Tapping into learner noticing measured by stimulated recall

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ABSTRACT

This paper examines the extent to which learner noticing can be measured by comments collected through stimulated recall. Noticing evidence was gathered based on the interaction between the researcher and Japanese learners of English, focusing on their errors of past tense use. The results suggested that past tense errors were not frequently noticed as such, and the stimulated recall comments were often related to other aspects of language, such as phonology, semantics, and lexicon. The low rate of noticing and the accounts as to why the recall comments were not made on the target forms were discussed from the perspective of memory, information-processing, interviewer effects, among other things.

INTRODUCTION

Since it has been widely recognized that noticing is related to learning, researchers have been trying hard to measure what learners noticed during their learning. Noticing is a construct for second language (L2) acquisition (Schmidt, 1990), generally operationalized as availability for reporting of the gap between L2 input, e.g., grammatical features, and learners' L2 knowledge. There are a variety of ways of measuring noticing. Measurement takes place either offline, that is, data is collected after the learning session, or online, i.e., the data is elicited during the task. Offline measures include questionnaires (e.g. Robinson, 1997), stimulated recall protocols (Mackey, Philip, Egi, Fujii &

Doshisha Studies in Global Communications 4 (2015) 79-100.

Tatsumi, 2002; Mackey, 2006), interviews (e.g. Williams, 2005) and diary entries (Schmidt & Frota, 1986). On the other hand, online techniques collect data while learners are doing the task. Think-aloud protocols are a fairly common example (e.g. Alanen, 1995; Jourdenais et al., 1995; Leow, 1997, 2000; Rosa & O'Neill, 1999; Rosa & Leow, 2004). Self-reports in the form of note-taking (Hanaoka, 2007; Izumi, 2002) are another.

Among them, stimulated recall methods are considered useful to gain insight into why research participants have chosen to act in certain ways (Calderhead, 1981; Dempsey, 2010; Lyle, 2003; O'Brien, 1993; Vesterinen, Toom, & Patrikainen, 2010). The methods basically use video cameras to record what research participants do and say during the treatment of the research, and later they are directed to watch the recordings. While watching the recorded session, the participants are asked to discuss what was going on during the session, and when the target of the treatment session comes up, the researcher "stimulates" the participants to talk about what they were thinking by giving verbal prompts. It is generally thought that the interaction between the researcher and the participants would yield the output which includes intention behind the participants' behavior, and the output would possibly entail what the participants noticed about the target of the treatment. The relationship between output and noticing has been widely argued by many researchers, and the advantages and disadvantages of stimulated recall methods have been discussed extensively up to now.

LITERATURE REVIEW

Output and noticing

The relationship between output and noticing has been examined in terms of memory capacity in studies investigating learners' noticing of interlocutors' recasts; i.e., reformulation of all or part of a learner's utterance, without mention of the error (Philp, 1998, 2003). Philp (2003) examined dyadic task-based interactions between thirty-three pairs of adult ESL learners and native

speakers. The learners received recasts on their nontargetlike question forms, and accurate immediate recall of the recasts upon a cue of the interlocutor's knocking on the desk was taken as evidence of noticing of the nontargetlike production. Results indicate that the learners noticed a fairly high percentage of recasts (60-70%). However, an examination of learners' accurate recall revealed that the length of the recast and the number of changes made in the recasts might be constraining factors of learner noticing. The longer and more complex the recast is, the more difficult it seems for the learners to retain the recasted information in their working memory; thus, it is less likely that the learners notice the target form in the recast. Philp argues that difficulties in accurate recall (reformulated output) may partly reflect the limitations of working memory, and suggests that investigations of learner noticing take them into account.

A closer look at the relationship between working memory, noticing, and L2 development was offered by Mackey, Philp, Egi, Fujii, and Tatsumi (2002). Their study follows a pretest, treatment, posttest, delayed posttest design, with communicative tasks in all phases to elicit participants' use of English question forms. During the three 30-minute sessions of dyadic task-based interactions, 30 adult Japanese ESL learners were given recasts to their nontargetlike question forms. In this study, noticing data were collected through stimulated recall upon watching videotaped treatment sessions, as well as through a questionnaire. Noticing instances included learners' comments on the target forms or explicit acknowledgement of the recasts or recasted errors in relation to the target forms. Based on the noticing data, the participants were divided into two groups: the more noticing group and the less noticing group. Furthermore, the participants took a nonword recall test and a listening span test, both of which measured their working memory capacity. Based on the test results, they were also divided into either the high working memory group or the low working memory group. The results indicate that participants with high working memory capacity showed significant development in delayed

posttests, whereas those with low working memory capacity showed significant development in immediate posttests, as opposed to those with high working memory capacity. Since the main aim of the study was to identify the relationship between working memory capacity and noticing and between working memory and L2 development, the study does not address the impact of learner output on development. If learner output had been investigated in the framework of their study, it might have tapped into the question of how much learner output is related to working memory capacity and noticing, which Mackey et al (2002) showed positive relationships with L2 development.

However, the amount of output may not directly indicate the amount of noticing, since not all items reported as being noticed may be manifested in output, and not all output may be a reflection of the noticed items. Schmidt and Frota's (1986) study provides evidence for an uncertain relationship between noticing and emergence in production. Based on diary entries that reflected on his development in learning Portuguese, Schmidt notes that his record was inadequate in terms of what he thought he had noticed in the given input:

> Of the 21 verbal constructions that we looked at, there was one, the conditional, that I produced occasionally and that is never mentioned in my diary. It was present in input, and I suspect that I did notice it, but either did not remember it long enough to write it down or just had no particular reason to record such an utterance (Schmidt, 1990, p.141).

This excerpt exemplifies a case where the learner's memory constrained his report on noticing, although the learner successfully produced the target structure. Schmidt suspected that he might have noticed the target feature based on the fact that he produced it. However, it could also be the case that he may not have been aware of the target structure during his successful production of it until he wrote the above self-observation about the use of the particular structure. According to this speculation, Schmidt's record of his noticing of the conditional may be an instance of delayed effects of input (Gass,

1988). Gass argues that, as learners process given input and store information at different rates, some input is processed and manifested in learners' output after a certain period of time.

In this line of consideration, investigation of the relationship between noticing and output should take into consideration learners' individual differences in the processing of input. Schmidt (2001) similarly asserts that the difference in each individual's working memory capacity may be one of the factors related to individual differences in how much s/he can attend to forms. If the individual differences do affect the degree to which the learners can attend to forms, then differences in the presence of following output as well as subsequent learning among learners may be explained, at least in part. Also, given that what learners notice immediately after input is provided does not necessarily carry over to their short-term memory (Robinson, 2003), learner performance may differ in immediate posttests and delayed posttests. Output production may help connect the noticed input and store it in one's memory, as research suggests that producing output in response to input may direct focused attention to specific production processes, thereby stimulating the development of connections in memory (Bock, 1995; Bock & Levelt, 1994; de Bot, 1996; Levelt, 1989). Considering these findings of studies on output and its relationship to noticing, research, especially in specific contexts involving error correction, would need to consider to what extent learner output in response to correction is related to noticing of target forms.

Stimulated recall methodology

Investigating what learners have noticed during the treatment sessions, introspective data provides insight into qualitative aspects of learners' noticing. It requires little consideration to discourse constraints by which learner response may get affected. However, it is of course not without problems. It is argued that the temporal proximity of the recall to the event to be recalled is critical for accurate reports (e.g., Egi, 2004 and Gass, 2001). Compared to

learners' response to the target forms, which typically occurs immediately after feedback, the temporal distance between the feedback and recall tends to be much larger for stimulated recall because it is conducted after the completion of a task. Coupled with the memory decay associated with the temporal distance, the presentation of recall stimuli, such as videotaped interaction, could facilitate the reconstruction of previous processes, rather than retrieval of the processes (e.g., Leow and Morgan-Short, 2004). Egi (2010) also pointed out that recall prompts are typically general (e.g., what were you thinking then?), and elicited reports often represented learners' summative comments about a conversational interaction presented in the stimulus video rather than their thoughts about a particular turn in the interaction (e.g., feedback).

Stimulated recall has its theoretical foundation relying on an information-processing approach, whereby the use of and access to memory structures is enhanced by a prompt that aids in the recall of information (Gass & Mackey, 2000). As opposed to learners' immediate response, stimulated recall methodology has been used more specifically to explore learners' thought processes and strategies at the time of an activity or task. This is achieved by asking learners to report those thoughts after they have completed a task or activity. Stimulated recall is conducted with some degree of support for the recall, such as the learners' L2 written product or questionnaire responses.

According to McInnis (2010), there are at least three purposes for which stimulated recall can be useful. First, it can help isolate particular events from the stream of consciousness. In so doing, it can help to identify the type of knowledge a learner uses when trying to solve particular problems, when making linguistic choices or judgments, or when generally involved in comprehension or production. Second, stimulated recall can also help to determine whether this knowledge is organized in specific ways. Third, stimulated recall can be used to determine when and if particular cognitive processes, such as search, retrieval, and decision-making are being employed. A related advantage of the stimulated recall methodology is that it allows

researchers to observe how individuals may be similar or different in their approach to problems. In certain cases, it is only through stimulated recall that differences in process can manifest themselves. Stimulated recall has also been utilized to document L2 learners' attitudes, beliefs, and perceptions, on learning for instance. In addition, stimulated recall methodology has frequently been used profitably in conjunction with other methodologies, as a means of triangulation or further exploration (Gass & Mackey, 2000; Mackey & Gass, 2005).

RESEARCH QUESTION

Given the findings and issues presented by the reviewed previous studies, the current study gives attention to the strengths of the stimulated recall methodology and examines the extent to which comments drawn from stimulated recall show the relationship with noticing. Specifically, the study addresses the following research question: To what extent does stimulated recall methodology dig into learners' noticing of the target forms?

METHOD

Database

The current study uses part of data sets from Suzuki (2007), which examined the relationship between learner uptake and learning. Participants in the study were 40 Japanese college students. They were all non-English majors, including Engineering, Economics, Chemistry, International Relations, Chinese, Japanese, and Nursing. There were 19 male and 21 female participants. They were all between the ages of 18 and 21. The maximum length of stay outside Japan among the participants was one month in Australia on a home stay program five years previously. Upon the start of the experiments, the subjects were only informed that the purpose of the study was to research second language acquisition.

Among the data gathered for Suzuki (2007), the current study makes use

of the stimulated recall data, which was collected after the treatment that was designed to collect participants' erroneous use of past tense of English. Stimulated recall was conducted in order to measure noticing of the errors, and the group that was given stimulated recall sessions consisted of fifteen participants. Video clips for the purpose of stimulated recall were created by recording treatment sessions with a digital camera on video recording mode. The video clips were viewed on a computer with video-playing software.

Procedure

Instances of noticing were identified when the participants' reports included verbs with tense errors that were recasted, or general mentions related to tense. These noticing instances were further coded according to the levels of processing (Craik & Lockhart, 1972, Leow, 1997, Tomlin & Villa, 1994). Drawing on Leow's (1997) operationalization of noticing instances, two subcategories were created to classify the noticing data in the current study: [+verbalization of target forms] and [-verbalization of target forms]. Specifically, noticing forms in the former category included specific target verbs in the past tense form, and in the latter included general comments such as "past tense", "tense use" and "verb inflection", without identifying the target verbs in the past tense. While it was unclear in the latter case ([-verbalization]) whether the learner actually detected the correct form in the recasts, it may be clearer that s/he realized the correct verb forms in the former type of noticing forms ([+verbalization]). Thus, the former type was considered to involve a higher level of processing.

Reports of recognition of failure to use the past tense of the verb, acknowledging the interlocutor's correction on the verb tense, and pointing out the learner's use of tenses of the verb other than past tense were considered as noticing instances. They were further categorized into [+verbalization] or [-verbalization] according to whether the comments included specific past tense verbs or general mention of tense. Comments on aspects other than verb

tense, such as those on the content or other parts of utterances and those unrelated to the utterances to be recalled, were not included in the noticing data. Examples of such instances are provided below, with the English translation of the recalled comments given in italics.

Example 1

[+Noticing], [+verbalization]:

Learner (L, hereafter) : Hawkin holded child

Researcher (R, hereafter): Mrs. Hawkin held the child

L: Held. Held.

Recall: A souda 'hold' no kakokei wa 'held' da tte (Episode #038)

I thought, ah that's right, the past tense of 'hold' was 'held'.

Example 2

[+Noticing], [+verbalization]:

L: And she's, she, her name is Hawkin

R: her name was

L: her name was Hawkin

Recall: 'Was' tte siteki saretande, iinaosita (Episode #265)

I corrected myself upon your correction to 'was'.

Example 3

[+Noticing], [-verbalization]:

L: 1975, something happen again.

R: Something happened again.

L: Something happened again

Recall: Kakokei ga dete konakattan desukane (Episode #056)

I guess I couldn't come up with past tense.

Example 4

[+Noticing], [-verbalization]:

L: to the sea. And he swim

R: swam

L: swam,

Recall: Genzaikei no mama de itta (Episode #286)

I went ahead with present tense.

Example 5

[-Noticing]:

L: The man, the man look the boy

R: Hm the man looked at the boy

L: Looked at the boy,

Recall: Atama no naka de, "otokonoko (boy)" to "otokonohito (man)" ga gochagocha ni nattemasita. Ede wakatta kedo, iza iutoki wakaranaku narimasita. (Episode #161)

In my mind, "boy" and "man" got confused. I knew which one to say from the picture, but when I had to say it I got confused.

Example 6

[-Noticing]:

L: The drowning man feel, feeled

R: The drowning man felt

L: felt, felt strange

Recall: Kono toki wa, kono bunshou wo henkan suru noni nayandetatte iuka, douiu huuni tango wo motteittara iinokatte iu kumitate desune. (Episode #226)

At this time, I was wondering how to change the (Japanese) sentence (to English), or wondering how to connect words to construct a sentence.

The comments were further classified into six categories: Tense-related, grammatical, semantic, lexical, phonological, and others. Tense-related comments represent noticed comments. Example 7 shows an instance of a tense-related (noticed) comment.

Example 7

L: Hawkin holded child.

R: Mrs. Hawkin held the child.

L: Held. Held.

Recall: A souda hold no kakokei wa held date (Episode #038)

I thought, ah that's right, the past tense of 'hold' is 'held.'

Grammatical comments involve concerns regarding grammar in general or grammatical aspects of the sentence (definite/indefinite article use, plural forms, and word order). Example 8 provides an instance of a grammatical comment.

Example 8

L: He had strange, feel strange

R: He felt

L: He felt strange

Recall: Bunpou ga muzukashikatta. (Episode #286)

The grammar was difficult.

Semantic comments involve participants' choice of expression about the pictures or the content of the picture story in which they were engaging during the treatment. An instance of a semantic comment is given in Example 9.

Example 9

L: He save, he saved the old man's life

R: Hmhmm

L: And reach the beach

R: Hmhmm, oh he reached the beach.

L: yeah, reached the beach.

Recall: Tada tasuketatte iunoja nakute, tuitatte iunoga iitakatta node kuwaete mimasita. (Episode #056)

It was not just that he helped, but I wanted to say that they arrived, so I added that.

Lexical comments include mentions about word choice. An instance of a lexical comment is given below in Example 10.

Example 10

L: Then he wonder.

R: He wondered.

L: He wondered.

Recall: Atterunoka wakaranakatta. Tango ga atterunoka. (Episode #178)

I wasn't sure if I was right, if the word is right.

Phonological comments are concerned with pronunciation of the words that the learner uttered. Example 11 provides an instance of phonological comments.

Example 11

R: So he come back.

L: He came back.

R: Came back, came back to the sand with drawing man, drowning man, drowning man.

Recall: Oboreteirutte iu hatuon ni isshoukenmei desita. (Episode

#226)

I was trying hard to pronounce "drowning."

Comments in the category of "other comments" are non-specific to language such as in Example 12:

Example 12

L: The boy play, play sand.

R: Played with sand.

L: Played with sand.

Recall: Sonna ni kangaenakatta. (Episode #208)

I wasn't thinking much.

Data analyses

The noticing rates were calculated by dividing the number of tallied instances of noticing by the number of recasts on tense use errors. The tallied instances were further categorized into six language aspects and the rates of each category for the number of tallied instances were calculated.

RESULTS

A total of about 1.5 hours of data collected from fifteen stimulated recall sessions was examined. Ninety-seven past tense errors were targeted in the recall sessions. The results revealed that noticing of the tense-related errors ranged from 0% to 100% across the 15 participants, with a mean of 37.1% of noticing of the errors. The rates of noticing with [+verbalization] and [-verbalization] were also calculated, leading to the means of 11.0% and 33.7%, respectively. This suggests that participants showed their noticing of the errors relatively more without verbalizing specific target forms than verbalizing them. Table 1 summarizes the stimulated recall data with the noticing rates.

Table 1 Overall frequency and rates of noticing

Stimulated recall group (n=15)	Minimum	Maximum	Mean	SD
Recalled (total #: 97)	1	11	6.5	3.1
Noticed (total #: 36)	0	7	2.4	1.9
[+verbalization] (total #: 12)	0	2	0.8	0.9
[-verbalization] (total #: 24)	0	6	1.6	1.7
Noticing rate	0%	100%	37.1%	33.0
[+verbalization]	0%	40%	11.0%	13.5
[-verbalization]	0%	100%	33.7%	35.1

The ninety-seven recalled instances included 36 tense-related (noticed) comments, 16 grammar-related comments other than tense-related ones, 24 semantics-related comments, 14 lexicon-related comments, three phonology-related comments, and four comments categorized as 'others.' In addition, there were four recall situations in which multiple uptake instances were involved because pausing the recording in between the uptake instances was not possible. In such a case, the learner provided a recall comment on one of the uptake instances and other uptake instances were not commented on. These four instances were excluded from the counts.

These numbers indicate that comments related to grammar constituted 53.6% of all comments (37.1% being tense-related and 16.5% concerned with other grammar points) which is more than half of the total. Semantics-related comments were the second most frequently made (24.7%), followed by lexicon-related comments (14.4%). Phonology-related comments counted for 4.1% of all the comments. Table 2 shows the summary of the types of stimulated recall comments.

Table 2 Types of stimulated recall comments

Type of stimulated recall comments	# of comments	%
Recalled comments	97	100
Grammar-related	52	53.6
Tense-related (noticed)	36	37.1
Other than tense-related	16	16.5
Semantics-related	24	24.7
Lexicon-related	14	14.4
Phonology-related	3	4.1
Other	4	3.2

DISCUSSION

The results revealed that nearly one quarter of all comments was semantics-related. This may be due to the nature of the task in which the learners were engaging. In other words, in the stimulated recall session participants might have thought that the comments should somehow be related to the content of the task, since the task was meaning-oriented. However, considering that the grammar-related comments occupied more than half of all comments, the learners were still quite form-oriented and grammar took priority in reporting in each episode of interaction involving uptake.

The variation in the types of comments during the stimulated recall sessions may be attributed to interviewer effects (Egi, 2004; Jourdenais, 2001; Norris, 1990), which refer to "the possibility that participants report information that they believe is of interest to the interviewer" (Egi, 2004, p. 246). Being less structured and less guided than some other measures of noticing, the stimulated recalls seemed to have made the participants wonder what kind of comments the interviewer was expecting. Consequently, they might have experimented with different types of comments, hoping to fulfill her perceived expectations. For example, the comments of one participant, who showed noticing evidence of target forms in two recall instances out of 11 recall instances, varied across language areas. Specifically, there were two

lexicon-related recall instances (e.g., "I was wondering which is correct, 'take' or 'help'"), four semantics-related instances (e.g., "I forgot to use 'when' to describe the situation"), two syntax-related instances (e.g., "I was thinking of how to connect words"), and one phonology-related instance (e.g., "I was conscious about pronunciation"). If the participant was intentionally engaging in providing her comments in different language areas during the recall, it may be possible that her attention was distracted from reporting what she was actually thinking at the moment uptake had been produced. This may induce non-veridical reports, which is addressed in the issue of veridicality, i.e., "whether the information in verbal reports accurately represents the thought process it is designed to capture" (Bowles & Leow, 2005, p. 417).

Veridicality has been discussed as one of the limitations of the stimulated recall protocol (Bowles & Leow, 2005; Cohen, 1987; Egi, 2004b; Gass & Mackey, 2000; Leow, 2002; Leow & Morgan-Short, 2004). In fact, Suzuki (2007) reported that the interviewer of the stimulated recall sessions in her study had wondered at times about the validity of the recall comments during the session, based on the way the participants produced their comments. It was noted that the participants occasionally concluded their comments with statements such as "konnan de iin desuka? (Is this kind of answer okay?)" and "yakuni tatetaka douka" (I wonder if I was helpful)". This type of comment was found in an email that one stimulated recall participant voluntarily sent to the researcher after the experiment:

> "I forgot to mention something, so I am emailing you. ... While participating, I thought that the purpose of the session may also have included finding out if the participants could discover or notice what they didn't know. ... I wonder if this (information) can be helpful." (Email dated on March 17, 2006, originally in Japanese)

This participant noticed at the rate of 18.2% in the stimulated recall session, and

tended to give lengthy comments on 11 recalled instances, types of which varied from semantic (36.3%), to lexical (18.2%), to syntactic (18.2%), and to phonological (9.1%). The email excerpt may exemplify the participant's further wish to be cooperative. Taking into consideration the observed cooperative intent of the current study's participant, the possibility of the reports not being veridical cannot be excluded.

One may also question the reliability of verbal reports as noticing evidence from an information-processing perspective. Ericsson and Simon (1987) argue that, within the information-processing framework, thinking can be represented as a sequence of states of information that is attended to. However, not all thinking may be representable verbally.

Dechert (1987) argues that the verbal protocols only give incomplete pictures of thoughts, claiming that the information that is accessible for verbalization is that retrieved at a declarative level. He contends that proceduralized information is not accessible for verbalization. If we suppose that the participants processed the past tense information and stored it at a proceduralized level, then they may not have retrieved it at the recalls. Following this argument, the low frequency of noticing rates measured through the stimulated recalls may be due to the unreported target items having been processed as proceduralized information.

CONCLUSION

The current study investigated the extent to which stimulated recall yielded noticing instances, and how much the instances were related to the target forms of the experiment, i.e., past tense errors. In the investigation, this study considered the level of processing in coding noticing comments. The results indicated that there was a limited amount of noticing comments elicited through stimulated recall methods across the participants; a mean of 37.1% of all the recalled data. Noticing with high-level processing across the participants was observed with a mean of 11.0% among the participants, and noticing with

low-level processing, a mean of 33.7%.

Taking a close look at the comments by language area revealed that other recalled comments than the noticed comments were about other grammar points than the research target (16.5%), semantics (24.7%), lexicon (14.4%), and phonology (4.1%). Some accounts on the variety of language types of comments were given referring to interviewer effects and the nature of the task. Also, the reliability of the verbal comments was discussed from an information-processing perspective.

Stimulated recall yielded some interesting comments that reflected the participants' personal ways of thinking. This may not have been elucidated by other noticing measures. Nonetheless, stimulated recall may shed light on only a limited area of what learners actually notice, and other noticing measures should be accompanied if we are to further dig into learner noticing.

REFERENCES

Alanen, R. (1995). Input enhancement and rule presentation in second language acquisition. In R. Schmidt (Ed.), *Attention and awareness in foreign language learning and teaching* (pp. 259-302). Honolulu: University of Hawai'i Press.

Bock, J. K. (1995). Sentence production: From mind to mouth. In J. Miller & P. Eimas (Eds.) *Handbook of perception and cognition Vol. 11: Speech, language, and communication* (pp. 181-216). San Diego: Academic Press.

Bock, K., & Levelt, W. (1994). Language production: Grammatical encoding. In M.A. Gernsbacher (Ed.), *Handbook of psycholinguistics* (pp. 945-983). San Diego: Academic Press.

Bowles, M., & Leow, R. (2005). Reactivity and type of verbal report in SLA research methodology: Expanding the scope of investigation. *Studies in Second Language Acquisition, 27*(3), 415-440.

Calderhead, J. (1981). Stimulated recall: A method for research on teaching. *British journal of educational psychology, 51,* 211-217.

Cohen, A. (1987). Using verbal reports in research on language learning. In C. Faerch & G. Kasper (Eds.), *Introspection in Second Language Research* (pp. 82-95). Clevedon: Multilingual Matters.

Craik, F. I. M., & Lockhart, R. S. (1972). Levels of processing: A framework for memory research. *Journal of Verbal Learning and Verbal behavior, 11*, 671-684.

de Bot, K. (1996). The psycholinguistics of the output hypothesis. *Language Learning, 46*, 529-555.

Dechert, H. W. (1987). Analysing language processing through verbal protocols. In C. Faech & G. Kasper (Eds.), *Introspection in second language research* (pp. 96-112). Multilingual Matters, Clevedon.

Dempsey, N. P. (2010). Stimulated recall interviews in Ethnography. *Qualitative Sociology, 33*, 349-367.

Egi, T. (2004). Verbal reports, noticing, and SLA research. *Language Awareness, 13*, 243-264.

Egi, T. (2010). Uptake, modified output, and learner perceptions of recasts: learner responses as language awareness. *The Modern Language Journal 94,* 1-21.

Ericsson, K., & Simon, H. (1987). Verbal reports on thinking, In C. Faerch & G. Kasper (Eds.) *Introspection in second language research* (pp. 24-54). Clevedon, Avon: Multilingual Matters.

Gass, S. (1988). Integrating research areas: A framework for second language studies. *Applied Linguistics, 9,* 198-217.

Gass, S. (2001). Sentence matching: A re-examination. *Second Language Research, 17*(4), 421-441.

Gass, S., & Mackey, A. (2000). *Stimulated recall methodology in second language research*. Mahwah, NJ: Lawrence Erlbaum Associates.

Hanaoka, O. (2007). Output, noticing, and learning: An investigation into the role of spontaneous attention to form in a four-stage writing task. *Language Teaching Research, 11*(4), 459-479.

Izumi, S. (2002). Output, input enhancement, and the noticing hypothesis: An experimental study on ESL relativization. *Studies in Second Language Acquisition, 24*, 541-577.

Jourdenais, R. (2001). Cognition, instruction and protocol analysis. In P. Robinson (Ed.), *Cognition and second language instruction* (pp. 354-75). Cambridge: Cambridge University Press.

Jourdenais, R., Ota, M., Stauffer, S., Boyson, B., & Doughty, C. (1995). Does textual enhancement promote noticing? A think-aloud protocol analysis. In R. Schmidt (Ed.), *Attention and awareness in foreign language learning* (pp. 183-216).

Hawaii: Second Language Teaching & Curriculum Center, University of Hawaii.

Leow, R. (1997). Attention, awareness, and foreign language behavior. *Language Learning, 47*, 467-505.

Leow, R. (2000). A study of the role of awareness in foreign language behavior: Aware versus unaware learners. *Studies in Second Language Acquisition, 22*, 557-584.

Leow, R. (2002). Models, attention and awareness in SLA: A response to Simard and Wong's alertness, orientation, and detection: The conceptualization of attentional functions in SLA. *Studies in Second Language Acquisition, 24*, 113-119.

Leow R., & Morgan-Short, K. (2004). To think aloud or not to think aloud: The issue of reactivity in SLA research methodology. *Studies in Second Language Acquisition, 26*, 35-57.

Levelt, W. (1989). *Speaking: From intention to articulation.* Cambridge, MA: The MIT Press.

Lyle, J. (2003). Stimulated recall: a report on its use in naturalistic research. British *Educational Research Journal, 29*(6), 861-878.

Mackey, A. (2006). Feedback, noticing and instructed second language learning. *Applied Linguistics, 27*, 405-430.

Mackey, A., & Gass, S. M. (2005). *Second language research: Methodology and design.* Mahwah, NJ: Lawrence Erlbaum Associates.

Mackey, A., Philp, J., Egi, T., Fujii, A., & Tatsumi, T. (2002). Individual differences in working memory, noticing of interactional feedback and L2 development. In P. Robinson (Ed.), *Individual differences and instructed language learning* (pp. 181-209). Amsterdam: John Benjamins Publishing Company.

McInnis, L. (2010). *Analyzing English L1 and L2 paraphrasing strategies through concurrent verbal report and stimulated recall protocols.* Unpublished dissertation. University of Toronto, Canada.

Norris, S. (1990). Effect of eliciting verbal reports of thinking on critical thinking test performance. *Journal of Educational Measurement, 27,* 41-58.

O'Brien, J. (1993). Action research through stimulated recall. *Research in Science Education, 23*, 214- 221.

Philp, J. (1998). *Interaction, noticing, and second language acquisition: An*

examination of learners' noticing of recasts in task-based interaction. Unpublished doctoral dissertation, University of Tasmania, Australia.

Philp, J. (2003). Constraints on "noticing the gap": Nonnative speakers' noticing on recasts in NS-NNS interaction. *Studies in Second Language Acquisition, 25,* 99-126.

Robinson, P. (1997). Individual differences and the fundamental similarity of implicit and explicit adult second language learning. *Language Learning, 47,* 45-99.

Robinson, P. (2003). Attention and memory in SLA. In C. Doughty & M. Long (Eds.), *Handbook of second language acquisition,* (pp. 630-678). Oxford: Basil Blackwell.

Rosa, E., & Leow, R. P. (2004). Awareness, different learning conditions, and L2 development. *Applied Psycholinguistics, 25*, 269-292.

Rosa E., & O'Neill, M. D. (1999). Explicitness, intake, and the issue of awareness: Another piece of the puzzle. *Studies in Second Language Acquisition, 21*, 511-556.

Schmidt, R. (1990). The role of consciousness in second language learning. *Applied Linguistics, 11*, 129-158.

Schmidt, R. W. (2001). Attention. In P. Robinson (Ed.), *Cognition and second language instruction* (pp. 3-32). New York: Cambridge University Press.

Schmidt, R., & Frota, S. (1986). Developing basic conversational ability in a second language: A case study of an adult learner of Portuguese. In R. Day (Ed.), *Talking to learn: Conversation in second language acquisition* (pp. 237-326). Rowley, MA: Newbury House.

Suzuki, M. (2007). *Learner uptake and second language learning.* VDM: Germany.

Tomlin, R., & Villa, V. (1994). Attention in cognitive science and second language acquisition. *Studies in Second Language Acquisition, 16*, 183-203.

Vesterinen, O., Toom, A., & Patrikainen, S. (2010). The stimulated recall method and ICTs in research on the reasoning of teachers. *International Journal of Research &Method in Education, 33*(2), 183-197.

Williams, J. N. (2005). Learning without awareness. *Studies in Second Language Acquisition, 27,* 269-304.

Tapping into learner noticing measured by stimulated recall

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Keywords: noticing, stimulated recall, second language acquisition, error correction

本稿では、学習者の気づきがどの程度刺激回想法 (Stimulated Recall) で測定できるかを検証する。気づきのデータは研究者と日本人英語学習者の間でのインターアクションを基に収集され、分析では学習者の動詞過去形の誤使用に焦点を当てた。録音されたインターアクションに対して刺激回想法を行い、学習者にコメントを求めた結果、動詞過去形の誤使用について、学習者自身はその誤使用に気づいていないことが多かった。また誤使用の起こった箇所については、実験の焦点である文法に対する気づきのコメント以外に、意味、音声、語彙といった他の言語領域に関連するコメントが出された。気づきの割合が低かったことと気づきコメントが他の言語領域に及んだことに関して、記憶、情報処理、質問者効果などの観点から考察した。