Annual Review of Applied Linguistics (2005) **25**, 98–111. Printed in the USA.
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5. CURRENT APPROACHES TO RESEARCHING SECOND LANGUAGE LEARNER PROCESSES[1]

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Language learning is a complex set of processes that largely take place in the learner's head. The extent to which learners consciously focus on specific aspects of language, the degree to which they notice particular features of language, and how this is done has been the object of considerable debate in different theoretical approaches to second language acquisition. For researchers in second language acquisition, one dilemma is how to find out what learners notice, and how, if at all, they incorporate this into their developing linguistic knowledge. Here, I discuss three approaches to researching learner cognitive processes that can be used to identify the knowledge that learners have about their second language, and obtain some insights into the cognitive processes of learners. These approaches have the potential to contribute to our understanding of how learners learn a second language, and, therefore, how this task may be facilitated. The first approach attempts to tap directly into the learner's thought through the use of think-aloud protocols, whereas the second involves having learners engage with activities that encourage them to talk aloud, thus providing insights into their thought processes. The third approach uses planning effects on task performance to investigate how learners monitor their language.

Learner Processes as Keys to Second Language Acquisition

The extent to which second language learners are conscious about the specifics of their language learning has been the subject of considerable debate. Krashen (1982, 1985) advocates that acquisition is an unconscious process, whereas others, such as Schmidt (1990, 1994, 2001) propose that it is a conscious process. The role of consciousness can be seen as an overarching concept which encompasses related questions about the role of explicit and implicit learning and knowledge, the roles of attention, awareness and noticing, and the extent to which learners monitor their language. Bearing these concepts in mind, this chapter investigates some of the ways in which learners process language, identify what they notice, and hypothesize about the ways in which they access and exploit their language knowledge. Three

https://doi.org/10.1017/S026719050500005X Published online by Cambridge University Press

different methodological approaches are considered. The first is the use of verbal protocols, a procedure used to tap learner processes in reading and writing activities.

Verbal protocols involve considerable intervention on the part of the researcher in the sense that participants are instructed to perform an activity that is unrelated to the language learning task or activity in which they are participating. However, this type of data allows us probably the most direct insights into learner thought processes. The second methodological approach is less interventionist in that it investigates what learners do while they are performing language activities that involve dialogic discussion, including metalinguistic discussion, of the workings of the language. In a sense, the activity itself incorporates the learner's thinking aloud. The same can be said of the third type of methodology, which involves manipulating the planning conditions under which tasks are performed to explore learners' processes, in particular, their monitoring of their language output. In this case, however, the evidence of language processing is derived not directly from what learners say while performing the tasks, but from posthoc analyses of their language products, that is, the speaking or writing samples elicited under the different planning conditions. What all these approaches have in common is that they involve an analysis of learner output as discourse (verbal think-aloud, dialogic discussion, or monitored spoken or written output) and allow insights into learner processes from different perspectives.

Schmidt (1990) argued that it is essential for learners to actively notice features in their second language that will allow them to identify the gaps in their own linguistic knowledge of their second language. This in turn enables them to form hypotheses about their second language that they may then test in their language use. More recently, Schmidt (2001, pp. 3–4) has hypothesized that: "SLA [second language acquisition] is largely driven by what learners pay attention to and notice in the target language input and what they understand the significance of the noticed input to be." Noticing, therefore, is a crucial concept in understanding how learners process their second languages. Equally, it is well established that learners are limited both in terms of their processing capacity (Skehan, 1998), and in terms of their access to attentional resources (Schmidt, 2001). Because second language learners are exposed to more linguistic data than they can effectively process, they need to find some way to reduce the complexity of those data, which allows them to notice certain features of the data, and to make related hypotheses that they may subsequently test (Gass, Svetics, & Lemelin, 2003).

The ability of learners to process such complex data is related to the extent to which their language is automatized because the more automatized language comprehension and production is, the more processing and attentional resources can be deployed to other activities, which may include those of noticing gaps in their linguistic knowledge, or turning their attention to monitoring their output, or testing their hypotheses against data in the input. One way in which learners may identify these gaps, and improve their linguistic accuracy, is to tap into their explicit knowledge about the language they are learning, that is, "knowledge of language about which users are consciously aware" (Ellis, 2004, p. 229). Indeed, the

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difference between explicit and implicit knowledge of language rests precisely in the individuals' abilities to describe their knowledge of language (N. Ellis, 1994) and mirrors Krashen's (1985) distinction of learning versus acquisition. Children's linguistic knowledge of their first language is clearly implicit because children demonstrate knowledge of the rules of language in their speech, but cannot generally articulate them. Second language learners are likely to have both implicit knowledge of their second language acquired through interaction with the language either in or out of a classroom, as well as explicit knowledge of some aspects of the language that may be acquired through explicit learning. DeKeyser (2003) argues that although implicit knowledge tends to remain implicit, and explicit knowledge to remain explicit, it is possible that explicit knowledge may become implicit over time, contrary to Krashen's claim that learned and acquired knowledge remain separated; further, he points out that there is no evidence "that explicit learning and practice cannot lead to automatized procedural knowledge, only a dearth of evidence that it can" (DeKeyser, 2003, p. 329). The important question here rests with the definition of "acquired" knowledge:

> If one takes lack of awareness to be as crucial for "acquired" knowledge as for implicit learning, then the end product of the learning process documented in DeKeyser cannot be called implicit, as students are still aware of the rules. If, however, the criterion for "acquired" knowledge is that it be available with the same degree of automaticity as implicitly acquired knowledge, then it is not clear why the end product of automatization processes as documented in DeKeyser (1997) could not be considered "acquired." Moreover, it is quite possible that, after large amounts of communicative use and complete automatization of the rules, learners eventually lose their awareness of the rules. At that point they not only have procedural knowledge that is functionally equivalent to implicitly acquired knowledge, but even implicit knowledge in the narrow sense of knowledge without awareness (DeKeyser, 2003, pp. 328–329).

Rod Ellis (2004) posits that explicit knowledge results from learning that involves attention to form as contrasted with implicit learning, where the focus is on meaning. Supporting the view that noticing is crucial to second language learning, recent reviews involving comparisons of the efficacy of implicit versus explicit instruction (see especially Norris & Ortega, 2000) and explicit learning (DeKeyser, 2003) indicate an advantage, at least in the short term, for explicit modes of learning over implicit modes of learning in both classroom and laboratory studies. The debates concerning the role of consciousness in language acquisition, the degree to which language is learned or acquired, and what explicit and implicit learning involves are complex. It is studies of language processing that will allow us to move beyond speculation and to gain greater insights through empirical evidence of the learning processes language learners use.

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In focussing on the following methodologies, I would point out that my concern is not with the measurement of what learners know (i.e., the end product of learning), but rather with the process of identifying what it is that learners focus on as they move toward increasing their proficiency in their second language. The challenge for all these methodologies is to obtain observable, externalized data from unobservable, internalized processes to draw conclusions about the processes.

Introspection and Verbal Protocols

In his review of attention, awareness, and noticing, Al-Hejin (2004) points to the importance of collecting introspective data to identify what learners notice. Verbal protocols have been used widely in psychological research, and were originally grounded in information processing approaches to cognition (Ericsson & Simon, 1984/1993). There are three different types of verbal protocol: think-aloud protocols, introspective protocols, and retrospective protocols. The first two rely on working memory and are collected concurrent with the performance on the task under investigation, whereas retrospective protocols attempt to tap information available in the learners short term memory (Jourdenais, 2001). Leow and Morgan-Short (2003) point out that it is important to differentiate between metalinguistic verbalization where specific information is requested, and nonmetalinguistic verbalization where learners are focussed on a task and verbalize their thoughts as they proceed, thus providing self-revelational data (Cohen, 2000). In the following discussion, because our interest is in using this methodological tool to investigate learner processes, and particularly what they notice in the data, only concurrent, nonmetalinguistic protocols through which such phenomena are most likely to be revealed are discussed, because retrospective protocols are unlikely to reveal a great deal about unconscious processes. My concern here is not with a discussion of what these techniques reveal about what learners notice (but see Alanen, 1995; Leow, 2000; 2001; Rosa & O'Neill, 1999; Simard & Wong, 2001) but rather with a consideration of some of the issues related to the validity of the methodology as a tool for exploring cognitive processes.

Think-aloud techniques are applied concurrently with the learner performing a language-related task. The idea is that the learner is asked to think out loud while performing the task. The learner's speech is recorded for later analysis. Training, prior to the actual data collection itself, is a crucial aspect of think-aloud techniques because the idea underlying the think-aloud is that the flow of speech is uninterpreted, spontaneous, and elicited directly from working memory.

The ability to perform such think-aloud activity is probably not equal for all individuals with some individuals, tending to process their thoughts prior to articulating them, particularly if they are feeling self-conscious about the activity itself. As Jourdenais (2001) points out, encouraging learners to say everything that comes into their minds in some ways mitigates against the tendency to "edit" what is said, but there does probably remain an individual response to think-alouds which should not be overlooked. Some individuals may find the task much more difficult than others, and in analyzing the data it is important to find some way of recognizing

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where the speech is more edited. One approach to investigating the level of analysis with which learners may engage while participating in think-alouds may be, as R. Ellis (2004) argues, to analyze the resultant protocols for hesitation phenomena associated with the output as an indicator of when learners are editing their thoughts (although with second language learners, hesitation phenomena may be a marker of disfluency rather than editing).

The idea that cognition is a socially and culturally isolated phenomenon available for scrutiny, that underpins the information processing approach to think-alouds has been challenged recently with researchers considering how this type of retrospective or concurrent internal speech behavior may be affected by the different cultural and social perspectives of the participants (Sasaki, 2004; Smagorinsky, 2001). Smagorinsky (2001) suggests that protocol analysis may be used as a tool to investigate the ways in which speaking mediates thought. He questions whether concurrent and retrospective protocols, initially developed within an information processing framework and used to develop models of cognitive functioning, can be isolated from the cultural and social context in which they are taking place, and from the cultural and social backgrounds of the participants. The relationship between sociocultural factors and think-aloud protocols has been investigated empirically by Sasaki (2004) who asked eight Japanese native speakers to conduct think-aloud protocols while completing a pragmatic refusal task. In the analysis of the protocols, Sasaki identified social politeness markers, comments which addressed the researcher directly, metacomments made by the participants on their behavior, comments regrading the protocol process itself, and comments regarding the selectivity of the information they were providing. The instructions given to the participants were in line with those recommended by Ericsson and Simon (1984, 1993), and participants were expressly instructed not to monitor their speech. The researcher was not present during the data collection process. Sasaki argues that the verbal report data revealed both selectivity in the information provided, and the social orientations of the participants toward the researcher through the use of social politeness markers and other interactional phenomena (which would not have been available had the reports been conducted in English). As Smagorinsky (2001) also argues, taking account of the social nature of think-aloud protocols does not invalidate the data as an effective method for exploring the cognitive processing of individual learners; rather, Sasaki points out, not taking account of the ways learners socially orient to the researcher runs the risk of underrepresenting the complexity of the social and cognitive processes the protocols can be used to reveal.

Another major concern, particularly with concurrent verbal protocols, has been the potential for such protocols, (think-aloud and introspection) to change the nature of the activity itself. The potential for thinking aloud to change the cognitive processes under investigation when participants are required to both complete the task provided, and at the same time articulate their thought processes (known as *reactivity)*, has been raised on numerous occasions (see for example Ericsson & Simon, 1984, 1993; Jourdenais, 2001; Smagorinsky, 2001; Stratman & Hamp-Lyons, 1994). Following a review of the (largely nonlinguistic) literature investigating reactivity and think-aloud protocols, which indicated that time-on-task was the factor

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most affected, Leow and Morgan-Short (2004) undertook an empirical investigation of reactivity in concurrent protocols motivated by the need to explore the validity of this research approach for studies of attention and awareness. Two equivalent groups of L2 Spanish learners were assigned to either a think-aloud group, or a non-think-aloud group, and half of each group was subsequently randomly assigned to either an enhanced reading condition, or a nonenhanced reading condition with a focus on the targeted form—the Spanish impersonal imperative. Three tasks were administered subsequent to the reading to evaluate the learners' comprehension, intake, and controlled production of the targeted form. The researchers found no significant effect for thinking aloud in any of the assessments tasks suggesting that, within the limitations of the study, reactivity was not at issue. However, further studies of reactivity, conducted with a variety of different tasks, are required to further support these findings.

In sum, verbal protocols are a useful tool with which to explore the cognitive processes of learners, and their use may be able to shed light on what, precisely, the features of language are that learners notice. However, the validity and usefulness of this approach may vary depending on who is thinking aloud, the interlocutor or audience of the think-alouds, and also according to task type. Because they involve a spoken response to the task, they are not appropriate for use with listening or speaking data because they necessarily conflict with the communicative nature of such activities. Therefore, to explore the kinds of features that learners notice in spoken language alternative methods need to be considered.

Analyzing Learners Talking Aloud About Language

In an approach pioneered by Swain and her colleagues, the effectiveness of different output-requiring tasks completed by pairs or small groups has been examined (e.g., Kowal & Swain, 1994; Swain & Lapkin, 1998, Swain, 2000). Research work in this paradigm has tended to adopt a sociocultural theoretical perspective (see, for example, Ohta, 2000; Swain, 2000). As Swain and Lapkin (1998) argue, this is complementary to the psycholinguistic perspectives of language learning but in addition provides new and significant insights into language learning processes. In this perspective, interaction is considered to be the site of cognitive development, including language development. In such interactions, language mediates cognitive development as well as reflects the processes taking place. The approach is based on the premise that interaction is critical to successful SLA and that classroom practice can be designed to maximize learners' opportunities to notice, test hypotheses, and receive and internalize feedback, processes which are hypothesized to occur within collaborative task-based interaction. The benefit of combining such tasks with group work is that these activities provide enhanced opportunities for noticing features of language in the output. In addition, it enables verbalization of the output, which then becomes an "objective product that can be explored further by the speaker or others" (Swain, 2000, p. 102), and enables dialogue about the language. Such activity has the added benefit of providing opportunities for learners to receive feedback on their hypotheses (Storch, 1997).

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From a methodological point of view, learner talk provides a source of data for researchers to explore the ways in which language learning processes are realized and, ultimately, posttesting of the type conducted by Swain (1998), or post-task activities such as those used by Donato (1994) and Storch (2002) contribute directly to our ability to evaluate precisely what aspects of language learners may be noticing. In this approach, pair dialogues are analyzed, following Swain and Lapkin (1998), into "language related episodes," or metalanguage episodes. Language-related episodes are defined as "any part of the dialogue where learners talk about the language they are producing, question their language use, or other- or self-correct (Swain & Lapkin, 1998, p. 326). These episodes can then be examined for what is the focus of attention (e.g., a lexical item, a grammatical point, a semantic concept), how the learners resolve the discussion and any disagreements that may emerge (Storch, 1997). Loewen (2004), following Ellis (2001), used similar episodes, identified as focus-on-form episodes, to investigate the characteristics associated learners' uptake of incidental form focussed episodes in teacher/learner interactions that occurred in meaning-focussed lessons. Such episodes may also be a form of hypothesis testing in which learners also receive feedback from each other.

This type of methodological approach appears to provide a very fruitful line of inquiry for the investigation of noticing, hypothesis testing, and particularly feedback. Feedback from an interlocutor may allow the learners to notice specific gaps in their own linguistic knowledge of the second language. It may also provide them with information that assists them either in confirming, or disconfirming, their hypotheses. However, for the feedback to be useful, it must be noticed. As the findings of a number of studies (e.g., Qi & Lapkin, 2001; Sanaoui, 1984) have shown, it is not just the noticing *per se* which is important for second language learning, but the quality, or depth, of that noticing. Deeper noticing of linguistic information (i.e., not only noticing but actively engaging with the feedback information) is more likely to lead to language learning. Qi and Lapkin (2001) have also found that the quality of the noticing is different for learners with different levels of L2 proficiency.

A research study currently being conducted is using this research approach is examining which of two different types of feedback, editing or reformulation, promotes deeper noticing by the learners (Wigglesworth & Storch, 2004). Editing is a common form of feedback with written output, most commonly in the form of explicit error correction through annotations in the text or margins of the work. Surveys have shown that L2 students overwhelmingly welcome this form of feedback (e.g., Zhang, 1995) and indeed expect it from their language teachers (Leki, 1991). Reformulation, originally defined by Cohen (1983) as a technique which consists of native speaker rewriting the original text produced by the learner, preserves the learner's ideas, but makes the language sound as native-like as possible by having the text rewritten by a native speaker. Learners then compare the reformulated version with their own text. The purpose of this is for the learner to notice differences between their text and the native speaker's version of it. Theoretically, this should allow learners to notice gaps in their linguistic knowledge. Again, research findings (Lapkin, Swain, & Smith, 2002; Mantello, 1996) suggest

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that the effectiveness of reformulation may differ according to the learners' second language proficiency. The Wigglesworth study of how learners incorporate feedback into their writing is expected to shed light on what learners notice in the feedback, and how they integrate this into their second language knowledge. Thus this project is pursuing a new emphasis on the study of how learners process feedback; the design of the project allows empirical investigation of the notions of noticing the grammatical gap, hypothesis testing, and uptake of feedback through both an analysis of written scripts on which feedback (either editing or reformulation) is provided, which will provide insights into the extent to which feedback is noticed and integrated into the cognitive system. In addition, the design of the study enables us to investigate the processes learners are using in their language activity through examination of the dialogue of pairs as they respond to the different forms of feedback received.

Using Discourse Measures to Investigate Planning Effects

Over the last decade a number of studies (e.g. Ellis, 2005; Foster & Skehan, 1996; Mehnert, 1998; Ortega, 1999; Skehan & Foster, 1997; Yuan & Ellis, 2003) have examined planning effects on learner output, usually spoken (although Ellis & Yuan, 2004, the most recent study conducted within this paradigm, examined planning effects on learners' written output). Given the limited processing capacity available to learners, and the competition for attentional resources, studies of planning allow detailed investigation of how the learners apply their limited resources when adequate time is provided. Thus, analysis of the discourse produced by the learners under different planned and unplanned conditions may provide insights into the ways in which accuracy, fluency, and complexity improve (or do not) under planned conditions. These studies do not have as their focus the concept of "noticing" as conceptualized by Schmidt, but where accuracy is enhanced we may postulate that this is the result of the learner's ability to monitor his or her output, and apply explicit knowledge about rules to his or her output.

The various planning studies that have examined oral language conducted over the last decade (e.g. Foster & Skehan, 1996; Mehnert, 1998; Ortega, 1999; Skehan & Foster, 1997; Yuan & Ellis, 2003) have all found improvements in both fluency and complexity where planning time is provided, but the situation with respect to accuracy is less clear, which may in part result from the fact that the studies have used a variety of measures to investigate accuracy. The Foster/Skehan studies have used global measures of accuracy such as error free clauses, whereas others have used specific measures such as regular past tense endings (Ellis, 1987), articles, noun modifiers (Ortega, 1999), accuracy of verbal morphology, and plurals (Wigglesworth, 1997). However, these studies have all examined pretask planning, where participants are given (often varied) amounts of time to plan prior to completing the activity. Two recent studies, however, suggest that an examination of online planning (Ellis & Yuan 1994; Yuan & Ellis 1993) may provide valuable insights into learners monitoring of their linguistic output.

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Yuan and Ellis (2003) and Ellis and Yuan (2004) investigated the effects of pretask planning, online planning, and no planning on oral and written narratives respectively elicited from a set of pictures. In the online planning (OLP) condition there was no time limit given for the task; in the planning (PTP) condition participants had 10 minutes of planning time, with the responses timed (5 minutes for the speaking task, 17 minutes for writing). In the no-planning (NP) condition responses were timed similarly. In the speaking task, four sentences for each of the six pictures were required; in the writing task a minimum of 200 words was required.

The OLP groups produced more accurate output in terms of both speaking and writing. In addition, the analyses of the spoken discourse revealed that the online planners spoke more slowly, and used more self-repairs suggesting a greater level of monitoring of their language. Yuan and Ellis (2003) suggest that the availability of online planning time allows learners to access their explicit knowledge about grammar, whereas in pretask planning learners tend to advantage content over form. Results from questionnaire and interview data for the writing study supported this view with participants reporting a greater focus on language (i.e., accuracy) with online planning (i.e., during the execution of the task) for both the PTP and OLP groups, but less for the NP group who presumably focus more on content planning during the limited time they have to write. Ellis and Yuan (2004) summarize:

> It is likely that the on-line planners used the additional time at their disposal to attend carefully to linguistic accuracy by editing their internal and external output. Writing allows learners access to observable units of text and thereby induces attention to form. When on-line assembly is unpressured, this inherent tendency in writing may be accentuated. In support of this, it can be remarked that the on-line planners noted in their posttask interviews that they attempted to attend to everything, which suggests that they monitored the output of translation extensively before and after execution (2004, p. 80).

Studies of online planning, such as those briefly outlined previously, have the potential to provide us with greater insights into the ways in which learners use their limited processing and attentional resources, how they monitor their language, and the extent to which they are able to exploit their explicit knowledge of their language resources.

Taken together, these three research methodologies each provide us with different insights into the ways in which learners process language. Think-aloud protocols, although providing the most direct insights into learner processes are not always suitable, and may be particularly problematic with second language learners, particularly at lower levels of proficiency. In undertaking the think-aloud, should learners be required to report in their first language, which would be the most natural, or their second language, in which they are completing the task? In the former case, the interaction between the two languages must be taken into account, but in the latter, the proficiency of the learners may make it difficult for them to report and

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verbalize their thoughts. Dialogic interchanges are less direct than think-alouds, and cannot be entirely guaranteed to elicit the kinds of processes we are concerned with investigating, although the empirical evidence suggests they are likely to. However, Storch (1997) has argued that they may be a more suitable method of collecting data from second language learners than think-alouds because second language learners may find it difficult to fulfill the two competing and concurrent goals involved with think-aloud protocols—the verbalization of their thought processes as well as the task completion. The planning time studies are even less direct, and it is important to recognize that what learners do with planning time is likely to be very variable and reflect considerable individual differences. Elder and Iwashita (in press) discuss the importance of looking at what learners do in their planning time, an issue addressed by Ortega (1999) and Rutherford (2001). However, whereas think-alouds and dialogic language related episodes may help us to understand what learners do while on task, planning studies provide post hoc evidence of learner processes, which the former often do not attend to.

Useful directions for further inquiry are likely to include studies which combine attention to processes with evidence of the learning outcomes of the learners, studies combining different types of methodologies, and studies which explore the limitations of these different methodological approach in varied performance contexts.

Note

1. I am very grateful to Catherine Elder, Carsten Roever, and Neomy Storch for their very insightful and helpful comments, provided at very short notice, on earlier versions of this chapter.

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This edited collection is introduced by a comprehensive discussion of the issues that bear on planning time and that have emerged from previous studies. In the following empirical studies, a broad range of topics are addressed, including the strategies learners use during pretask planning, how learners' attention to form can be manipulated through pretask planning, the effects of learners' proficiency level on their ability to use planning time, how unpressured planning affects oral and written production, and how learners use planning over extended periods of time.

https://doi.org/10.1017/S026719050500005X Published online by Cambridge University Press

Jourdenais, R. (2001). Cognition, instruction and protocol analysis. In P. Robinson (Ed.), *Cognition and second language instruction* (pp. 354–375). Cambridge, UK: Cambridge University Press.

This chapter provides a detailed discussion of the advantages of using protocol analysis for investigating cognitive processes relevant to second language acquisition. The chapter discusses the types of prompts which can be used, the importance of training, and approaches to the analysis of the protocols. Also included is a survey of previous research studies in language learning that have employed verbal protocols as a methodology. The chapter concludes with a discussion of concerns that have been raised about the use of protocols.

Swain, M. (2000). The output hypothesis and beyond: Mediating acquisition through collaborative dialogue. In J. Lantolf (Ed.), *Sociocultural theory and second language learning* (pp. 97–114). Oxford: Oxford University Press.

Swain's chapter focuses on the nature of collaborative dialogue and examines it within the context of contemporary views about the role of interaction in second language learning. The chapter situates the discussion within a sociocultural frame of mind and discusses the role of language as a mediational tool, and details a number of studies that have adopted this perspective. A range of examples of collaborative dialogue are used to illustrate the ways in which language is used for this purpose.

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