58)		Control (*n*=15)		ENGEL	Control
1 Message quality	*mq*	T1	22.6	t = 18.742**	22.5	t = 1.054 n.s.	7.65	10.84
		T2	47.4		24.8		13.55	10.43
2 Response time	*res*	T1	6.91	t = 10.913**	7.01	t = .973 n.s.	1.89	1.90
		T2	4.57		7.63		1.35	2.01
3 Complexity	*cplx*	T1	13.8	Z = .004 n.s.	17.4	Z =.628 n.s.	10.80	9.38
		T2	14.8		17.2		11.23	10.43
4 Accuracy	*acc*	T1	46.4	t = 5.394**	60.6	t = .353 n.s.	27.31	27.40
		T2	64.9		65.8		23.87	32.58
5 Fluency	*flu*	T1	114.4	t = 10.975**	111.1	t = 1.202 n.s.	39.24	43.53
		T2	164.2		100.4		45.27	43.31
6 Used CS	*avoid*	T1	3.9	Z = 5.678**	4.7	Z = .597 n.s.	2.61	3.26
		T2	1.2		5.4		1.60	2.95
	apprx	T1	3.7	Z = 3.277**	2.9	Z = 2.304*	2.46	2.13
		T2	2.3		4.5		3.02	3.20
	parap	T1	12.1	Z = 5.508**	12.4	Z = 1.858 n.s.	4.22	4.32
		T2	16.4		9.9		3.78	5.28
7 Type tokens	*tf*	T1	12.4	Z = .672 n.s.	12.0	Z = .221 n.s.	4.55	3.70
		T2	12.5		11.7		3.45	3.58
	tc	T1	37.8	t = 12.352**	34.7	t = .099 n.s.	14.21	17.12
		T2	58.3		35.0		15.63	18.06

N.B.: 1) T1 = Test 1, T2 = Test 2; * $p < .05$, ** $p < .01$. 2) Paired sample *t*-tests were applied to those variables whose values yielded a normal distribution. Otherwise, nonparametric tests (Wilcoxon Singed Ranks test) were used and their statistical values are shown in *Z*.

Table 2. Descriptive statistics and statistical summary of normally-distributed variables

Category	V	G	M			SD			ANOVA repeated measures	
			T1	T2	T3	T1	T2	T3	Tests*Week	Tests*ENGEL
1 Message quality	*mq*	f1	21.3	50.1	42.9	8.19	10.26	10.54	F = .747 n.s. df = 2	F=8.693** df = 2
		f2	23.6	54.4	51.0	5.47	12.79	14.45		
		h1	22.9	39.3	38.8	9.19	10.58	13.36		
		h2	22.5	45.0	40.5	8.05	16.12	14.71		
2 Response time	*res*	f1	7.32	4.13	4.89	1.97	0.52	1.15	F = .234 n.s. df = 1.798	F=5.047* df = 1.798
		f2	6.48	4.14	4.21	1.77	1.39	1.17		
		h1	6.91	5.12	5.70	1.79	1.22	1.96		
		h2	6.95	4.96	5.61	2.13	1.78	2.10		
3 Complexity	*cplx*	f1	10.8	16.2	16.0	9.14	12.54	14.22	F = .302 n.s. df = 2	F= 3.905* df = 2
		f2	14.8	21.4	25.0	11.66	13.09	15.94		
		h1	14.2	12.2	15.6	11.72	8.53	12.27		
		h2	15.6	8.8	14.0	11.06	5.35	12.55		
5 Fluency	*flu*	f1	110.7	167.7	140.7	44.22	39.65	33.10	F = .716 n.s. df = 1.744	F= 2.734 n.s. df = 1.744
		f2	116.6	176.0	161.3	31.28	49.22	48.54		
		h1	113.4	149.8	134.8	40.67	44.53	43.12		
		h2	117.2	162.0	142.9	43.65	47.91	44.15		
7 Type token (content words)	*tc*	f1	35.3	58.0	46.5	15.13	12.36	13.04	F = 1.917 n.s. df = 1.659	F= 2.546 n.s. df = 1.659
		f2	40.6	64.9	53.9	12.80	19.19	15.73		
		h1	39.8	52.6	47.7	15.13	13.59	13.36		
		h2	35.3	57.1	46.1	14.39	15.45	13.63		

N.B.: * $p < .05$, ** $p < .01$. V = variables, G = groups. f1 (n=15) = E-full x 1 week; f2 (n=15) = E-full x 2 weeks; h1 (n=14) = E-half x 1 week; h2 (n=14) = E-half x 2 weeks. The result of *tf* is not included in the table since its non-significant change was apparent from the pre- vs. post-test analysis.

Table 3. Descriptive statistics and statistical summary of non-normally-distributed variables

Category	V	G	M			SD			Week			ENGEL		
			T1	T2	T3	T1	T2	T3	T1	T2	T3	T1	T2	T3
4 Accuracy	*acc*	f1	49.5	59.2	54.4	27.84	25.54	31.02	370.0 n.s.	385.5 n.s.	406.0 n.s.	321.0 n.s.	320.5 n.s.	383.0 n.s.
		f2	51.3	59.5	54.9	30.84	28.81	15.01						
		h1	38.4	69.6	54.4	25.67	15.95	20.42						
		h2	46.1	72.1	60.2	25.42	22.23	24.76						
6 CS used	*avoid*	f1	4.4	0.3	0.5	2.67	0.59	0.92	362.0 n.s.	410.0 n.s.	329.0 n.s.	387.0 n.s.	160.5**	205.5**
		f2	3.5	0.5	0.1	1.85	0.92	0.35						
		h1	3.9	2.0	2.6	2.89	1.41	2.62						
		h2	3.6	2.0	1.9	3.10	2.22	3.15						
	apprx	f1	4.0	2.7	3.7	2.51	3.90	3.48	398.5 n.s.	362.5 n.s.	321.0 n.s.	374.0 n.s.	365.5 n.s.	362.0 n.s.
		f2	4.0	1.9	2.8	2.80	2.90	2.88						
		h1	3.1	2.6	3.2	2.38	2.90	3.29						
		h2	3.7	2.1	1.9	2.27	2.34	2.18						
	parap	f1	11.3	16.8	15.9	4.51	4.09	3.80	406.0 n.s.	353.5 n.s.	315.0 n.s.	392.0 n.s.	290.5*	362.0 n.s.
		f2	12.2	17.7	17.0	3.84	3.22	3.05						
		h1	12.6	15.3	14.1	4.29	3.91	5.07						
		h2	12.1	15.9	16.2	4.57	3.82	4.08						

N.B.: The figures under 'Week' and 'ENGEL' represent the result of a Mann-Whitney U test and statistical significance. *$p < .05$, **$p < .001$

These results indicate that the material, the methodological factor, can be an influential factor for raising the participants' overall performance (*mq*) and processing efficiency (*res*). They also imply that temporary gains can be expected in CS use (*cs*); however, its longitudinal effects are doubtful as far as the training program of this study is concerned.

Study Two

Research questions

This study investigated the subject of listener clarification strategies in an EFL setting and the effects of teaching those strategies. The research questions in this study were as follows:

1. What kind of listener clarification strategies do the EFL learners use when performing interactive tasks?
2. Does clarification strategy use differ depending on L2 proficiency?
3. What effect does training in the use of clarification strategies have on university, non-English majors' use of such strategies in interactive tasks?

CS training program and data collection method

The participants of this study were 48 first-year Japanese university students at two proficiency levels determined by a CELT test (Table 4). They were non-English majors enrolled in compulsory English reading and discussion courses taught by one of the authors.

Table 4. Total participant assignment

Proficiency/Group	Experimental	Control
High (CELT above 160)	12	12
Low (CELT below 130)	12	12

Explicit and implicit instruction in clarification strategy use took place over four consecutive weeks during normal class time (Table 5), and three different kinds of target clarification strategies were taught: positional reprise, hypothesis testing, and forward inferencing (Table 6). Implicit instruction took the form of listening to a series of dialogues and discussing how the speakers clarified specific points. The students were given clear, explicit, written instructions and examples of when and how each of the three strategies could be used, as well as underscoring the benefits of using such strategies. The amount of time spent on instruction was approximately 40 minutes each week. All instructional activities were designed so that they did not resemble the tasks used for data elicitation tests, thus controlling for any practice or test effect. The control group, as a placebo, received 40 minutes per week of instruction in skimming and scanning newspaper articles.

Table 5. Study design

Week	1	2	3	4	5	6	9
Experimental Group	X	T1	T2	T3	T4	–	X
Control Group	X	–	–	–	–	–	X
N.B.: X represents pre- and post-tests.							

Table 6. Definition and example of strategies taught

Strategies	Features	Examples
Positional reprise	The listener points out general parts or the narration that were not understood.	What was the first thing?
		Please repeat the last part.
		What did she do after…?
Forward inferencing	Using question words to ask for specific information the speaker has not yet given.	What happened?
		How much did you say?
		When does that happen?
Hypothesis testing	Listener tests understanding of the story to check schematic structure.	Oh, so you mean he ...?
		So after that she...?

The study used a pre- and post-test design with three different tasks: a complete-the-pictures task, a spot-the-differences task, and a task which involved separating and organizing twelve pictures into three cartoon stories. The tasks were designed so that they could be performed in a narrative fashion (as if telling a story), thus giving ample opportunity to use the target clarification strategies. Since the three tasks were quite different, the task difficulty across groups and proficiency levels was controlled by counterbalancing the tasks. For the pre- and post-tests, students were put into pairs and each given a task. Prior to starting each task, the teacher arranged the students into pre-assigned dyads and handed out the task worksheets. The teacher then introduced the task to the entire class, explaining that each member of the dyad had part of a story and that it was their job to communicate their portion of the story in English to their partner and to complete the task as described in the directions. During the tasks, the teacher observed the students and answered any questions they may have had. All dyads were recorded and transcribed for analysis of strategy use.

Four trained raters analyzed the transcripts for evidence of strategy use. The raters independently coded the transcripts for the three strategies, noting the type and frequency of use of the clarification strategies by the participants. The results of the coding, which were recorded as frequency counts, were then reinterpreted as ratios by dividing each student's strategy frequency counts by the total number of words in the respective transcript. This resulted in a ratio of strategy use to words for each transcript. This transformed the data from an ordinal to a ratio scale representation, values which, for ease of manipulation, were then multiplied by 100 and used for the statistical calculations. Descriptive statistics can be found in Table 7.

Table 7. Descriptive statistics

Task	Strategies	Mean	SD
Pre-test total		.0147	.0175
	Positional Reprise	.0006	.0015
	Hypothesis Testing	.0111	.0156
–	Forward Inferencing	.0030	.0044
Post-test total		.0151	.0156
	Positional Reprise	.0010	.0028
	Hypothesis Testing	.0107	.0138
–	Forward Inferencing	.0034	.0042
N.B.: All values multiplied by 100.			

Results

A multivariate analysis of variance (MANOVA) was performed (alpha level at .05) on the dependent variable of strategy use. Independent variables were *group* (experimental and control), *time* (pre and post), *strategy* (positional reprise, hypothesis testing, and forward inferencing), and *level* (low proficiency and high proficiency).

The results of the MANOVA indicated a significant effect for the independent variable of *strategy*, $F(2, 88) = 33.43$, $p < .000$. In contrast, there were no significant effects for the independent variables of *group, time*, and *level*, nor were there any significant interaction effects for any of the variables. These results suggest that there is a tendency for specific strategy choice (hypothesis testing) across groups regardless of the treatment and proficiency level of the participants.

To investigate these phenomena, a series of follow-up interviews with a set of the students in the experimental group was undertaken. During the interviews, students were asked how they would/did react to miscommunications both with native speakers of English (NSE) outside of the classroom environment and with their peers. Most of the students who had had experience communicating with NSE outside of class reported the use of avoidance strategies (feigning comprehension) or global reprise strategies as the most frequent categories used. This was followed by lexical reprise, particularly if they felt they could elicit a Japanese translation from the NSE (as in the case of teachers or NSE friends in Japan). Regarding miscommunication with their peers, the interviewees reported a reliance on Japanese as a problem solving tool during class time (rather than asking their peers for clarification) and a tendency towards global reprise strategies outside of class. These remarks suggest that the participants tended to prefer certain kinds of CS, regardless of language. As far as CS use in the classroom is concerned, it has been suggested that Japanese students prefer a more passive learning style (Reid, 1987) with less teacher/student interaction and clearly defined roles and expectations for both the participants and materials involved in the educational setting. We may hypothesize that this learning style preference is evident in clarification strategy use based on the results of the student interviews, questionnaires, and the less frequently observed use of clarification strategies in general.

During the second wave of interviews, the participants were asked about any memorable communication problems they have had, in English or in Japanese. This data provided further evidence of the participants' reluctance to engage in strategies that they may feel are *high risk* or *low return.* The term high risk is used here to describe communication strategies that would either put the onus of comprehension on the speaker or that may contribute to more detailed explanations, which in turn may lead to more communication breakdown and possible loss of face.

Discussion

In each one of the empirical studies above, we set separate research questions, so we would like to deal with them first. Regarding the first study, the answers to the two research questions are both positive and negative. One positive note comes from the finding that the effects of CS training were positively significant for all variables, except for the *complexity* variable. However, we cannot say that the CS instruction is unconditionally superior to grammar-based instruction. Among the variables tested, the effects on the *cs* variable were temporal, and more importantly, three of the most essential linguistic variables, *complexity*, *fluency*, and *accuracy*, were not significantly affected by CS-based instruction. The answer to each of the research questions, 1) whether lexical CS training improves temporal and linguistic factors as well as message and strategic qualities, and 2) whether different effects emerge from different teaching methods, is rather negative in this sense, especially regarding the second question.

The second study clarified that, just as learning style preferences are related to cultural background, strategy preferences may be related not only to task types, but also to cultural background and social constraints. More precisely, the answer to the first question is that students tend to use low risk strategies when asking for clarification and that this tendency is seen regardless of proficiency and training (research questions 2 and 3, respectively). Such reluctant use of interaction strategies by Japanese students may be largely due to their preference of passive learning style (Fujiwara, 1990; Tinkham, 1989). That is, passive learning styles may emphasize less overt risk taking on the part of the student. Clarification strategies as a group and the *forward inferencing* strategy in particular may be seen as risk taking. Indeed, these higher level strategies suggested by Rost and Ross (1991) could be considered riskier than the lower level strategies such as global reprise, and this is the pattern of strategy use identified among the participants in this study.

The results of the two studies provide no concrete solutions regarding the teachability of CS, but rather, shed light on the following three points in terms of the pedagogical issue regarding CS. First and foremost, the studies clarify why CS should be viewed from both interindividual and intraindividual perspectives. On one hand, task-based interactions may be stressed if the emphasis of CS instruction is placed on enhancing learners' actual use of L2. On the other hand, we should always be aware of how such class activities contribute to nurturing their internal linguistic competence. The opposite is also important. If the intraindividual aspect is overemphasized, we may ignore the fact that spoken language is primarily interactive in nature. These two perspectives have to be taken into account in a balanced manner when teaching CS.

Second, both studies revealed that teaching CS cannot be separated from instructional and contextual conditions. The first study suggests that the training effects are affected by the instructional material and that further efforts would be necessary to maintain the training effects. The second study implies that preferred strategies may depend to a large extent on cultural factors, so that introduced strategies should be carefully chosen for efficient instruction.

Third, the most important implication from these two studies is the necessity of a *strategy* for strategies. As stated in the introduction of this study, the teachability issue of CS has been mainly argued on the basis of researchers' past experiences, rather than on the basis of empirical evidence. These disputes are rather intuitive, and this motivates us to emphasize that a strategy for strategies; i.e., efforts to create different types of teaching materials and to construct teaching methods according to learner needs and idiosyncrasies has been inadequate. Through our attempts in this study, we feel that there is still a lot of ground for CS researchers to cover, both empirically and pedagogically.

Conclusion

Readers of this study might have the impression that our attempt to intermingle two contrasting perspectives is excessively bold. In this respect, we honestly admit that more meticulous examinations are necessary for the perspectives discussed. While acknowledging this theoretical shortcoming as well as other methodological inadequacies, we believe that the contribution of this study to the body of CS research is an important one in reassessing the teachability issue of CS and promoting more in-depth empirical studies to conclude this issue. It is not too late to determine the pros and cons of the CS teachability issue and come up with a feasible strategy for strategies.

Notes

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1. In this study, the terms *instruction* and *training* are both used and have separate connotations. The former represents the meaning of teaching for certain objectives, while the latter stands for teaching in a specific program.

2. That the participants did not know the target words was confirmed by a questionnaire that was given to them retrospectively after the tests. On the questionnaire, the target images were printed and the students were requested to write words for them.

3. In the table, the *cplx* variable also shows a significant difference. However, a follow-up investigation revealed that this result was not confirmatory.

4. In fact, these results were obtained by post-hoc tests. The detailed results are omitted due to space restrictions.

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