Awareness and Performance through Self- and Partner's Image in Videoconferencing

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ABSTRACT

This paper examines potential designs of videoconferencing systems for communicative language learning in learner-centered communication from the viewpoint of self-awareness. In this study, we focused on the effect of the presence of images on learning. We compared four types of videoconferencing systems: (a) videoconferencing with both the learner's own and the partner's image, (b) one with only the partner's image, (c) one with only the learner's image, and (d) one without images (audioconferencing), each supporting the use of formulaic expressions concerning communication strategies as the learning objective. We investigated the effect of each type of videoconferencing on two features of language learning: the perceived effectiveness of the images and the assistance they provided during communication and learner performance. The results showed that the presence of both self- and partner images had a main effect on learning awareness as well as on some aspects of learner performance. In addition, path analysis revealed that both self- and partner images had a direct and indirect significant effect on learner performance by raising perceived awareness.

KEYWORDS

XXXXXX, XXXXXX, XXXXXX, XXXXXX, XXXXXX,

INTRODUCTION

Computer-mediated communication (CMC) allows second language teachers to offer internet-based collaborative learning synchronous CMC (SCMC) is effective in the development of communication skills in second language acquisition (SLA) because SCMC (e.g., text chat) can offer an environment similar to that of face-to-face communication. Learners in SCMC exhibit behavior similar to that in face-to-face communication such as the use of various communicative strategies (Blake, 2000; Lee, 2002). The similarity to real-time settings affects the motivation for learning; interlocutors perceive each others' presences in real time and modify some aspects of their communicative behavior such as speed of response and use of easily understandable words, accordingly. In particular, learners' perception of presence seems to be affected by "social presence," suggested by Short, Williams, and Christie (1976) as the "degree of salience of the other person in the interaction and the consequent salience of the interpersonal relationship" (p. ??), that is, the perceived proximity to real-time communication in face-to-face settings. Short et al. also suggested that two factors play an important role in promoting social presence: immediacy—the psychological proximity of the interlocutors—and intimacy—the perceived familiarity caused by social behavior such as eye gazing, nodding, and smiling. Social presence is a key factor for learning in distance learning (e.g., McIsaac & Gunawardena, 1996; Garrison and Anderson, 2003) and seems to be emotionally effective; it can increase learners' satisfaction with learning (Gunawardena & Zittle, 1997). In asynchro-

nous CMC (e.g., email), social presence can motivate learners and promote interaction such as requests for help (Leh, 2001). Social cues such as nodding, smiling. and gestures can also facilitate effective learning in interactive television settings (Hackman & Walker, 1990).

In traditional text-based CMC, which lacks customary social cues, learners tend to type emoticons for expressing their emotions, thus leading to enhanced social presence in communication. Faceless SCMC, such as audioconferencing and text chat, does not allow learners to use social cues such as eye-gazing and nodding, and as a result they "are not aware when one person starts to type a message and may continue with a topic, or else may change the direction of the discussion while a potential contributor to the discussion types his or her message" (Levy & Stockwell, 2006, p. 100). Learners can have at least a limited impact on social presence in text-based CMC through the community constructed by the learners themselves or with the teacher's assistance (Gunawardena, 1995). The advent of broadband network technology has led to the development of a new type of SCMC using multimedia, audioconferencing, and videoconferencing. In this richer environment, learners can use more usual social cues, potentially leading to effective learning (e.g., Hackman & Walker, 1990; McIsaac & Gunawardena, 1996; Gunawardena & Zittle, 1997; Zähner, Fauverge, & Wong, 2000). However, it is unclear whether the nature of media leads to a change in communication behavior (Walther, 1992). In this paper, we compare four types of videoconferencing systems and discuss their effect on second language learning with a particular focus on social presence and self-awareness perceived by learners and the effects of that perception on the acquisition of communication skills.

CMC and Communicative Language Learning

As mentioned above, SCMC provides an environment similar to that of face-to-face situations, enabling learners to communicate with each other in the second language that involves interactions with sociopsychological factors such as awareness of rapid response (e.g., Blake, 2000; Lee, 2002, 2004; Smith, 2003; Hampel & Baber, 2003). Previous research has shown the positive effects of CMC in language learning. CMC has proven to be a useful tool for learning in general (Furstenberg, 1997; Warschauer, 1997), and SCMC in particular promotes more equal participation among learners than face-to-face communication in discussions in the second language (Warschauer, 1996). Language learners who use SCMC outperform learners who use asynchronous CMC or no CMC at all in the amount of speech generated (Abrams, 2003). SCMC tends to promote task-based communication such as decision-making discussions due to a combination of the rapid nature of communication exchange, linguistic effects (e.g., the amount of language produced), cognitive effects (e.g., use of communicative strategies to sustain continuous communication), and emotional effects (e.g., increased participation in discussion by shy learners compared to a regular classroom (Beauvois, 1998a, 1998b). Language learners use communicative strategies in SCMC much in the same way as in face-to-face communication (Lee, 2002; Smith, 2003), and task-based communication seems especially effective in encouraging the use of communicative strategies in the negotiation of meaning (Roed, 2001; Smith, 2002) and the processing of feedback for repairing lexical and syntactic errors (Morris, 2005). Beauvois (1994) suggested that a positive attitude toward technology, a low-stress environment (see also Kelm, 1992), and anonymity—allowing learners to hide personal information such as race, gender, and timidity—leads to a positive effect in oral performance in second language communication. These positive effects promote interaction between learners, which many researchers regard as one of the most important factors in communication (e.g. Long, 1981, 1989; Gass, Mackey, & Pica, 1998).

Recent advances in technology have created a new type of SCMC which allows interlocutors to feel others' presence to a much greater degree than in text-based communica-

tion. Videoconferencing allows learners to eliminate physical barriers and motivates them to speak in the second language (McAndrew, Foubister, & Mayes, 1996). Videoconferencing enables learners to use communication devices such as eye-gazing and gestures for understanding each other (Bruce, 1996). In task-based language learning, videoconferencing can improve performance in collaborative learning (Zähner, Fauverge, & Wong, 2000). However, Wang (2004) suggested that the practical use of IT-enhanced CMC in SLA has not yet been explored. In particular, instructional design must take into account the relevant features of IT-enhanced CMC to support effective learning.

SLA Theoretical Background: CMC Assists SLA

Within the perspective of SLA, the research described above suggests that CMC is effective in communicative language learning because CMC can promote social interaction for the negotiation of meaning between learners, comprehensible input, and comprehensible output. The importance of interaction, comprehensible input, and comprehensible output in classroom-based communicative instruction has been confirmed by many previous studies.

Interaction refers to meaningful communication in the second language in which interlocutors share information. Interaction also provides the context in which learners obtain comprehensible input. Comprehensible input means written or spoken information in the second language which the learner understands (e.g., Krashen, 1985; Gass et al., 1998). When interlocutors face the problem of misunderstanding each other, they prefer to repair the problems before continuing the communication (Clark, 1994). For example, when a learner does not understand an interlocutor's utterance, the interlocutor may modify or paraphrase the utterance to help the learner understand or the learner may ask the interlocutor to repeat the utterance. Comprehensible output means producing understandable utterances in the second language. In the classroom, learners produce various of utterances in speaking and writing. Swain (1995) claimed that comprehensible output has three functions; it helps learners notice the gap between what they can and cannot express; second, test hypotheses (trial-and-error process) about the structure of the language, and reflect on their progress in the language.

A communicative approach to language is effective in fostering communication skills by combining interaction, comprehensible input, and comprehensible output together. However, in a classroom setting, it is difficult to make learners explicitly aware of these factors because they are not normally described in clear terms in communicative task-based instruction; evaluation criteria are typically concerned with task completion and communicative outcomes, not the accuracy of the form of learners' utterances (Ellis, 2003). As a result, it has been suggested that focus-on-form instruction be applied in the interactive communicative situations in order to raise learners' awareness of these factors (e.g., Ellis, 1992; Fotos, 1994; Muranoi, 2005).

Instructional Background in Japan

Language learning in Japan has traditionally focused on grammatical competence. However, with an increasing emphasis on internationalization, we face the possibility of having to speak English anywhere, anytime, even in Japan. Thus, recently, the focus of instruction has shifted from English as sophisticated knowledge to English as a communicative tool, and the development of practical communication skills has been established as the goal of English education in the official curriculum guidelines of Japan (Ministry of Education, Culture, Science, Science and Technology, 2004).

However, teachers need a great deal time to teach communication skills, which consist of a number of basic subskills, that learners, particularly beginning-level learners, have to master. Ideally, teachers would be able to teach both basic- and high-level skills in face-to-face classes. However, this ideal is difficult to achieve because lecture time is so short that teachers may not be able to accomplish even basic learning objectives. The use of CMC can be an effective solution; blended learning involving the use of face-to-face classes and CMC can be practical and effective solution to this problem.

In blended learning, online learner-centered study is often offered with the intent of motivating learners to study and review independently. It has been suggested that learner-centered instruction may increase motivation for language learning and promote negotiation of meaning (Fernández-García & Martínez-Arbelaiz, 2002; Pica & Doughty, 1985). However, there are concerns that learners do not study accurate speech in this kind of situation. Because they are not aware of learning objectives, they do not understand what they are to learn and what they are to do in learner-centered instruction. Some studies have reported that it can be difficult for learners to learn objectives without being aware of them (e.g., Schmidt, 1990, 1993, 2001). Discourse in teacher-fronted instruction has been shown to be more grammatically accurate than in learner-centered study (Pica & Doughty, 1985).

Previous studies have compared the features of learner-centered communication performed with various communication media; however, the effectiveness of specific media with respect to awareness of learning objectives and the requirements for effective communicative language learning have not been discussed. Making communication as realistic and natural as possible is a major challenge on CALL (Bax, 2003), but there is also a practical value in making learners aware of learning objectives even in learner-centered communication outside the classroom. Learners should be provided with the opportunity to recognize their current skill level and to obtain assistance when necessary during learner-centered communication. It seems important to design instruction which raises awareness of learning objectives and yet retains high motivation without having the teacher in front of the learner. Communication in learner-centered SCMC seems to be potentially effective for learning when support functions are integrated into it (Martin, 2005; Smyth, 2005)

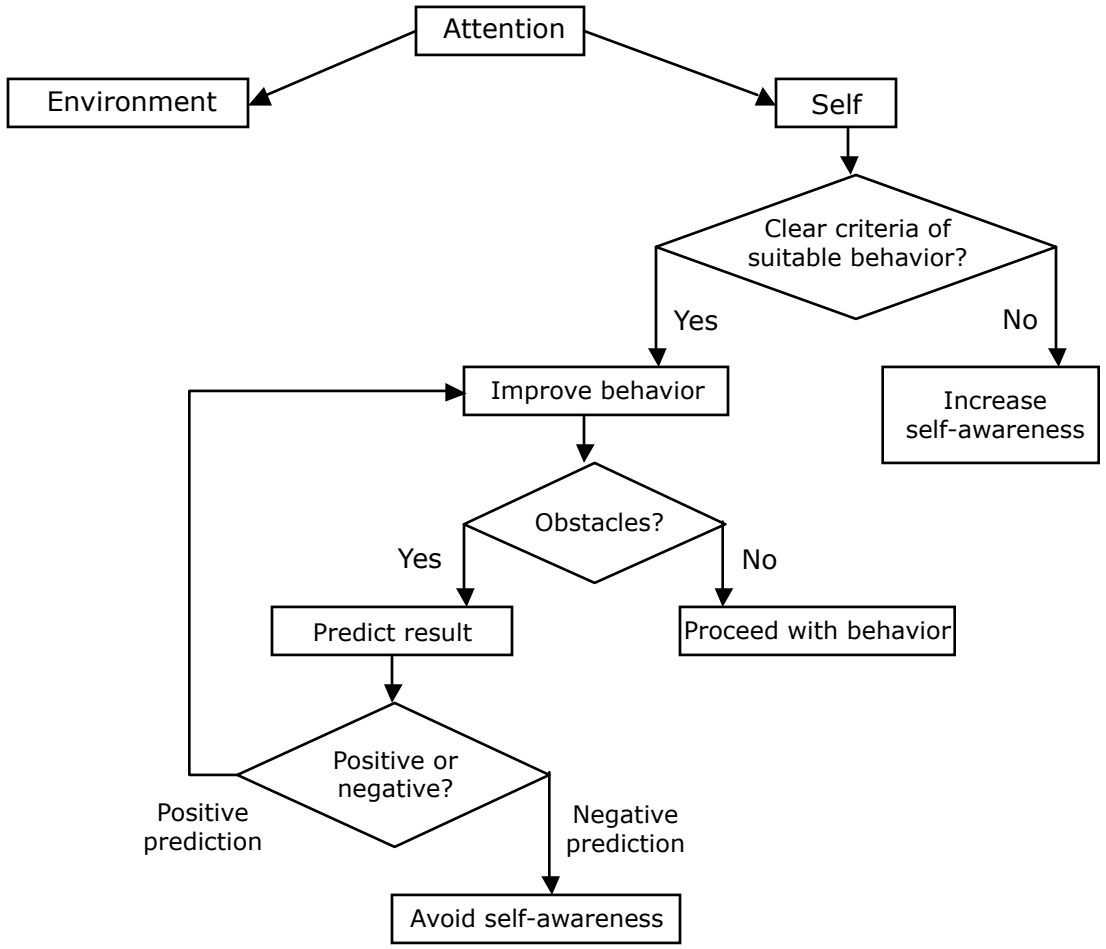
Self-Awareness

Research has shown that learners try to modify their errors during communication in SCMC. Lee (2002) suggested that the display of utterances as written characters in text-chat helps learners recognize mistakes, thereby increasing awareness of focus on form during synchronous communication.

From the viewpoint of social psychology, this display of text chat may also function as a symbol of the self, raising self-awareness and allowing the person to fill in the gap between the present situation and the ideal situation. When we see our own image in a mirror (or are seen by another person), we become conscious of ourselves. This perception seems to affect behavior through self-evaluation. Duval and Wicklund (1973) proposed a self-awareness model called "objective self-awareness" to describe the adjustment of behavior through self-evaluation as a result of self-awareness in which self-awareness may be generated by people seeing a symbol of the self (e.g., their own image). From this self-awareness, individuals consider the suitability of their behavior. If they recognize a gap between ideal behavior and their actual behavior, they take action such as avoiding attention or improving their current behavior to fill in the gap. Within this model, negative self-evaluation is viewed as a major cause of behavior modification.

However, Carver and Scheier (1981a, 1981b) modified Duval's model from the viewpoint of cognition (see Figure 1). This model suggests that self-awareness leads to not only negative evaluation but also positive evaluation; individuals will try to modify their behavior as a result of self-awareness and will try to escape a negative situation upon recognizing that they cannot change it.

Figure 1
Carver's Control Model



First, individuals pay attention to the environment and the self. When they raise self-awareness, they determine the suitability of their behavior. Upon recognizing the necessity of a change in behavior, they try to take action to bridge the gap between the present situation and the ideal situation. In this process, if they encounter difficulty in improving the present situation, they predict the result of taking action to change the situation and whether they are likely to succeed in doing so. If thy predict a positive result, they proceed to change the situation, but, if not, they try to escape the situation.

The objective self-awareness model proposed by Duval and Wicklund (1973) suggests that people first avoid self-awareness and then improve their behavior in order to decrease the conflict. Carver's model, on the other hand, suggests the opposite process: improving behavior first and then predicting the result of changed behavior in order to determine whether to keep improving or to avoid self-awareness.

In synchronous communicative language learning, the concept of self-awareness based on Carver's model can be applied to reflective learning. In text-chat, learners recognize the gap their between present ability and their ideal ability in synchronous communication, allowing them to reflect and modify their former utterances. SCMC is often applied to focus-on-meaning learning. However, from the viewpoint of reflective features such as application of self-awareness, a focus-on-form design can be applied to SCMC, and an effective design of SCMC can be suggested from a social psychology perspective.

PURPOSE OF THIS STUDY

This study examines students' self awareness during learning and its effect on their performance in learner-centered communicative language learning. In order to do this, we analyze the differences between four videoconferencing systems from the following two points of view:

1. Perceived effectiveness of learner's image and language assistance provided during communication
   This point is concerned with awareness of grammatical accuracy in the learner's and interlocutor's utterances, perceived awareness of the learner's and interlocutor's images and its effect on performance, and comprehension of learner's intended meaning during videoconference sessions. In learner-centered communication, learners often fail to maintain attention on the forms they are expected to master. The accuracy of these forms is evaluated to get a clear view of the effect of the learner's and partner's images in videoconferencing. Learners' responses to questions are analyzed regarding the effect of the images and communication assistance implemented in the videoconferencing system (i.e., their perception of awareness of their own or the interlocutor's face or attitude and their perception of the long-term retention of the target forms displayed by the communication assistance in the system).

2. Language performance
   In addition to the subjective data of learners' awareness, objective data of learner's use of the target expressions displayed by the communication assistance module in the system are examined to evaluate the effect of the learners' images. For this purpose, the effect of features in four different videoconferencing systems on language performance are investigated: (a) videoconferencing with both the learner's own and the partner's image, (b) videoconferencing with only the partner's image, (c) videoconferencing with only the learner's image, and (d) videoconferencing without images (i.e., audioconferencing).

Research Design

In order to investigate the effect of images, we used a within-subjects experimental design (with and without self image, with and without partner's image). Because the order of the videoconferencing conditions could have affected learners' evaluation and performance. we used a Latin square method to balance conditions and control for the effect of the order of the condition order (Mutou, 1995; Reese, 1997; Choi & Gupta, 2007)). Table 1 shows the basic Latin square design used in the experiment.

Table 1
Basic Latin Square Matrix

Condition	Order 1	Order 2	Order 3	Order 4
Condition 1	A	B	C	D
Condition 2	B	A	D	C
Condition 3	C	D	A	B
Condition 4	D	C	B	A

Following this design, learners were divided into four groups. Subjects in each group used each videoconferencing software following the order established by the Latin square matrix.

FOUR VIDEOCONFERENCING SYSTEMS

We designed four videoconferencing software systems based on videoconferencing software we developed for our previous studies (Yamada & Akahori, 2006, 2007). The software allows learners to be aware of and use target formulaic expressions during SCMC sessions. For this experiment, the first system displayed both the learner's and the partner's image, the second system displayed only the partner's image, the third displayed only the learner's image, and the four displayed neither image (audioconferencing). Figures 2, 3, 4, and 5 show the interface of each system.

Figure 2
Videoconferencing with the Learner's and the Partner's Image

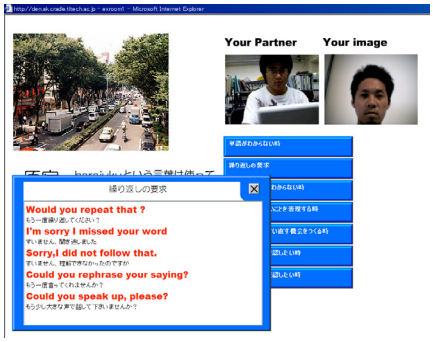


Figure 3
Videoconferencing with Only the Partner's Image

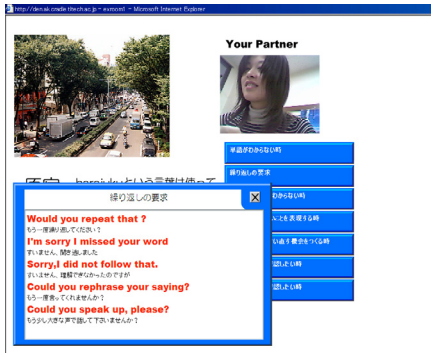
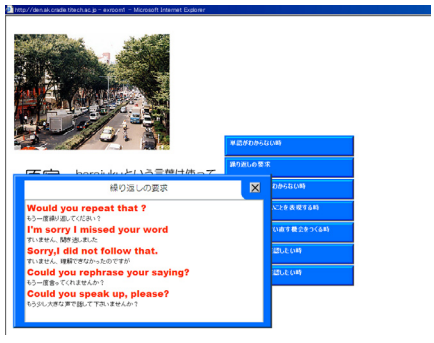


Figure 4
Videoconferencing with Only the Learner's Image

Figure 5
Videoconferencing with Neither Image (audioconferencing)



System Architecture and Function

The videoconferencing software has client and server systems. The client software reads in a target expression file that contains target expression categories and individual target expressions. It selects and displays target expressions to make learners aware of them as well as the learning material for collaborative activity during the SCMC session. The server streams learners' video and voice to the other learners and distributes the learning material documents and target expressions that the client software reads in and displays. All client software was developed in Macromedia Flash with ActionScript and can be used in web browsers with the Flash Player plug-in 7.0 or later. If the Flash Player plug-in is not installed or if the installed version is too old, most web browsers currently in common use (including Microsoft Internet Explorer, Netscape, and Mozilla Firefox) allow users to download and automatically install the plug-in. The server side consists of software to manage the learning material and the target expressions and store learners' selected expressions. The common functions in all four videoconferencing systems and the text-based communication software are implemented in PHP 5.0 and use the Apache 2.0 web server with the PHP module and the Macromedia Flash Communication Server MX 1.5 streaming server. All of the server software runs on the same computer. Learners use webcams and headsets with microphones as they work together in SCMC sessions.

METHODOLOGY

Subjects

The subjects in this study were 40 university students who did not know each other prior to the experiment. All subjects were nonnative speakers of English. The subjects' proficiency in English varied from intermediate level (TOEIC score 725) to low level students who needed help to understand others' utterances (TOEIC score 365). Computer literacy among them was high; all used computers everyday for email, text chat, writing reports, and so on.

Procedure

The subjects were randomly divided into four groups, with each group following an order of condition set by the Latin square method as shown in Table 2.

Table 2
Order of Conditions Based on Latin Square Matrix With and Without Images

	Order 1		Order 2		Order 3		Order 4	
	Learner's image	Partner's image	Learner's image	Partner's image	Learner's image	Partner's image	Learner's image	Partner's image
Condition 1	present	present	present	absent	absent	present	absent	absent
Condition 2	present	absent	present	present	absent	absent	absent	present
Condition 3	absent	present	absent	absent	present	absent	present	present
Condition 4	absent	absent	absent	present	present	present	present	absent

After instructions on how to use the system and complete tasks prior to the experiment, all subjects moved to their own separate room. Each room contained a laptop computer with a webcam and headset, and all computers were connected to a local area network. The subjects were divided into pairs, and each pair engaged in a learner-centered discussion for 10 minutes in each session. The task used in this experiment was an explanation task (information

gap task). In the task, one learner explained pictures of objects to his/her partner without using the objects' names, and the partner guessed what the objects were. For example, an explanation of a picture of a pencil could include mention of its shape and composition but not the word "pencil." The pictures were not displayed in the learning materials on the computer of the learner's partner. Two different sets of five pictures were given to each learner in the pair (see Figure 6).

Figure 6
Sample Pictures in the Explanation Task

Data Collection

The aim of this study was to investigate the contribution of self- and partner's images to perceived learning awareness, perceived social presence, and the use of target expressions. Data were collected in two ways. First, the subjects completed a questionnaire after the experiment in which they rated their perceived learning awareness, their perception of their own social presence, the social presence of their partner, and the assistance provided by displaying the target expressions as learning objectives (see Table 3). Second, all communications were videorecorded, and the number of times the subjects performed the actions listed in Table 4 were counted.

Table 3
Psychological Perception Questions

	Question	Scale
1	Rate your perceived awareness of accuracy in English communication.	1: not at all – 4: very much
2	Rate your perceived awareness of communicating your intended meaning in English, even if you make a grammatical mistake.	1: not at all – 4: very much
3	Rate your perceived awareness of responding as soon as possible.	1: not at all – 4: very much
4	Rate your perceived awareness of uttering the target expressions displayed on the screen.	1: not at all – 4: very much
5	Rate your perceived awareness of communicating with your partner using in accurate grammar and vocabulary.	1: not at all – 4: very much
6	Rate your perceived awareness of pronouncing accurately.	1: not at all – 4: very much
7	Rate your perceived recognition of errors in grammar and vocabulary.	1: not at all – 4: very much
8	Rate your perceived awareness of grammatical accuracy in your partner's utterances.	1: not at all – 4: very much
9	Rate your perceived awareness of comprehension of your partner's utterances.	1: not at all – 4: very much

	Question	Scale
10	Rate your perceived awareness of the response speed from your partner.	1: not at all – 4: very much
11	Rate your perceived awareness of whether your partner used the target expressions.	1: not at all – 4: very much
12	Rate your perceived awareness of your partner pronouncing words accurately.	1: not at all – 4: very much
13	Rate your perceived awareness of accurate grammar and vocabulary in your partner's utterances.	1: not at all – 4: very much
14	Rate your perceived recognition of errors in the grammar and vocabulary in your partner's utterances.	1: not at all – 4: very much
15	Rate your perceived awareness of your own image during English communication.	1: not at all – 4: very much
16	Rate your perceived awareness of your partner's image during English communication.	1: not at all – 4: very much
17	Rate your perceived awareness of your partner's thinking during English communication.	1: not at all – 4: very much
18	Rate your perceived awareness of your partner's attitude during English communication.	1: not at all – 4: very much
19	Rate your perceived effort made to engage in communication during English communication.	1: not at all – 4: very much
20	Rate your relief in having target expressions displayed during English communication.	1: not at all – 4: very much
21	Rate your perceived usefulness of the use of the target expression display.	1: not at all – 4: very much
22	Rate your perceived effectiveness of the use of the target expressions in avoiding interruption of communication.	1: not at all – 4: very much
23	Rate your perceived awareness of learning target expressions.	1: not at all – 4: very much
24	Rate your perceived awareness of your partner's presence.	1: not at all – 4: very much
25	Rate the relief during English communication.	1: not at all – 4: very much
26	Rate your perceived smoothness communication compared to face-to-face communication.	1: not at all – 4: very much
27	Rate your perceived awareness of learning English communication.	1: not at all – 4: very much
28	Rate your perceived awareness of natural communication.	1: not at all – 4: very much

Table 4
Data collected through analysis of video records

Item	Description
1	Clicks on the target expression button
2	Self-corrections
3	Use of nonverbal devices
4	Use of target expressions

Analysis Procedure

In order to determine the validity of and detect perceived psychological factors for each item, an exploratory factor analysis was employed. Items with a communality less than 0.20 and with factor loading less than 0.400 were excluded. Analysis of variance (ANOVA) was conducted using each factor score for the confirmation of the effect of images on psychological perception. Afterwards, path analysis was conducted using each factor score, dummy variables for the self- and partner's images and language learning performance items in order to speculate on the relationship between perceived psychological factors and language learning performance.

RESULTS

Before analysis was undertaken, data from four of the subjects were removed because their data sets were incomplete. Six of the 28 items were eliminated due to low commonality or factor loadings (items 2, 3, 6, 7, 15, and 19). Four factors were subsequently extracted by factor analysis: "perceived awareness of accuracy during communication" which contained the perceived awareness of grammatical accuracy in partner's utterance and so on; "perceived similarity to a real setting due to partner's presence" which contained items involving perceived strength of presence, perceived ease of communication in English, and so on; "perceived awareness of the use of target expressions" which contained the perceived usefulness of target expressions in learning and so on; and "perceived awareness of the partner's use of nonverbal devices." The results of factor analysis are shown in Tables 5.

Table 5
The Results of Factor Analysis: Four Factors

Question	Factor 1	Factor 2	Factor 3	Factor 4	Communality
Rate your perceived awareness of accurate grammar and vocabulary in your partner's utterances.	0.854	-0.169	-0.050	0.060	0.744
Rate your perceived recognition of errors in the grammar and vocabulary in your partner's utterances.	0.815	0.032	-0.213	-0.049	0.599
Rate your perceived awareness of grammatical accuracy in your partner's utterances.	0.755	0.045	-0.079	-0.051	0.532
Rate your perceived awareness of communicating with your partner using accurate grammar and vocabulary.	0.628	0.146	0.111	0.084	0.525
Rate your perceived awareness of your partner's pronouncing words accurately.	0.581	-0.139	0.071	0.024	0.376
Rate your perceived awareness of accuracy in English communication.	0.560	0.288	0.082	-0.123	0.421
Rate your perceived awareness of whether your partner used the target expressions.	0.454	-0.077	0.244	0.140	0.368

Question	Factor 1	Factor 2	Factor 3	Factor 4	Communality
Rate your perceived awareness of natural communication.	0.106	0.816	0.090	-0.184	0.670
Rate your perceived effort made to engage in communication during English communication.	-0.120	0.762	0.041	0.087	0.644
Rate awareness perceived smoothness of communication compared to face-to-face communication.	-0.060	0.727	-0.117	0.172	0.594
Rate your perceived awareness of your partner's presence.	-0.165	0.646	-0.009	0.169	0.512
Rate your perceived awareness of learning English communication.	0.251	0.629	0.000	-0.092	0.440
Rate your perceived effectiveness of the use of the target expressions.	-0.074	0.006	0.829	-0.091	0.652
Rate your relief in having target expressions displayed during English communication.	0.048	-0.146	0.745	0.049	0.550
Rate your perceived awareness of learning target expressions.	-0.033	0.075	0.725	0.000	0.547
Rate your perceived usefulness on the use of the target expression display.	-0.119	0.122	0.704	-0.024	0.517
Rate your perceived awareness of uttering the target expressions displayed on the screen.	0.254	-0.049	0.562	0.123	0.489
Rate your perceived awareness of your partner's attitude during English communication.	0.112	0.023	-0.085	0.830	0.736
Rate your perceived awareness of your partner's image during English communication.	-0.004	0.119	-0037	0.671	0.504
Rate your perceived awareness of your partner's thinking during English communication.	-0.062	-0.024	0.116	0.627	0.399
Eigenvalue	5.064	3.364	2.457	1.690	
Cumulative contribution ratio (%)	23.007	37.718	47.908	54.107	

Differences among the Four Factors in the Subjective Data

A two-way ANOVA revealed that the main effect for the partner's image was statistically significant in factors 1, 2 and 4 (factor 1: $F(1,35) = 4.169$, $p < .05$; factor 2: $F(1,35) = 63.252$, $p < .001$; factor 4: $F(1,35) = 11.487$, $p < .01$). The main effect for self-image was confirmed on factor 2 ($F(1,35) = 4.575$, $p < .05$). There was no significant effect for self-image and partner's image on factor 3. Figures 7, 8, 9, and 10 show the average score and main effects for each factor.

Figure 7
Perceived Awareness of Accuracy During Communication (factor 1)

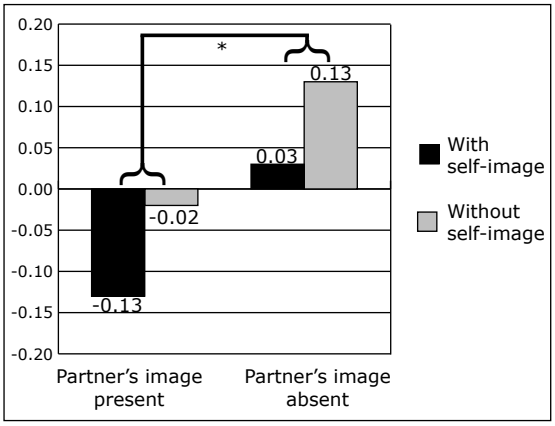


Figure 8
Perceived Similarity to a Real Setting due Partner's Presence (factor 2)

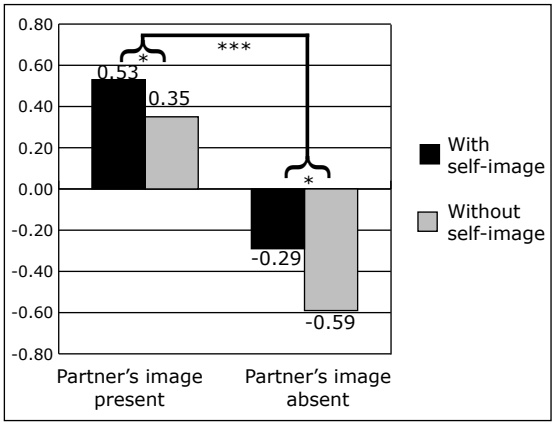


Figure 9
Perceived Awareness of the Use of Target Expressions (factor 3)

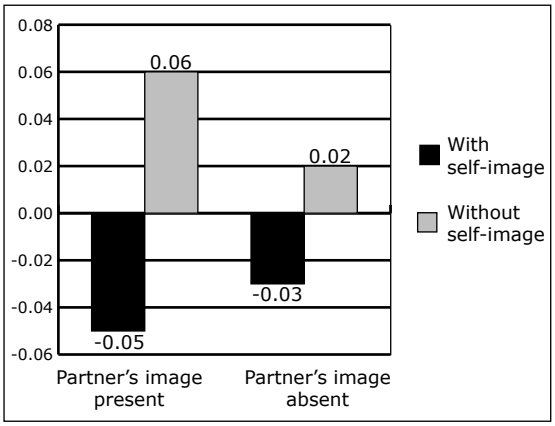
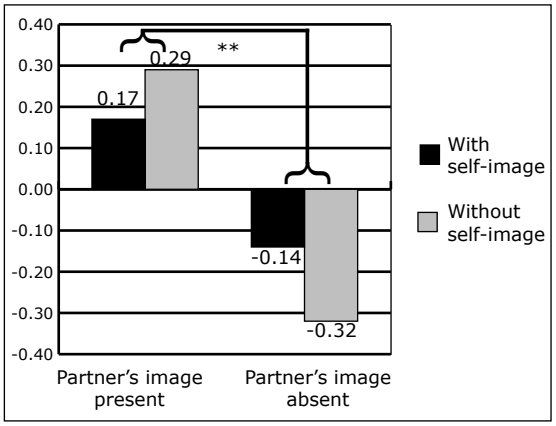


Figure 10
Perceived Awareness of the Partner's Use of Nonverbal Devices (factor 4)



*p < .05. **p < .01. ***p < .001.

Differences among the Four Factors in Language Performance

In the results of ANOVA, significant effects on item #2 "number of self-corrections" and item #3 "number of utterances of the target expressions" were found for the self-image (self-correction: $F(1,35) = 8.058$, $p < .01$; use of target expressions: $F(1,35) = 5.193$, $p < .05$). A main effect for the partner's image was found on item #3 "number of utterances of the target expressions" and item #4 "mean number of occurrences of nonverbal devices" (use of target expressions: $F(1,35) = 16.337$, $p < .001$, nonverbal devices: $F(1,35) = 50.103$, $p < .001$). Figures 11, 12, 13, and 14 show these results in detail.

Figure 11
Mean Number of Clicks on the Target Expression Button

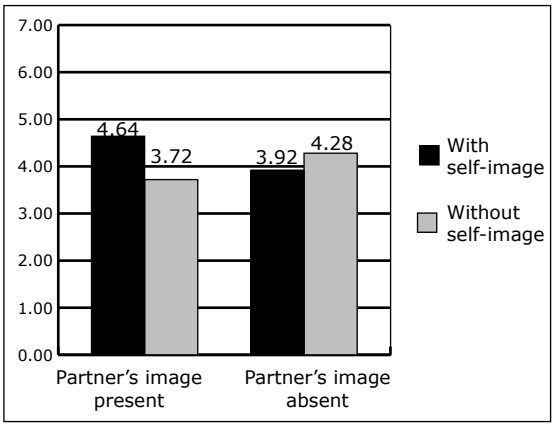


Figure 12
Mean Number of Self-corrections

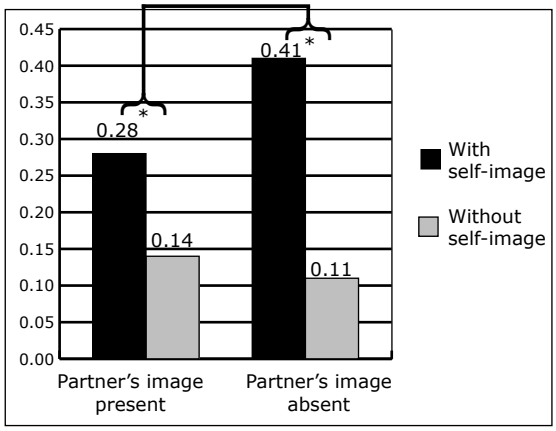


Figure 13
Mean Number of Occurrences of Target Expressions

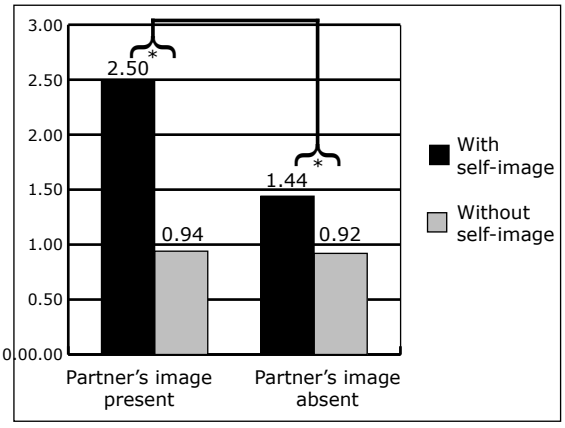
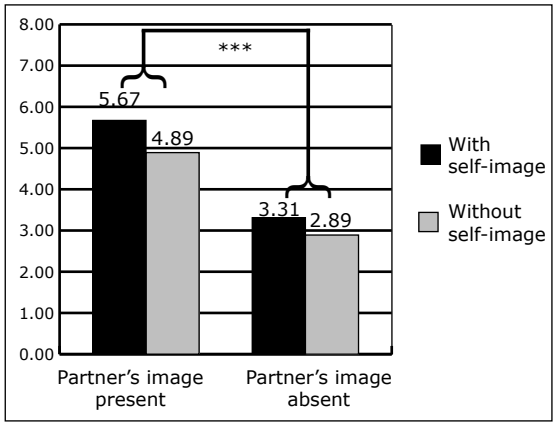


Figure 14
Mean Number of Occurrences of Nonverbal Devices



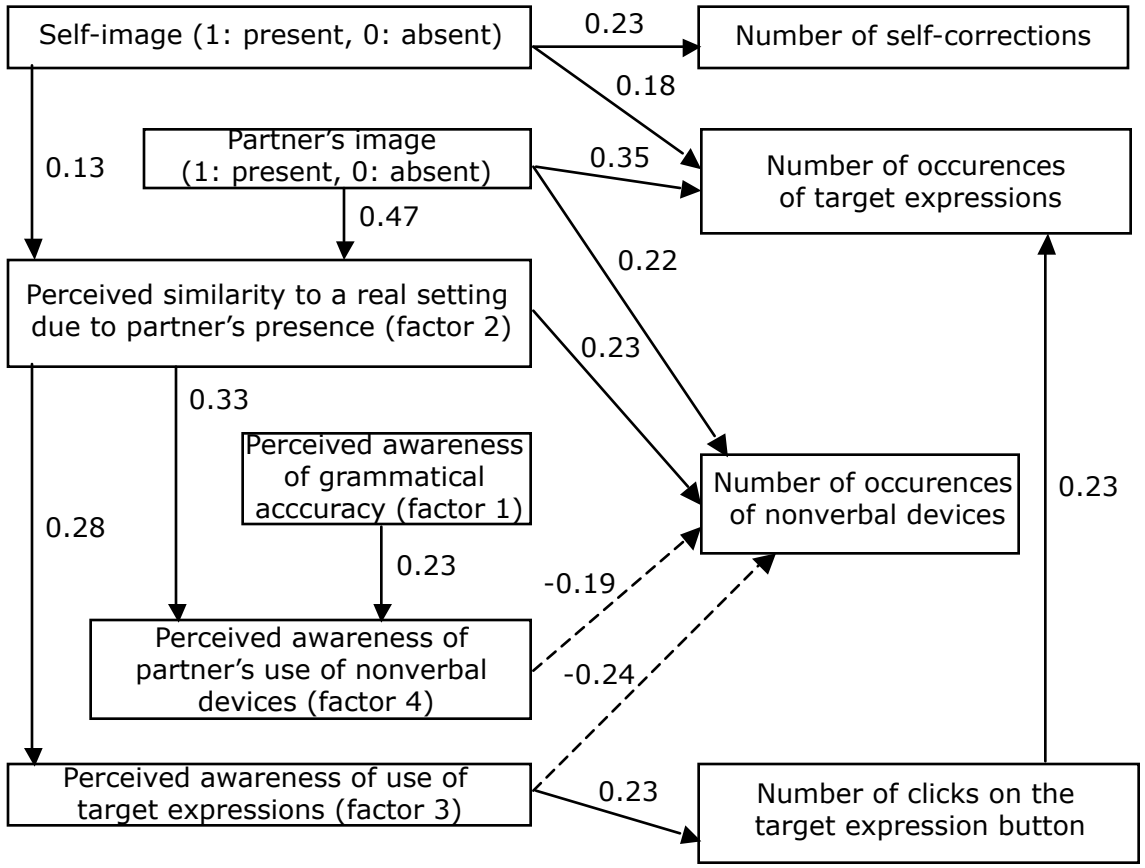
*p < .05. **p < .01. ***p < .001.

Path Analysis

Because the aim of this study was to investigate the relationships among affective evaluation, images, and language learning with a view toward the effective design of SCMC, path analysis was conducted between the four factors' score and four language learning performance items as dependent variables. Additionally, dummy variables were used to differentiate the medium used. The variable "self-image" was set to 1 when the learner's own image was displayed during communication and to 0 when it was not. The variable "partner's image" was set to 1 when the partner's image was present and 0 when it was not.

Figure 15 shows the significant relationships among the factors' score, image presence/absence, and learning performance. Both the self- and partner's images have a direct effect on target expression use. Factor 2 "perceived similarity to a real setting due to partner's presence" is affected positively by both the self- and partner's image. This factor affects three variables: perceived awareness of target expression use (factor 3), perceived awareness of the partner's use of nonverbal devices (factor 4), and the number of occurrences of nonverbal devices. Factor 3 relates to clicking on the target expression button, which promotes the use of target expressions. Also, factor 3 has a negative effect on the use of nonverbal devices.

Figure 15
Significant Relationships among Images, Factors, and Performance

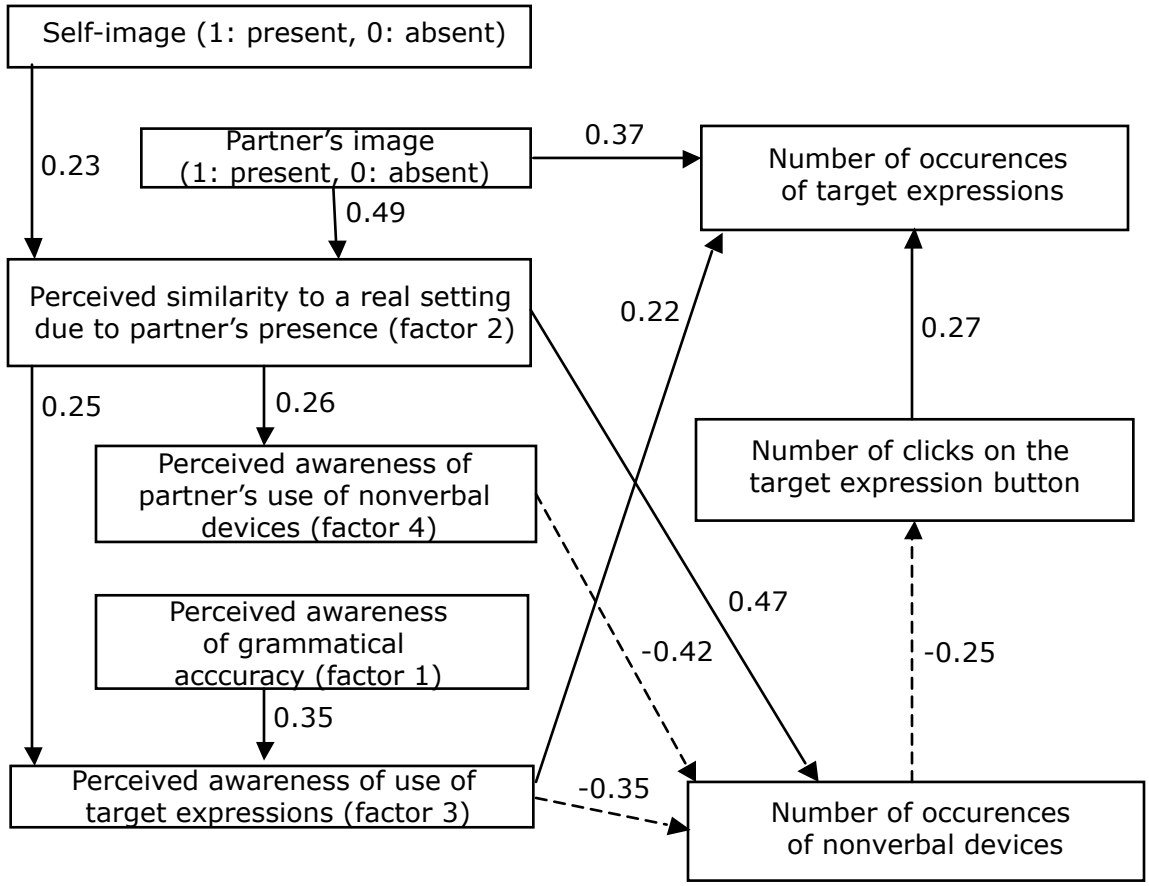


Notes: All relationships are significant ($p < .05$). Dotted lines indicate negative relationships.
GFI = 0.962, AGFI = 0.928, RMSEA = 0.000, $X^2 = 28.331$, $df = 29$, $p = .500$

However, these relationships seem to depend on the learner's level of proficiency because high-level learners recognize their own abilities than low-level learners (e.g., Oxford, 1990; O'Malley & Chamot, 1993). The subject data were divided into two parts; high level ($n = 19$) and low level ($n = 17$) based on the average TOEIC score of 557. Figures 16 and 17 show the significant relationships in high- and low-level groups.

The high-level model is essentially similar to the overall model. Both self and partner's image affect factor 2, "perceived similarity to a real setting by interlocutor's presence," which, in turn, has a positive effect on the factor 3, "perceived awareness of the use of the target expressions." This awareness is a very important factor; it affects the use of nonverbal devices negatively and the use of target expressions positively. The use of nonverbal devices affects the use of target expressions, meditated by the number of clicks on the target expression button. The use of nonverbal devices is affected by three factors: perceived awareness of the partner's use of nonverbal devices and perceived awareness of use of the target expressions (negative effect) and perceived similarity to a real setting due to partner's presence (positive effect). Self-correction is not affected by image, other factors, or other performance variables.

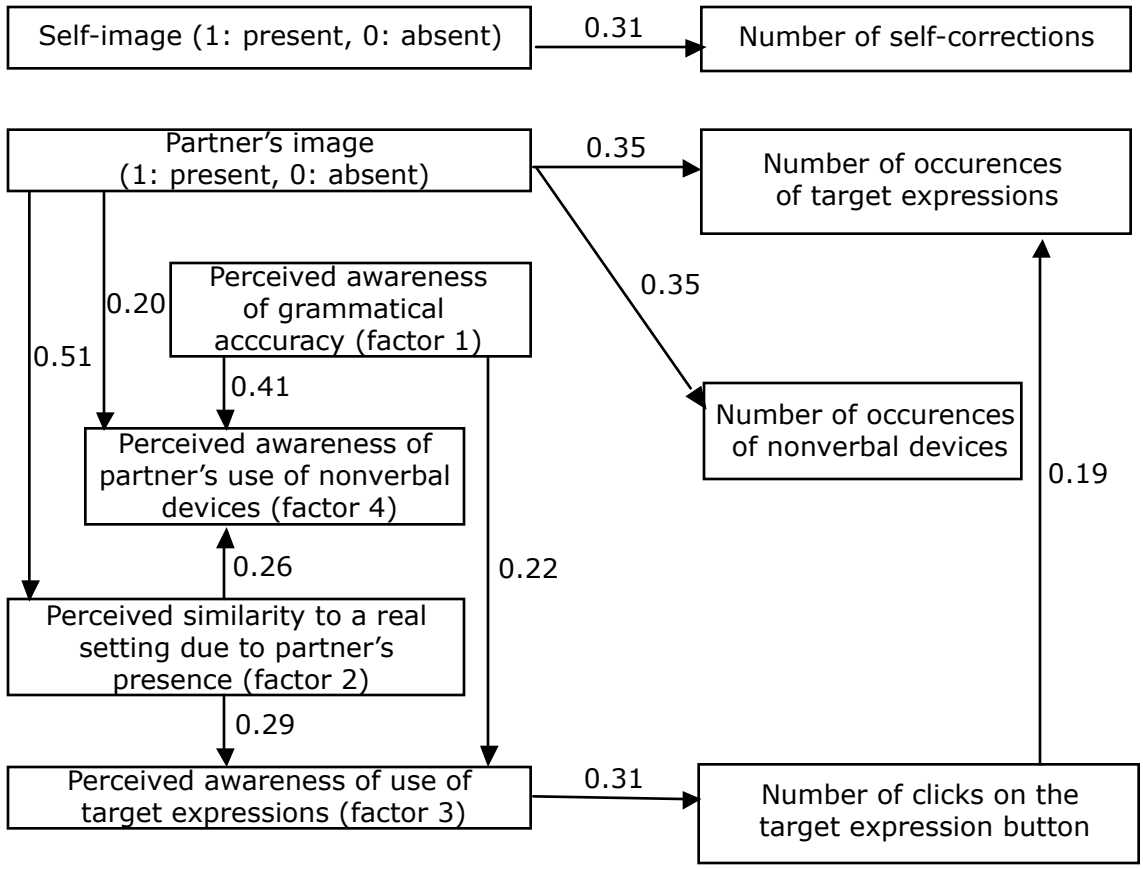
Figure 16
Significant Relationships among Image, Factors, and Performance in the High-level Group



Notes: All relationships are significant ($p < .05$). Dotted lines indicate negative relationships.
GFI = 0.957, AGFI = 0.919, RMSEA = 0.000, X^2 = 15.846, df = 24, p = .894

In the low-level model, self-image does not affect the perceived similarity to a real setting due to partner's presence. The partner's image is the key in promoting learning performance; it affects factor 2, which, in turn, has a positive effect on the perceived awareness of the use of target expressions. This promotes clicking the target expression button, and, as a result, low-level learners utter target expressions more frequently. The use of nonverbal devices is affected by the perceived similarity to a real setting due to partner's presence; however, the use of nonverbal devices does not lead to the use of target expressions. This is one of the important differences from the high-level learners.

Figure 17
Significant Relationships among Image, Factors, and Performance in the Low-level Group



Note: All relationships are significant ($p < .05$).
GFI = 0.962, AGFI = 0.928, RMSEA = 0.000, X^2 = 28.331, *df* = 29, p = .500

Opinions and Suggestions from Subjects

Students made several comments about the four SCMC systems. Almost all of the students found that systems which displayed the partner's image helped foster communication. Systems that did not show the partner's image received a more negative response, with some subjects commenting on the stress of not being able to see their partner's behavior and consequently feeling uncomfortable during communication.

> Positive comments
> I was conscious of my partner's use of the target expression.
> The system with the partner's image facilitated comprehensive communication.
> I could understand whether the partner understood what I meant. (Comment on both SCMC with the self- and the partner's image and SCMC with only the partner's image)
> The SCMC with self image allowed me to be conscious of the target expression.
> It helped me to see our communication from the third person. (Comment on both SCMC with the self- and the partner's image and SCMC with only the self-image)

Negative comments
I could not communicate with my partner, watching only my own image. (Comment on SCMC with only the self-image)
I could not find a suitable timing to start communication without my partner's image. (Comment on SCMC without an image)
I could not understand whether my partner understood what I meant. (Comment on SCMC with only the self-image and without an image)

DISCUSSION

Perceived Awareness of Each Factor

We found that the presence or absence of the learner's own image and the partner's image affected the perceived awareness of each of the four factors. The results for factor 1 show that the absence of the partner's image promotes "perceived awareness of accuracy during communication." Learners have difficulty in communicating their intended meaning without the partner's image because the presence of the image allows the use of social cues (Garrison & Anderson, 2003). Without the image, learners tend to communicate meaning through accurate grammar, vocabulary, and pronunciation. The results for factor 2, "perceived similarity to a real setting due to the partner's presence," indicate that the presence of both the self- and the partner's image promotes the perceived similarity to a real setting. The partner's image affects the perceived awareness of the learner's presence. Gunawadera (1995) also suggested that the partner's presence in e-learning affects the perceived similarity to a face-to-face setting. Interestingly, the self-image also affects the perceived similarity to a real setting. It seems that the self-image promotes having an objective viewpoint of the communication. Morikawa and Maesako (1998) and Morikawa (1999) affirmed that learners have a stronger awareness of face-to-face communication because of the self-image. They studied the effect of the self- and the partner's images on the awareness of real time communication by the use of "hyper mirror," a video-mediated communication tool that casts a self-image in front of learners. They argued that learners perceive the situation as highly realistic, because they share the perception of existence in the same place as a cognitive process. Videoconferencing with the self- and the partner's image provides a similar perception to hyper mirror. The results for factor 4, "perceived awareness of the partner's use of nonverbal devices," reveal that the presence of the partner's image leads to an increase in the use of nonverbal devices. When learners' attention focuses on their partner's image, they try to understand the partner's intended meaning. Nonverbal devices facilitate learners' efforts to understand the full meaning of their partner's utterances.

Effects on Learning Performance

Images in videoconferencing have an effect on both meta-cognition and comprehensibility in communication. Our results show that a self-image promotes self-correction. Carver and Scheier (1981a, 1981b) claim that a self-image draws attention to oneself. Learners then judge the suitability of their actions; when they judge that their actions are not ideal, they try to modify their actions by themselves, following the model described in Figure 1. In our study, the self-image seems to allow learners to be aware of their actions. Text chat, which displays learners' utterances on screen, also activates the awareness of self-correction (Lee, 2002). Learners focus on their utterances, recognize their mistakes, and try to repair them. Objects which reflect self-action allow learners to reconsider their action while communicating. The results for target expression use in our study indicate that both the self- and the partner's images have an effect on promoting the use of target expressions, contrary to the result

for factor 3 that indicates no significant effect on the perceived awareness of use of target expressions. This finding underscores the complicated effect of both images and the target expression itself on its use. First, the partner's image helps learners understand the partner's degree of comprehension of their utterances in communication using social cues such as laughing or nodding (Garrison & Anderson, 2003; Stacey, 2002). Second, selecting to use a target expression as a communication strategy allows learners to utter the expression when they face communication troubles such as hearing words whose meaning they do not know (Tarone, 1981a, 1981b). Lastly, the self-image promotes self-focus, which allows learners to recognize the gap between their present situation and the ideal situation and modify their actions accordingly. The result for the use of nonverbal devices suggests a positive effect of the partner's image. It seems to be clear that the partner's image facilitates the comprehensibility of communication, similar to the result for the use of target expressions. When learners face unsuccessful communication, they tend to use nonverbal devices as a communication strategy in order to compensate for their inability to communicate their intended meaning.

Relationship between Image, Perceived Awareness, and Performance

Overall, both the self- and the partner's image have a direct and indirect positive effect on the use of target expressions. Images affect the perceived similarity to a real setting, which seems to be a key factor that affects other factors. This perception affects the perceived awareness of the partner's use of nonverbal devices and target expressions. It also has a positive effect on the use of nonverbal devices; in other words, when learners feel the similarity to a face-to-face situation, they tend to use nonverbal devices. The perceived awareness of target expression use promotes clicking on the target expression button and leads to increased use of target expressions.

However, language proficiency can modulate the degree of effect of images due to the differences in meta-cognitive skill between high- and low-level learners. In the high-level learner model, the self- and the partner's images have an influence on the perceived similarity to a real setting. This perception affects the perceived awareness of the partner's use of nonverbal devices, the learner's own use of nonverbal devices, and the use of target expressions. It is interesting to note that the use of nonverbal devices promotes the use of target expressions indirectly and negatively, with the target expression button being clicked on less frequently. Self-correction, which indicates learners' reflection and meta-cognitive activity, is not affected by the four factors at all. For high-level learners, the self-image indirectly helps them achieve their learning objectives; they can apply useful resources provided by the system to practical communicative situations, which leads to comprehensible communication. The partner's image can assist in understanding the partner's situation, such as a failure to understand the meaning of a word in a previous utterance. Given the ANOVA results described earlier, it can be speculated that the self-image allows learners to recognize language gaps in their performance and promotes modification of their utterances. Nonverbal devices, which seem to increase with perceived similarity to a face-to-face situation, affect learning performance negatively. Decreasing the use of nonverbal devices leads to more frequent use of target expressions. As mentioned earlier, nonverbal devices facilitate comprehensible communication; when learners try to solve communication difficulties without nonverbal devices, they tend to use target expressions as a communication strategy. In the videoconferencing system with both self- and the partner's image, high-level learners seem to be able to view their communication objectively. The high-level learner model suggests that high-level learners can take advantage of both the self- and the partner images to control fluent communication and corrective feedback.

In the low-level learner model, the partner's image seems to have a strong direct and indirect influence on perceived awareness and performance. The perceived similarity to a real setting is affected only by the partner's image and not by the self-image. The partner's image also directly affects the use of nonverbal devices, but nonverbal devices have no effect on the performance, contrary to the high-level learner model. The perceived awareness of target expression use, which is affected by the similarity to a face-to-face situation, triggers clicking on the target expression button, promoting the use of target expressions. The only effect of the self-image on performance is the promotion of self-correction; it is otherwise independent of other relationships. Overall, the partner's image has a effect on the four factors and performance similar to that in the high-level learner model. We did find, however, a difference in the effect of the self-image on performance based on the learner's proficiency level. In the low-level learner model, the self-image has a direct positive effect on modification; low-level learners seem to be aware of form, such as grammar and vocabulary, because of the self-image display. On the other hand, the self-image allows high-level learners to focus on meaning or comprehensible communication. From the viewpoint of focus-on-form, the self-image can assist learner reflection during communication for low-level learners, but not as much for high-level learners. For high-level learners, it serves more to promote reflection from the viewpoint of comprehensible communication.

CONCLUSION

The goal of this study was to investigate the effect of images displayed in videoconferencing with respect to the use of SCMC in second language learning: perceived awareness of the interlocutor's presence, perceived awareness of the second language in communication, and language learning performance.

The presence of the partner's image seems to have an effect on the awareness of comprehensible communication and performance such as the perceived similarity to a real setting due to the partner's presence, the perceived awareness of the partner's nonverbal devices, and the learner's own use of nonverbal devices. In this study, the partner's image played an important role in helping learners comprehend each other's intended meaning. Learners were able to understand their partner's situation, for example, whether the partner could understand the meaning of the words in the learner's utterances.

The presence of the learner's own image appeared to be effective for meta-cognitive awareness and performance such as self-correction and the use of the target expressions. In text chat, the view of one's own utterances raises the awareness of reflection (Lee, 2002). In videoconferencing, the self-image, allowing learners to see themselves as though in a mirror, has a similar effect on meta-cognitive behavior. When considering the design of a videoconferencing system including the function of maintaining learners' attention on learning objectives and meta-cognitive behavior, the use of the learner's own image in addition to the partner's image can help learners see themselves from a third-person perspective and activate meta-cognitive behaviors. However, one point that should be noted is that the perceived awareness of accuracy is increased by the absence of the partner's image. The ideal design of any system depends on the learning objectives, but in the case of fostering grammatical competence in SCMC, system developers should be flexible when designing their system.

The path analysis in our study shows that the presence of the self- and the partner's images allows learners to perceive a similarity to a face-to-face situation, which then affects the use of target expressions. This perception seems to lead to enhance the learning performance. However, meta-cognitive skills, which depend on proficiency level, seems to affect the

relationship between images and other variables. The results suggest that the self- and the partner's image directly affects the perceived similarity to a face-to-face situation. This can lead to more frequent use of nonverbal devices, which negatively impacts learning performance. Consequently, the reduction of the use of nonverbal devices as tools to communicate meaning promotes higher learning performance. On the other hand, low-level learners tend to focus only on the partner's image, which leads to a greater perceived similarity to a face-to-face situation. This perception helps low-level learners use target expressions with no effect on nonverbal devices. Interestingly, self-image has a direct effect on self-correction but no other relationships in this model.

This study suggests grounds for the use of SCMC in communicatively oriented language learning. However, this study has limitations. Since this study was designed within an experimental setting, the results may not be directly applicable to a variety of practical environments; long-term investigation in classroom settings will be needed to extend the examination of the effectiveness of videoconferencing. Furthermore, the Latin Square Method was applied in the experimental design of this study; therefore this study cannot statistically clarify interaction effects between the self-image and the partner's image. In order to clearly determine interaction effects, a study based on this research is planned, focusing on types of videoconferencing.

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