

NOTICING AND TEXT-BASED CHAT

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ABSTRACT

This study examined the capacity of text-based online chat to promote learners' noticing of their problematic language productions and of the interactional feedback from their interlocutors. In this study, twelve ESL learners formed six mixed-proficiency dyads. The same dyads worked on two spot-the-difference tasks, one via online chat and the other through face-to-face conversation. Stimulated recall sessions were held subsequently to identify instances of noticing. It was found that text-based online chat promotes noticing more than face-to-face conversations, especially in terms of learners' noticing of their own linguistic mistakes.

INTRODUCTION

Noticing is an important cognitive construct in second language acquisition. According to Schmidt (2001), noticing plays a crucial role in various accounts of second language acquisition (SLA), be it in theory of development or in the role of instruction, and decades of research in the area of cognitive psychology have concluded that attention is essential for learning: "The orthodox position in psychology is that there is little if any learning without attention," and "the allocation of attention is the pivotal point at which learner internal factors ... and learner-external factors ... come together" (p. 11). The potential of technology to promote noticing has been discussed and examined by a number of researchers (e.g., Chapelle, 1998; Hegelheimer & Chapelle, 2000; White, 1998). Text-based online chat, a particular form of synchronous computer-mediated communication (CMC) involving written oral-like conversation, has the great potential of increasing noticing for two reasons: first, it allows conversation to flow at a slower pace compared to face-to-face conversation, and thus gives the "speakers" longer processing time in receiving and producing the target language; secondly, it saves texts in such a manner that users can access previous messages quite easily. This study attempts to examine the capacity of text-based online chat to enhance learners' noticing of their own problematic linguistic output and of the interactional feedback from their interlocutors.

This paper is organized as follows: First, we review the research literature on the Noticing Hypothesis and discuss the current trend of research in this field—the exploration of contextual factors that affect noticing. Based on existing arguments that suggest a link between text-based online chat and noticing in the CMC literature, text-based online chat is hypothesized as one of the conditions that may have an impact on noticing. Next, we describe our research context and procedures together with our coding schemes for both the negotiated interaction (self-correction, negotiation of meaning, and recast) and the noticing of these episodes. In the results section, we first compare the participants' noticing of their own errors (measured by the number of self-corrections), and then we compare their noticing of the two types of interactional feedback (negotiation of meaning and recast). Finally, we discuss the findings and limitations of this study and provide suggestions for future research.

Noticing Hypothesis

Schmidt (1990) proposed the Noticing Hypothesis, according to which the emergence of new forms should be preceded by their being noticed in the input. In other words, the conscious noticing of a mismatch between one's language production and the target form is a necessary and sufficient condition

for second language acquisition. Schmidt (2001) argued that "noticing requires of the learner a conscious apprehension and awareness of input," and "while there is subliminal perception, there is no subliminal learning" (p. 26). Tomlin and Villa (1994) acknowledged the significance of focusing on attentional resources in SLA and further analyzed attention in terms of three distinct components: alertness, orientation, and detection. According to Tomlin and Villa, detection is the key attentional moment that enables learners to use the detected grammatical instances as data to formulate and test hypotheses about second language (L2) grammar, and hence facilitates second language acquisition. Their view differs from Schmidt on the importance of awareness in SLA and holds that detection, both with and without awareness, is sufficient for learning. Robinson (1995) gave the strictest definition of noticing, conceiving it as "what is both detected and then further activated following the allocation of attentional resources" (p. 297). Gass (1997) regarded noticing as a necessary condition under which the input gets transformed into intake.

Although these definitions of noticing differ in the degrees or levels of awareness that are deemed necessary for SLA, the researchers all agree on the importance of noticing in SLA. In both the strong version of the Noticing Hypothesis (noticing is necessary and sufficient for second language acquisition) and the weak version of the Noticing Hypothesis (noticing is a necessary but not sufficient condition for second language acquisition), noticing is considered to play a significant role in SLA. In Gass and Selinker's (2001) view, noticing or selective attention is "at the heart of the interaction hypothesis," (p. 298) and is one of the crucial mechanisms in the negotiation process.

A series of studies which have been attempted to test these theoretical arguments have demonstrated the link between the noticing of a target structure and its intake (Izumi, 2002; Izumi, Bigelow, Fujiwara, & Fearnow, 1999; Leow, 2000, 2001; Mackey, Gass & McDonough, 2000; Rosa & O'Neil, 1999). These research findings have substantiated noticing as an important cognitive construct in second language acquisition.

A decade of research on noticing has also yielded evidence suggesting that L2 learners do notice the interactional feedback from their interlocutors during oral interactions (Mackey et al., 2000). Moreover, Mackey and colleagues also found that learners noticed lexical and phonological feedback more often than they noticed morphosyntactic feedback. Philp (1999) investigated the noticing of a specific type of interactional feedback, recast, in manipulated (cued recall) oral interaction. She found that over 70% of the recasts were accurately recalled. She concluded that learners can notice a great number of recasts in a primed context. She further identified some constraining factors, such as recast length and learner readiness, that affected the noticing of interactional feedback.

Contextual Factors and Noticing

Philp's (1999) findings pushed the agenda of research on noticing away from general evidentiary studies on the positive effect of noticing on SLA towards exploratory studies on contextual factors that affect noticing. Realizing the potential effect of learners' memory capacity on noticing as laid out in Doughty's (2001) cognitive comparison framework, Mackey, Philp, Egi, Fujii, and Tatsumi (2002) designed a study to explore the relationship between learners' working memory (WM) capacities and their noticing of interactional feedback. They found that there was a positive relationship between WM capacities and their noticing of interactional feedback, and that learners at lower developmental levels exhibited more noticing than those at higher levels.

Mackey et al.'s (2002) study corroborated one of the determining factors of noticing proposed by Robinson (2001). According to Robinson, not only individual differences such as pattern recognition ability and memory of contingent input, but also different learning conditions and tasks that impose different demands on language processing load, might affect the noticing of an L2 knowledge gap and hence lead to different learning outcomes. Different processing demands from different tasks or learning conditions may levy different cognitive loads on the learners' working memory. Since WM capacity is

limited and affects learners' noticing of interactional feedback, it is reasonable to hypothesize that different learning conditions might yield different levels of noticing. Izumi (2002) further suggested that modality is an issue that deserves some research attention and suspected that different modalities (written vs. oral/aural modes) might lead to different levels of noticing. His suggestion is supported by Sanz's (1997) research on the effect of modality on second language processing. Sanz found that the quality of learner performance varied depending on whether they performed the task in written mode or in oral mode, thus showing the importance of investigating modality as a variable that affects second language processing. In consideration of this research finding and of current theoretical arguments on the relationship between learning conditions and noticing, we regard it worthwhile to investigate whether text-based online chat may lead to different levels of noticing from face-to-face conversation, as one is a written mode of conversation and the other is in oral/aural mode.

Text-Based Online Chat and Noticing

Few studies have explored the cognitive effects of text-based online chat and even fewer have focused on noticing. Despite the paucity of the current literature on noticing in text-based online chat, some researchers did allude to this issue when trying to explain the contribution of text-based online chat to second language learning. For example, Kitade (2000) found that Japanese learners of English actively engaged in negotiation of meaning and self/other-initiated corrections. He therefore hypothesized that "IC (Internet Chat) with task-based L2 interaction facilitates comprehensible and meaning-making interaction, awareness raising, as well as collaborative learning" (p. 162). Pellettieri's (2000) study revealed that text-based online chat fostered negotiation of meaning and form-focused interaction. She reasoned that online chat promoted the noticing of problematic linguistic structures and thus was beneficial to the development of grammatical competence. Salaberry (2000), in his effort to account for the finding that his participants showed their first signs of understanding past-tense morphological marking in an online setting, stated: "Arguably, the specific characteristics of the medium of communication represented in CMC may increase the chances that learners will focus their attention on both function and form, thereby increasing the likelihood that morphological development will occur in such an environment rather than in face-to-face setting" (p. 19).

An important feature that resonated throughout these studies was the potential of text-based online chat in helping learners notice both their own problematic L2 utterances and the feedback on problematic linguistic forms provided by their interlocutors. In line with these arguments, Smith (2004) listed several features of text-based online chat that might "amplify students' attention to linguistic form": written communication mode, the visual saliency and re-readability of the messages, and longer processing time. In their analysis of learners' verbalizations, scrolling behaviors, and body language, Smith and Gorsuch (2004) provided some evidence of "a heightened degree of attention to form" among learners during text-based online chat. Many researchers have either hinted at or argued explicitly that text-based online chat could promote more noticing of problematic linguistic structures during the interaction, which could be a crucial factor in determining the facilitative role of text-based online chat in SLA. In Salaberry's (2000) words, "the inherent characteristics of the discourse of text-based CMC (e.g. written mode of communication and absence of paralinguistic and nonverbal information) may represent a pedagogically-sound environment for increasing metalinguistic awareness in the L2" (p. 21). Pellettieri (2000) concurred with Salaberry and called for future research with regard to this potential, suggesting that text-based online chatting might allow extra processing time and provide more resources that would help learners discriminate between the target and non-target-like forms.

RESEARCH QUESTIONS

This study explores the role of noticing during text-based online chatting in order to better understand the potential of text-based online chat to facilitate second language learning. It also aims to add to the emerging literature on the contextual factors that affect noticing. Specifically, we wanted to find out whether text-based online chat would help L2 learners notice both their problematic linguistic output and the interactional feedback from their non-native speaker interlocutors more often than in face-to-face conversation. We predicted that learners would be more likely to notice their own problematic linguistic output and the interactional feedback from their interlocutors in text-based online chat than in face-to-face conversation for two reasons. First, text-based online chat allows for a slower pace of conversation, which might give learners more time to process and produce the target language. Second, conversations during text-based online chat can be saved as they are typed out and are accessible for review at any time during the conversation.

METHOD

Participants

Twelve ESL learners of intermediate English proficiency participated in this study. They were recruited from an intensive English summer program at a university in the United States. Students in this summer institute were placed in classes of different proficiency level on the basis of their performance on the entry placement test. Six participants were recruited from Level 2 (the low-intermediate class) and the other six were recruited from Level 4 (the high-intermediate class). The participants were paired to form six mixed proficiency dyads of low-high intermediate English level with the intent of stimulating instances of negotiated interaction (Iwashita, 2001; Porter, 1986).

The participants were of two first language (L1) backgrounds, Korean and Japanese. Most of the Korean participants came to the United States on an exchange program from the same university in Korea, and most of the Japanese participants were colleagues from the same company in Japan. The age of the participants ranged from 20 to 34, with an average of 26.

Materials

The participants were instructed to spot the differences between two pictures: a pair based on a park scene and a pair based on a kitchen scene, both tasks having been used in previous ESL research on negotiated interaction (Mackey et al., 2000). These two spot-the-difference tasks were used because they met the four criteria believed to facilitate negotiated interaction (Pica, Kanagy, & Falodun, 1993): both interlocutors hold a different portion of the information and are required to request and supply the information to each other so as to achieve the same goal of reaching the only one acceptable task outcome. These tasks were used in the hope of eliciting sufficient instances of noticing to permit a valid comparison between the two modes of communication (text-based online chat and face-to-face interaction). Each dyad worked on one task through face-to-face communication and the other via text-based online chat using Yahoo! MessengerTM. Half of the dyads conducted face-to-face communication first and the other half did online chat first in order to eliminate sequencing effects. The two tasks were assigned to each dyad in a random order to eliminate the possible effect caused by the differences in difficulty between the two pictures.

Procedure

Each dyad participated in this study in a computer lab on two consecutive days. On Day 1, the participants first completed a practice spot-the-difference task in both online chat and face-to-face conversation for five minutes each. Afterwards, they performed one treatment task via online chat and the other through face-to-face conversation, the sequence of which was the same as that of the practice session. There were no time limits imposed on these two treatment tasks. The face-to-face conversations

were video and audio taped, and the online chat sessions were recorded in video format using Camtasia Studio 2¹. Both the transcripts for the face-to-face conversations and the online chats were coded for two types of interactional feedback, negotiation of meaning and recast, as well as self-correction.

On Day 2, each participant of each dyad met individually with one of the researchers to conduct the stimulated recall (Gass & Mackey, 2000) on both treatment tasks.² Like any other type of verbal protocol, the validity of stimulated recall has been heavily debated (see Ericsson & Simon, 1993; Gass & Mackey, 2000). Notwithstanding, stimulated recall has been widely used in psychology, education, and L2 writing research, and Mackey et al. (2000) used it in L2 interaction research. Aware of the limitations and potential problems of stimulated recall, we made sure that the recalls for both the face-to-face interaction and the online chat were obtained as the participants watched the live recordings of the two conversations. The stimulated recall sequence was the same as that of the treatment sessions. During the stimulated recall, each participant and the researcher together reviewed the video of the face-to-face conversation and the online chat. The researcher paused at instances of interactional feedback (negotiation of meaning and recast) and invited the participant to recall what he or she was thinking at each instance. Since the majority of the online chat sessions lasted more than 40 minutes (see Table 1) and, if asked to watch the whole interaction, the participants might become tired, bored, or distracted and thus perform poorly in the recall, the participants were invited to watch and recall only those episodes that contained instances of negotiation of meaning and recast. However, they watched the whole recording of the face-to-face conversation due to its short duration.

Table 1. Time on Task and Language Output by Each Participant

Dyads	Participants	Time on task		# of words produced		# of turns (average length of turn)	
		Face-to-face	Online chat	Face-to-face	Online chat	Face-to-face	Online chat
Dyad 1	I	9 min	52 min	390	503	58 (6.7)	122 (4.1)
	C			137	599	57 (2.4)	171 (3.5)
Dyad 2	E	13 min	45 min	677	480	108 (6.3)	165 (2.9)
	S			585	565	108 (5.4)	172 (3.3)
Dyad 3	Jiy	3 min	26 min	199	603	40 (5.0)	136 (4.3)
	Jin			157	480	40 (3.9)	97 (4.9)
Dyad 4	J	13 min	13 min	699	207	74 (9.4)	54 (3.8)
	G			334	160	73 (4.6)	48 (3.3)
Dyad 5	D	21 min	50 min	722	358	127 (5.7)	48 (7.5)
	T			1106	493	127 (8.7)	48 (10.3)
Dyad 6	E	7 min	42 min	168	251	40 (5.3)	49 (5.1)
	H			210	456	38 (4.4)	79 (5.8)
Average		11 min	38 min	892	859		

Immediately after the stimulated recall of each chat session, the participants were asked whether their interlocutors frequently corrected their mistakes and whether they frequently went back to correct their own mistakes during the conversation. At the end of the stimulated recall sessions, the participants were asked to compare the two modes of communication to see under which conditions they noticed their own mistakes and the corrective feedback from their interlocutors more often. They were also asked to express their perceptions on these two experiences in regard to second language learning.

Data Analyses

The conversations on Day 1 in both face-to-face interaction and online chat were coded for instances of self-correction and for the two types of interactional feedback. The stimulated recall on the interactional feedback on Day 2 was coded to see whether it was noticed or not (see [Figure 1](#)).

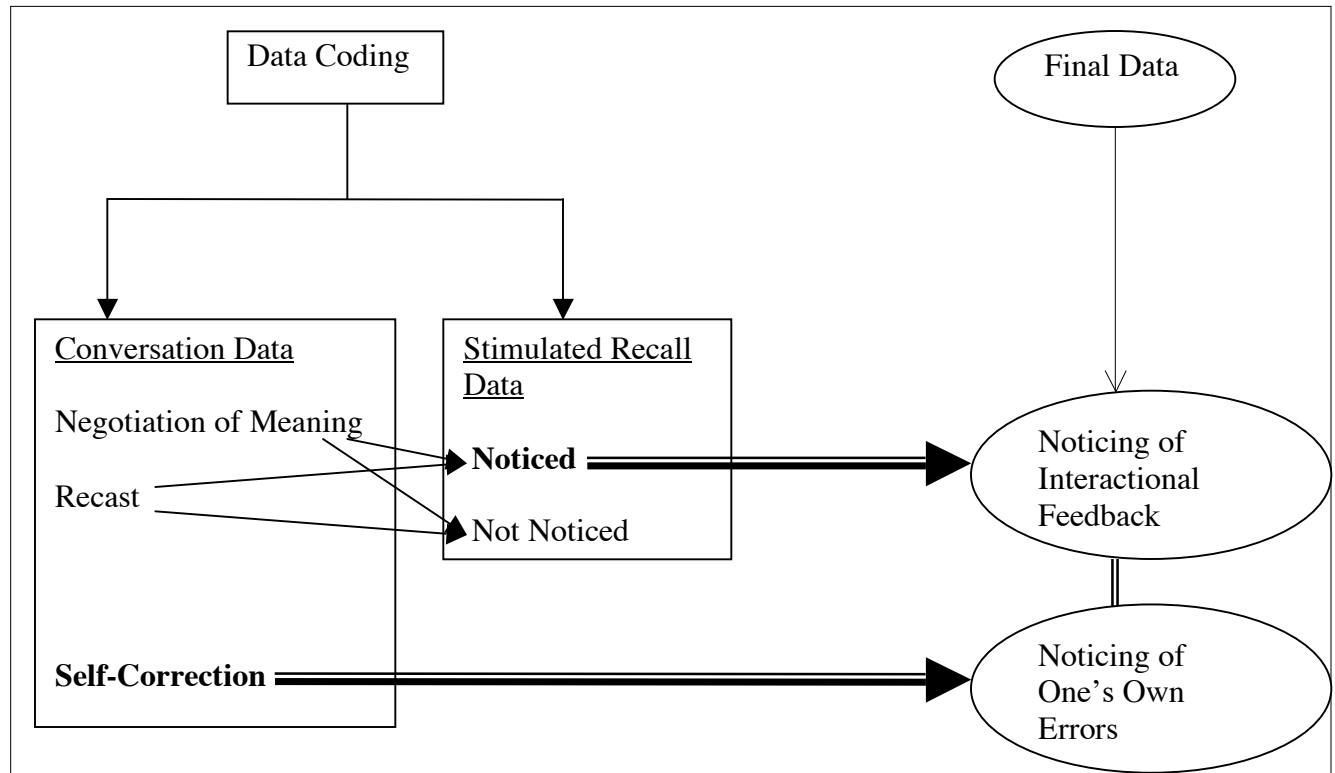


Figure 1. Flow chart of data coding.

The face-to-face conversations and the online chat were transcribed and coded for instances of negotiation of meaning, recast, and self-correction. Negotiations of meaning were operationalized as episodes that either started with indicators of non-understanding such as "what (is ...)?" and "uh?", or with the partial or complete repetition of the interlocutor's or learners' previous utterance with a rising intonation (for those in online chat, the rising intonation was replaced by question marks). Recasts were episodes in which the interlocutors implicitly corrected the mistakes without breaking the flow of the communication. Self-corrections were episodes in which the participants immediately corrected their own vocabulary, grammar, phonological mistakes (in the case of face-to-face communication only), or wording without prompts from their interlocutors (the spelling mistakes in online chat were not counted, e.g., S: I anc understnad you.). One researcher coded the conversations for all instances of self-correction and interactional feedback, and a trained independent coder recoded a randomly-selected 25% of the data. The inter-rater reliability was 85%. See [Table 2](#) for examples of each type of negotiated interaction in the two modes of communications.

The stimulated recall sessions were audio-taped and analyzed to identify instances of noticing interactional feedback provided during episodes of negotiation of meaning and recast. If the participant's recall of the episodes focused on the linguistic forms, it was counted as evidence of reported noticing. If the participants reported that they could not remember what happened during the episodes or if their recall was mainly about the content of the picture, it was considered as no reported noticing (see [Table 3](#) for examples). One researcher coded the stimulated recall data, and a trained independent coder recoded a

randomly-selected 25% of the data. The inter-rater reliability was 93%. The percentages of the two types of interactional feedback that were noticed were calculated for both modes.

Table 2. Definitions and Examples of Different Types of Negotiation Moves

Negotiated Interaction	Working Definitions	Mode of communication	
		Online Chat	Face-to-face Conversation
Self-correction	episodes where the participants immediately corrected their own vocabulary, grammar, phonological mistakes, or wording without prompts from their interlocutors	S: so my each window's hape ((backward to erase hape)) shape are ((backward to erase are)) is almost same.	S: Yeah. And the woman have has a cup.
Recast	episodes in which the interlocutors implicitly corrected mistakes without breaking the flow of the communication	J: does window open? J: or close? J: mine is close G: No, it is closed .	D: only sky, there birds. And two big wood. Two big wood is there, center and left side. T: yeah. Tree . D: tall tree. Like a palm tree. Palm tree have, leftside palm tree have 5 big leaf.
Negotiation of meaning	episodes in which the interlocutors indicated their non-understanding or misunderstanding by using "what (is).." or "uh?", or by partially or completely repeating the expressions or words in rising intonation or with question marks	I: man wears long sleeve and color. I: one piece with short sleeve? C: sleeve is shirts? I: yes, about woman. I: guy wear long sleeve.	T: maybe one girl. Ponytailed hair D: yes T: and wearing a skirt. And walking D: my picture is doing T: doing? With what? D: ball

Table 3. Examples of Noticing and No Noticing of Interactional Feedback

Attention	Interactional feedback	Stimulated recall
Noticing ³	H: Yes, in the middle on the wall E: wall? H: wall. There is a picture E: yes, one picture	Researcher: When you heard Emi repeated 'wall', what was in your mind? What were you thinking? H: <i>My pronunciation is bad and she can't understand the word</i>
No noticing ⁴	D: window is separated 4 part D: I can not see anything, too T: Yes, separated 4 parts	Researcher: my question is, when you saw Tomo typed this sentence, what was in your mind? D: <i>Oh, he agree with me.</i> Researcher: Ok. Did you notice that he actually corrected your mistake D: Ah, I don't, I don't do ah notice. So Researcher: because he said D: yes, yes, for now, but Researcher: but now you noticed, right? D: yes, yes Researcher: at that time you didn't. You just thought that he agreed with you D: yes, yes. Researcher: o.k.

Due to the small sample size, the Wilcoxon Signed Ranks Test⁵ was used to compare the noticing of the two types of interactional feedback as well as the noticing of the participants' own errors (as measured by the number of self-corrections) between face-to-face conversation and online chat. Furthermore, the exit interviews were analyzed to identify the participants' perceptions of the two conversation modes, in particular their capacity to promote the participants' noticing of their own mistakes, of their interlocutors' mistakes, and of the interactional feedback provided by the interlocutors.

RESULTS

Noticing of One's Own Errors

The noticing of the participants' own errors was measured with the number of unprompted self-corrections, since the learners corrected or attempted to correct their own mistakes only when they noticed them.⁶ Because participants took considerably greater time in online chat, and thus their language output in these two modes might be different, we converted the number of self-corrections into standardized scores by computing the ratio of each participant's self-corrections in each mode of communication to the number of words he or she produced in that mode. In order to eliminate the possible effect of unequal amounts of language output between the two modes, the standardized scores were compared to indicate whether there was any significant difference between the two modes of communication. It was found that online chat elicited significantly more self-correction even after the amount of language output was controlled for ($z = 2.63, p = .009, d = 1.34$; see Table 4).

Table 4. Comparison of Learners' Noticing their own Errors between Modes of Communication

Modes	N	M	SD	Z	p	Cohen's d
Face-to-face	12	0.11	0.006			
Online	12	0.29	0.017	2.63*	.009	1.34

Note. M is the mean, calculated using the standardized scores of self-correction (i.e., number of self-correction/number of words produced). N is the number of participants.

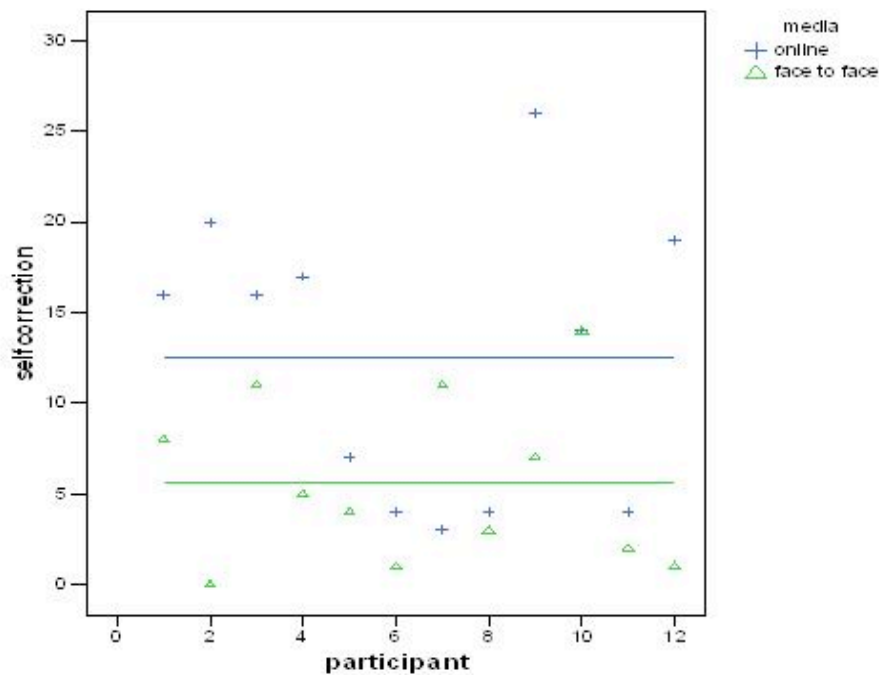


Figure 2. Instances of self-correction by individual participants.

The instances of self-correction for each participant were plotted to see whether the overall trend was in favor of online chat. Figure 2 shows that 10 out of 12 participants provided more self-correction during online chatting, one participant provided an equal amount of self-correction under the two settings, and only one participant provided more self-correction during face-to-face conversation. Thus it seems that the participants consistently provided more self-correction in online chat than in face-to-face conversation, which suggests that no individual participant biased the finding by producing more self-correction than the other participants during online chatting.

Furthermore, when asked under which mode of communication they were more conscious of their own errors, eight out of the 11 participants interviewed reported that they paid more attention to their own language output in online chat than in face-to-face interaction.

Noticing of Interlocutors' Interactional Feedback

Noticing of negotiation of meaning in stimulated recall.

By noticing of negotiation of meaning, we mean noticing the feedback, indicating non-understanding or misunderstanding that is provided in a negotiation of meaning episode. There were significantly more instances of negotiation of meaning during face-to-face interaction ($z = 2.80, p = .01, d = 1.68$). However, the participants exhibited 20% more noticing of negotiation of meaning in online chat. Noticing of negotiation of meaning was calculated using the ratio score of negotiation of meaning noticed over the overall instances of negotiation of meaning during the interaction. Although the difference was not statistically significant ($z = 1.16, p = .17, d = 0.83$; see Table 5), the large effect size suggests that this difference is worth noting.

Table 5. Comparison of Noticing Negotiation of Meaning between Modes of Communication

Modes	N	M	SD	Z	P	Cohen's d
Face-to-face	10	.24	.18			
Online chat	10	.45	.31	1.38	.17	0.83

Note. N refers to the number of participants with valid values for comparison⁷. M is the mean, calculated using the ratio of negotiation of meaning noticed over the overall instances of negotiation of meaning during interaction.

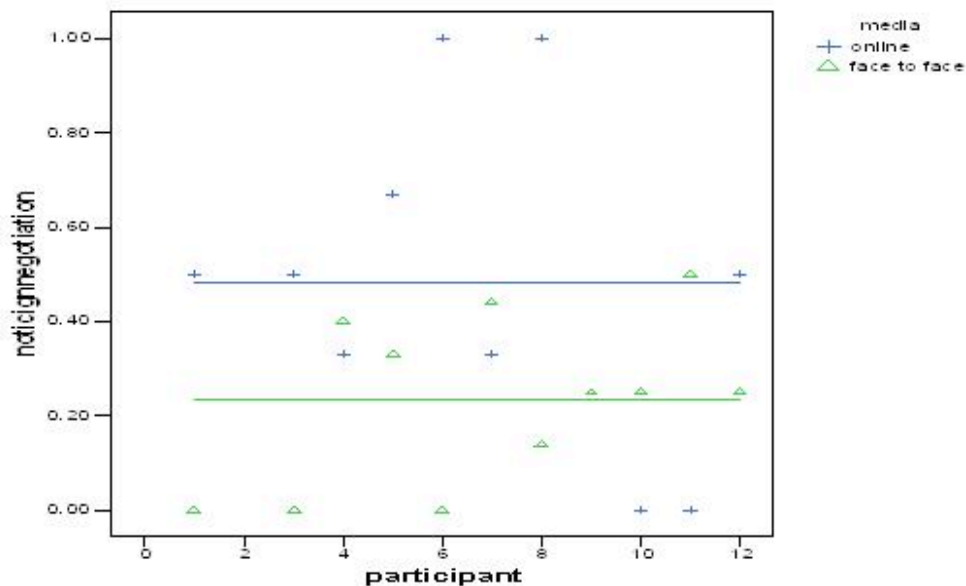


Figure 3. Noticing of negotiation of meaning by individual participants.

Furthermore, the plotting of each participant’s noticing of negotiation of meaning (Figure 3) shows that six out of ten participants noticed more negotiation of meaning in online chat.

Noticing of recast in stimulated recall

The frequencies of recasts in the two modes of communication were almost the same ($z = 0.57, p = .57, d = 0.16$), suggesting that learners were at least as likely to provide recast in online chat as during face-to-face conversation. This finding is consistent with the CMC literature that supports the capacity of CMC in providing recast (Iwasaki & Oliver, 2003). Moreover, both modes provided abundant opportunities for response to or incorporation of the recasts: in online chat, around 70% of the recasts provided opportunities for response, and in face-to-face conversation, the rate was 71%.

Table 6. Types of Recasts in Modes of Communication

Modes	Types			
	Morphosyntactic items	Lexical items	Reformulation of fragmented sentences	Phonological items
Face-to-face	28%	39%	5%	11%
Online chat	65%	17%	13%	

However, there were some differences in the types of recast. Table 6 shows that the majority of recasts provided in online chat were of morphosyntactic items, such as adding inflectional morphemes or making syntactic changes, whereas the majority of recasts provided in face-to-face were of lexical items.

Table 7. Noticing of Recasts in These Two Modes of Communication

Modes	N	M	SD
Face-to-face	4	.18	.24
Online chat	4	.10	.20

Note. N refers to the number of participants with valid values for comparison. (See note 7.) M is the ratio of recasts noticed over all instances of recasts.

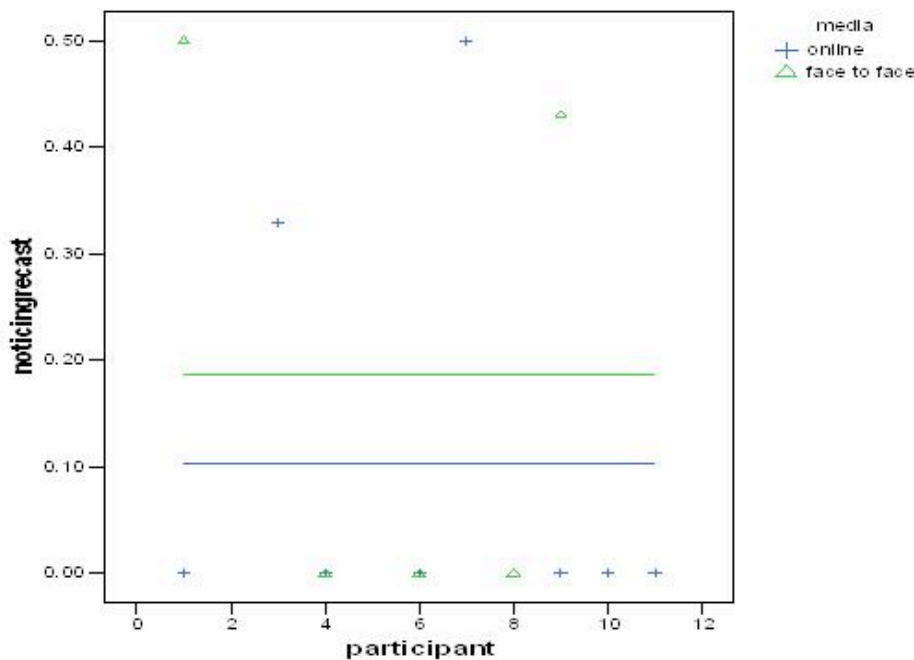


Figure 4. Noticing of recast by individual participants.

Table 7 showed that the noticing rates for recasts in these two settings were similar and both low. Since the comparison could only be based on four participants' data, the statistical analysis might not carry much weight. The plot of the participants' noticing of recasts (Figure 4) also revealed little difference in these two modes.

DISCUSSION

Noticing of One's Own Errors

Two inherent features of text-based online chat might have contributed to its facilitative role in promoting more noticing of learners' own errors: longer processing time and relative permanency of the text. Dörnyei and Kormos (1998) have pointed out that a great amount of processing time is needed in the monitoring phase of second language production. The lack of paralinguistic cues in text-based online chat might have made the participants feel less time pressure to come up with the responses during this mode of communication, and therefore monitored their language output more. As shown in Table 1, the participants spent an average of 22 more minutes in online chat, but produced an average of 33 fewer words. This seems to suggest that during the online chat, the participants did have longer time to process the input and monitor their own language output. The extra time allowed by text-based online chat might have lowered the learners' cognitive load so that they could allocate their cognitive resources to reviewing and evaluating the linguistic forms in their output. As Smith (2004) has noted, "CMC may also afford learners more processing time ... This extra time may lead to better comprehension and more accurate production ..." (p. 372). In fact, during the exit interview, one participant remarked: "If uh, face to face, uh, I couldn't review my words, so in online chat, I review after I type." That being said, we also need to consider that it takes much more time to type an utterance than to produce it orally. Thus, it is quite likely that the participants spent more time on typing than on processing the language in the online chat. More refined measures than the ones used in this study are needed to distinguish the typing factor from the processing factor. Thus, the interpretation presented here should be taken with caution.

Text-based online chat made it possible for the participants to go back to read their output and make revisions as they saw fit. This self-editing capacity afforded by text-based online chat increased the learners' noticing of their own errors. Furthermore, the greater saliency of errors in text-based online chat might have also enhanced the likelihood the participants noticed their own errors. As Smith (2004) has argued, "[t]he visual saliency of incoming and outgoing messages as well as the ability to reread previous messages may allow students to better attend to such formal aspects without substantially hindering the flow of communication" (p. 372). The participants frequently commented on this point during their exit interviews. For instance, one participant remarked: "because [the text] remain[s], you can see [your errors]." One said: "after typing, I can look at the sentence. After I saw the sentence, I noticed my mistake." According to another, "[in] online chat, I can trace the conversation on the display, so first I made a [lot of] mistake[s]. But I [was] conscious [that] I have a lot of mistake[s], so I try to improve my sentence." Moreover, a review of the live recording of the online chat sessions revealed that many of the participants went back to make revisions on certain linguistic forms even after they finished the whole sentence. Furthermore, since the text in the online chat was saved and accessible as the conversation went on, its relative permanency might have given the learners a stronger sense of it being a representation of their ability, and thus they might have been more conscious about its correctness and monitored it more frequently. This point was reflected in the comment of one participant: "In online chatting, I'm more concerned about my typing mistake and grammar."

Noticing of Interactional Feedback

The reason for more noticing of negotiation of meaning in online chat might be that, consistent with other research findings (Fernandez-Garcia & Martinez-Arbelaiz, 2002; Fidalgo-Eick, 2001), the majority (69%) of the negotiation of meaning was expressed in a more explicit manner with indicators like "what is ...?"

or "... is ...?" that clearly expressed a difficulty in understanding. This type of negotiation of meaning was expected to be easier to notice than the negotiation of meaning involving the repetition of individual words or expressions with a rising intonation. In contrast, during face-to-face conversation, only 30% of all instances of negotiation of meaning were explicit, which might have led to a lower rate of noticing in this mode of communication. However, the large difference (69% vs. 30%) in explicit negotiation of meaning between the two settings actually produced a smaller difference in noticing than could reasonably be expected. This seems to indicate that the paralinguistic cues and rising intonation coupled with questioning expressions from the interlocutors during face-to-face interaction might have left a stronger impression on the participants and have the effect of enhancing noticing. The paralinguistic cues available during negotiation of meaning in face-to-face conversation might have, to some extent, compensated for its lack of verbal explicitness.

The noticing of recasts in text-based online chat was quite low. One possible reason might be that 50% of the recasts provided in the online chat (8 out of a total of 17) were not given immediately after the target turn, with an average of 3-4 turns in between. Such an elapse might have made it difficult, if not impossible, for the participants to notice the recast. As Kim (2004) pointed out, the contingency of the feedback and the deviant learner output was crucial for the noticing of recasts. However, this is an empirical question that needs to be tested. This elapse suggests that the findings about the noticing of recasts in this study might have been biased by the particular chat software that was used, because the software only displayed the messages after they were completed, which made participants often type concurrently and thus made conversation less immediate and coherent (e.g., the recasts were provided 3 or 4 turns after the target turn). Furthermore, almost all the recasts provided in this setting were embedded in a sentence, which added to the difficulty of noticing.

What is puzzling is the low noticing rate during the face-to-face conversations. All the recasts in the face-to-face interactions occurred in the turn immediately following the problematic language output. Moreover, 47% of the recasts given in this setting were presented as isolated words or phrases. These features were expected to promote noticing. However, the noticing rate of recasts in this mode was just 18%, very similar to that in text-based online chat. This finding suggests that even though Philp (2003) reported a high noticing rate for cued recasts (70%) among her participants, caution should be taken when generalizing her finding to non-manipulated settings, since it seemed that the learners did not notice much of the recasts provided from their interlocutors during the task-based interaction. As Mackey et al. (2000) pointed out, recasts did not "make participatory demands on the learner," and thus learners might not perceive them as feedback. The lack of difference in the noticing of recasts between these two modes corresponded to the negative answers from some participants when asked whether they noticed their partners correcting their mistakes. However, this lack of difference should be interpreted with caution, since it could be biased by the participants' level of unfamiliarity with the chat software (four of the participants had no experience in online chatting). It was possible that the affordance of online chat in promoting the noticing of recasts was inhibited by the fact that typing per se consumed too much of the participants' energy and time, and thus they were unable to spare cognitive resources to notice the recasts, as one participant commented: "In online chat, I concentrated on typing."

Time on Task

Since time on task in face-to-face conversation and text-based online chat differed quite significantly, the different amount of time that learners spent on the task in these two modes of communication might have exerted a different impact on the participants' attentional resources. Learners might find it easier to concentrate and be attentive to the interactional feedback when a task requires less time to complete. For this reason, the correlations between time on task and the noticing of recasts and of negotiation of meaning were checked. The correlations were $-.115$ and $-.023$ respectively, and neither of them was statistically significant. This suggests that time on task did not have a significant effect on the learners' noticing of the interactional feedback. Furthermore, the scatterplots of time on task and the learners'

noticing of the negotiation moves (Figure 5 and Figure 6) does not show an association between the two factors.

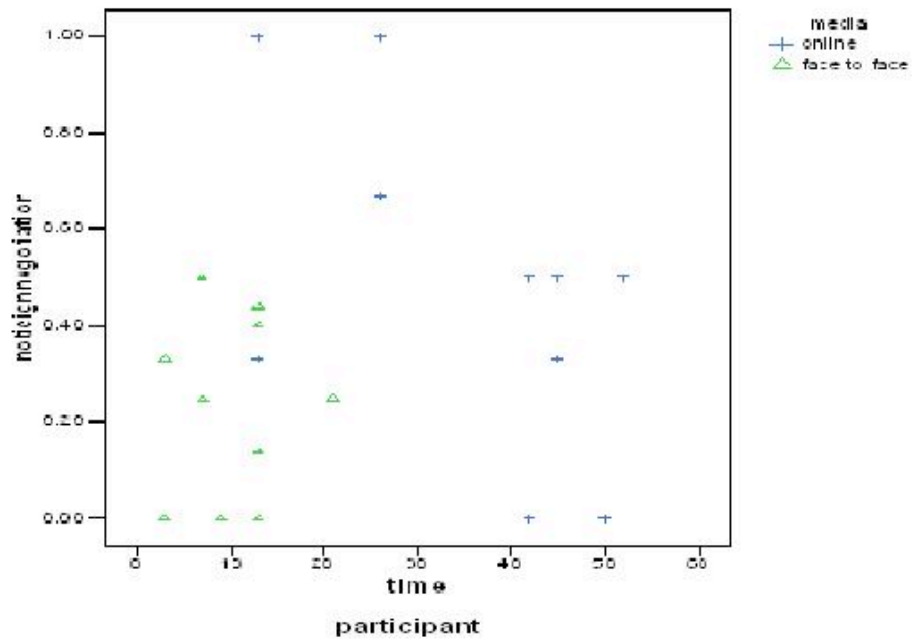


Figure 5. Relationship between noticing of negotiation of meaning and time on task.

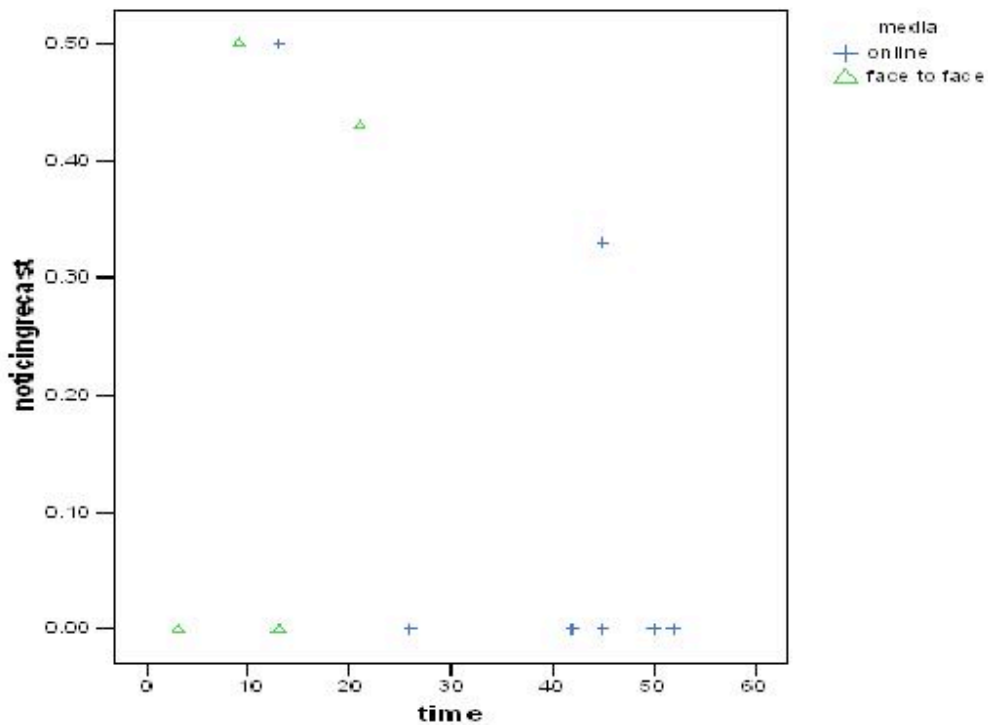


Figure 6. Relationship between noticing of recast and time on task.

LIMITATIONS AND FUTURE RESEARCH

Since this is an exploratory study with a small sample size, we need to be cautious with the interpretation of the results. These participants were intermediate English learners from the same intensive English class, and they knew that their interlocutors' English proficiency was not very high. This perception might have made them lose 'credibility' in front of each other. As a result, they might not have paid attention to the corrections or feedback given by each other. Several of the participants expressed that they were not as attentive to feedback as they would have been when chatting with native speakers or teachers, just as one participant noted: "When I chat with the teacher, English teacher, (online chat) is a good for the learner, because same students, or same learner, we don't know the mistake. But English teacher know the grammar and word. So the teacher corrects the words and grammar and teach you learning." The results might therefore have been skewed due to the homogeneity of the sample and the limited English proficiency of the participants. It would be interesting to investigate the effect of learners' perception of their interlocutors' language proficiency on their noticing of interactional feedback.

Familiarity with the technology itself poses another potential problem. By familiarity with the technology, we mean both the participants' familiarity with online chatting and their keyboarding skills. As has previously been noted, online chat was new to four of the participants. Although the other participants had done some online chat with friends before, they all reported using a different chat program instead of the one used in this study. It is quite likely that unfamiliarity with the technology and its interface might have exhausted some of their attentional resources and thus negatively affected their performance. Limited typing skills might have been another factor that affected their performance. As one limitation of the research design, the participants were not given adequate training on typing before the experiment. Many of the participants expressed frustration over their typing speed. Furthermore, the unbalanced experience with chatting between the dyads might have also inhibited the participants' ability to notice. A remark like "...he typed very fast, I was to catch up" makes us wonder whether the reported noticing rate in this study underrepresents the contribution of text-based online chat to increasing noticing. It would be interesting to use a pre/post-test design after a certain period of time (e.g., a semester) to check whether the potential novelty effect of the chat program and the keyboarding skills would have an effect on noticing in text-based online chat.

Since the stimulated recall was conducted one day after the interaction, this time lapse might have endangered the accuracy of the recall (Gass & Mackey, 2000). Notwithstanding this limitation, measures were taken to ensure that it would have a similar effect on the recall of both face-to-face session and online session. The recalls on both modes of communication were done using the live videos of the interaction, which provided equally rich information for the recall. Thus, there is no reason to suspect that the time lapse would favor the recall of one mode over the other.

Another limitation is that the measure of the time-on-task effect used in this study was rough and might be inadequate to capture its impact on noticing. Comments from participants that complained about the slow pace and the long duration of online chat (e.g., "my typing is too slow. [I'm] [t]ired after the picture") indicated that increased time on task might have some negative effect on the learners' level of attentiveness or alertness, thus inhibiting noticing. The amount of time participants spent on the stimulated recall is another concern, as they might get bored or exhausted if one recall session lasted significantly longer than the other, negatively affecting their recall ability in that session. It is therefore advisable to control for both time effects in the future study.

It is interesting to note that, when asked to evaluate and elaborate on which mode of communication they paid more attention to their own output and the interactional feedback, the participants volunteered the following factors: (a) perceived value of different language skills (e.g., "I paid attention to my language in face-to-face conversation more often, because speaking is more important for me"); (b) perceived own language ability (e.g., "because my English is so terrible. He is correct. He say correct words and change

my words, so it's useful to me"); and (c) permanency of the texts (e.g., "[I'm] more conscious online, [the text is] on the display [so] I can see what I said, so I become more conscious"). In addition, one participant alluded to an oft-cited feature of online chat, namely the lack of paralinguistic features: "[in] face-to-face chatting, if I was wrong, she could understand. [In] online chatting, I have to use correct sentence." It would be interesting to examine the effect of the above factors on noticing in future studies.

During online chat, because participants could not see what their interlocutors were typing, unrelated sentences were sent subsequent to each other. This was also the partial reason why recasts appeared 3 to 4 turns after the target turns. It would therefore be interesting to examine different chat programs that provide the ability for learners to view each other's utterances word by word as they are typed out, such as Y-Talk (Pellettieri, 2000) and ICQ. Such a feature would alleviate one of the constraints of online chat, that of producing non-adjacent discourse, and it would increase the immediacy and coherence of the conversation while keeping its benefits of making texts permanent and allowing longer processing time. Future efforts to examine noticing during text-based online interaction using this type of software would be very meaningful, as it would not only yield valuable implications for the design of chat software, but also add to our understanding of contextual effects on noticing.

CONCLUSION

This study has provided some empirical evidence for the capacity of text-based online chat to promote noticing, adding support to the current argument on its facilitative role in second language learning (Abrams, 2003; Payne & Whitney, 2002; Salaberry, 2000; Smith, 2004). It has shown that text-based online chat enhances learners' noticing of their own mistakes. Online chat also has the potential, although not statistically significant, of promoting the noticing of negotiation of meaning, given the explicit manner in which meaning is negotiated in that mode. This study could not provide much information on the noticing of recasts due to the small amount of data that was available. Overall, our findings suggest that text-based online chat has some advantages over face-to-face conversation in facilitating noticing, and they provide some preliminary support for the theoretical arguments posited in CMC/SLA literature.

In addition, this study has shown that negotiated interaction did occur in text-based online chat. There are some features of the language used in text-based online chat that warrant closer attention: (a) there was a comparatively high frequency of recasts; (b) the majority of recasts were on grammatical items; and (c) the majority of the instances of negotiation of meaning were raised in an explicit manner. The facilitative role of negotiated interaction during face-to-face conversation in second language acquisition has been argued and empirically tested by many researchers (Gass, Mackey & Pica, 1998; Long, 1996; Mackey, 1999; Swain & Lapkin, 1998). This study has shown that negotiated interaction also exists in text-based online chat, as the learners did notice some of the interaction. The next step would be to test whether text-based online chat leads to actual learning.

Due to its exploratory nature, no strong or in-depth claims on the pedagogical implications of this study can be made. However, our findings indicate that text-based online chat is a second language learning environment that holds some pedagogical potential, as it leads to higher rates of noticing. Despite its tentative practical implications, this study has value for research on CMC. Previous research on CMC, text-based online chat in particular, has mainly focused on discourse functions (Kern, 1995; Smith, 2003; Sullivan & Pratt, 1996), motivational factors (Beauvois, 1998; Skinner & Austin, 1999), linguistic features (Blake, 2000; Fernandez-Garcia & Martinez-Arbelaz, 2002; Kötter, 2001), and lexical acquisition potential (Smith, 2004; Zhao, Alvarez-Torres, Smith, & Tan, 2004). This study has examined the cognitive effects of this language learning environment and suggested another field for research in this area. It has revealed that noticing in text-based online chat is an interesting and worthwhile issue to pursue and can be the object of a rich research program.

NOTES

1. Camtasia Studio 2 is screen capture software that records each keystroke dynamically into video files.
2. Self-correction was coded and used as the measure of learners' noticing of their own errors, and no stimulated recall was done on it. Stimulated recall was done on two types of interactional feedback (negotiation of meaning and recast) to measure learners' noticing of the interactional feedback from their interlocutors.
3. This negotiation of meaning example was taken from a dyad's face-to-face interaction.
4. This recast example was taken from a dyad's online chat.
5. The Wilcoxon Signed Ranks Test is a non-parametric statistical method that, like its counterpart in parametric statistics—the matched t-test, is used to compare pairs of participants in two different conditions. This test is often used with small samples that do not have a normal distribution.
6. The participants' self-correction might be an underestimation of their noticing of their own errors in both modes of communication, because the learners might have noticed their mistakes but not attempted to correct them. However, there was no evidence suggesting that participants preferred to correct their mistakes in one mode over the other *when the mistakes were noticed*.
7. For cases where a particular type of interactional feedback did not occur either during a dyad's face-to-face conversation or during their online chat, the noticing data for this particular dyad were counted as missing. Thus, the results for negotiation of meaning were based on data from ten participants.

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