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INPUT, INTERACTION, AND SECOND LANGUAGE DEVELOPMENT

An Empirical Study of Question Formation in ESL

Alison Mackey
Georgetown University

This study examines the relationship between different types of conversational interaction and SLA. Long's (1996) updated version of the interactionist hypothesis claims that implicit negative feedback, which can be obtained through negotiated interaction, facilitates SLA. Similar claims for the benefits of negotiation have been made by Pica (1994) and Gass (1997). Some support for the interaction hypothesis has been provided by studies that have explored the effects of interaction on production (Gass & Varonis, 1994), on lexical acquisition (Ellis, Tanaka, & Yamazaki, 1994), on the short-term outcomes of pushed output (see Swain, 1995), and for specific interactional features such as recasts (Long, Inagaki, & Ortega, 1998; Mackey & Philp, 1998). However, other studies have not found effects for interaction on grammatical development (Loschky, 1994). The central question addressed by the current study was: Can conversational interaction facilitate second language development? The study employed a pretest-posttest design. Adult ESL learners ($N = 34$) of varying L1 backgrounds were divided into four experimental groups and one control

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Address correspondence to Alison Mackey, Department of Linguistics, 480 Intercultural Center, Georgetown University, Washington, DC 20057-1051; e-mail: mackeya@gusun.georgetown.edu.

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group. They took part in task-based interaction. Research questions focused on the developmental outcomes of taking part in various types of interaction. Active participation in interaction and the developmental level of the learner were considered. Results of this study support claims concerning a link between interaction and grammatical development and highlight the importance of active participation in the interaction.

Long's interaction hypothesis (1983a, 1983b, 1985, 1996) evolved from work by Hatch (1978) on the importance of conversation to developing grammar and from claims by Krashen (1985) that comprehensible input is a necessary condition for SLA. Long argues that interaction facilitates acquisition because of the conversational and linguistic modifications that occur in such discourse and that provide learners with the input they need. Through one type of interaction, termed *negotiation* by Long, Pica, Gass and Varonis, and others, nonnative speakers (NNSs) and their interlocutors signal that they do not understand something (Gass & Varonis 1989, 1994; Long, 1983a, 1983b, 1996; Pica, 1994). Through the resulting interaction, learners have opportunities to understand and use the language that was incomprehensible. Additionally, they may receive more or different input and have more opportunities for output (Swain, 1985, 1995). Various empirical studies have considered the effects of different input and interactional conditions on SL production and acquisition. Pica's comprehensive review of work on negotiated interaction[1] suggests that interaction may facilitate conditions and processes that are claimed to be important in second language learning. As linguistic units are rephrased, repeated, and reorganized to aid comprehension, learners may have opportunities to notice features of the target language. Pica showed how, through interaction, syntactic elements may be perceived as units because they are segmented or manipulated and certain features can be given prominence through stress, intonation, and foregrounding. The hypothesis has been further refined and developed by Gass (1997), who stressed that the effects of interaction may not be immediate, pointing out the importance of looking for delayed developmental effects of interaction. Other summaries of interaction hypothesis claims and reviews of recent empirical work can be found in Gass, Mackey, and Pica (1998).

An example of how negotiated interaction may be operating to facilitate L2 development can be seen in example (1), taken from data in the present study. In this example the NNS does not understand the word *glasses*. The word is repeated by the native speaker (NS), the original phrase is extended and rephrased, and finally a synonym is given.

(1) NS: *There's there's a a pair of reading glasses above the plant.*
NNS: *A what?*

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NS: *Glasses reading glasses to see the newspaper?*
NNS: *Glassi?*
NS: *You wear them to see with, if you can't see. Reading glasses.*
NNS: *Ahh ahh glasses glasses to read you say reading glasses.*
NS: *Yeah.*

INTERACTION

Output and Comprehension in the Context of Interaction

Swain (1995) has argued that it is having to actually produce language that forces learners to think about syntax. Swain argued for the importance of comprehensible output in the SLA process. What she means by this is that learners, in their effort to be understood in the target language, are *pushed* in their production and may try out new forms or modify others. To explore output, Swain and Lapkin (1995) used think-aloud procedures during dictogloss tasks that they suggested may tap into some of learners' introspective processes. Swain and Lapkin (1998) discussed what they termed "collaborative dialogues" in "language-related episodes," in which the learners talk about the language they are producing or writing. They suggested that such conversations may be a source of second language learning. An example of a learner being pushed to produce more comprehensible output (see also Pica et al., 1989) can be seen below (data are from the current study), where the NNS rephrases the original sentence in an effort to be understood and produces a simile of his partial production of the lexical item that seems not to be understood by the native speaker. Example (2) shows the learner restructuring output to facilitate native speaker understanding of the utterance.

(2) NNS: *And one more weep weep this picture.*
NS: *Huh?*
NNS: *Another one like gun to shoot them weep weepon.*
NS: *Oh ok ok yeah I don't have a second weapon though so that's another difference.*

Based on the output hypothesis, it would seem that, for interaction to facilitate SLA, learners need to have opportunities for output during interaction. In many second language classrooms as well as naturalistic contexts, however, learners often observe the output of others without producing their own output. Is it helpful for learners to observe output without actually taking part in it? In terms of comprehension, Pica (1992) found no significant differences between learners who observed interaction and learners who took part in interaction. She therefore suggested that it may not be necessary for learners to take part in interaction for it to have a beneficial effect on comprehension; simply observing interaction may be sufficient. Ellis, Tanaka, and Yamazaki (1994) compared the developmental outcomes for learners who were in the same class and carried out the same task. Some learners actively participated in interaction and some learners listened. Scores for vocabulary acquisition

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and comprehension were not significantly different for these learners. Ellis et al. concluded that active participation may be less important for acquisition than has been claimed, but they noted that it is not detrimental either. Although the processes involved in production and comprehension and the relationship between them obviously preclude direct comparison, these two studies can be considered supportive of the need for further research on the outcomes of observation of interaction, as well as the outcomes of taking part in interaction.

Premodified Input in the Context of Interaction

Premodified input has also been studied by Pica and her colleagues (see Pica, 1994) in the context of interaction. Premodified input is generally operationalized as input that has been carefully targeted at the level of the learner in order to facilitate learner comprehension. Negotiation is generally not necessary when input is premodified. Examples of premodified input may be found in many second language textbooks. The linguistic structures are ordered in a supposed difficulty hierarchy. For example, the simple present tense is usually presented early on in most ESL texts. Examples, dialogues, and surrounding text are often premodified so that learners will not have difficulties with comprehension. Conversational interaction that utilizes premodified input—such as partially scripted role plays, for example—may yield better comprehension in that learners do not have to negotiate for meaning and make adjustments. However, in terms of the interaction hypothesis, premodified input may be less beneficial for learners because their opportunities to listen for mismatches between their own output and the target language are obviously limited when the input has been premodified to ensure comprehension. Premodified input is sometimes termed "scripted" (Gass & Varonis, 1994). An example of premodified input similar to example (2) might consist of the native speaker taking the questioning role and asking, "Do you have a gun in your picture? A gun is like a weapon. A gun shoots bullets." When input is premodified in the context of interaction, learners seldom have occasions to misunderstand, negotiate for meaning, and produce errors; and therefore opportunities for language learning as a result of their mistakes are limited. The interaction hypothesis suggests that conditions and processes for second language learning are met by negotiation for meaning and the resulting interactional modifications that take place. Thus, premodified input, such as that obtained through scripted interaction, which results in few or no opportunities for negotiation or misunderstandings, may not be helpful for SLA. Learners who participate in negotiation in the context of interaction may have more learning opportunities.

Feedback, Interaction, and Noticing

Long's (1996) claim in the interaction hypothesis was that there is an important role in the SLA process for negotiated interaction that elicits negative

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feedback. According to Long, this feedback may induce noticing of some forms: "it is proposed that environmental contributions to acquisition are mediated by selective attention and the learner's developing L2 processing capacity. . . . negative feedback obtained in negotiation work or elsewhere may be facilitative of SL development" (p. 414). Negative feedback obtained through negotiation for meaning has been discussed above. Another source of negative feedback currently receiving attention in the SLA literature is recasts. Recasts have been generally defined as being a targetlike way of saying something that was previously formulated in a nontargetlike way (see also Farrar, 1992; Long, Inagaki, & Ortega, 1998; Mackey & Philp, 1998; Oliver, 1995). Thus, in example (3), from data in the current study, the NS interlocutor responds to the NNS's ill-formed utterance with a reformulation, modifying the NNS's utterance by supplying the copula, adding a plural marker, and adding a preposition. The central meaning of the NNS's original utterance is retained.

(3) NNS: *Your picture how many how many cat your picture?*
NS: *How many cats are there in my picture?*
NNS: *Yeah how many cats?*

Long (1996) pointed out that recasts are often ambiguous; a learner might not be able to determine whether negative feedback is a model of the correct version or a different way of saying the same thing. Recent work by Lyster (1998a, 1998b) in the classroom context has also pointed to the idea that negative feedback may be perceived or reacted to differently in dyadic and classroom contexts.[2] The focus of the current study was interaction containing negotiation rather than recasts, although in some cases recasts and negotiation cooccur.

If interaction containing negotiation or recasts can lead to SL restructuring, how may this come about? Some researchers have suggested that input must be internalized in some way in order to affect the acquisition process. If learners are to make use of the possible benefits of interaction, for example, because it provides SL data at the appropriate time for them and it provides feedback on their production, they must not only comprehend this SL data but must also notice the mismatch between the input and their own interlanguage system (Gass, 1991, 1997). Ellis (1991) also claimed that the acquisition process includes the procedures of noticing, comparing, and integrating, and that interaction that actually requires learners to modify their initial input may facilitate the process of integration.

Thus, researchers have claimed that if interaction is to affect the learners' interlanguage, learners may need to notice the gap between their interlanguage (IL) form and the second language alternative (Gass, 1991, 1997; Gass & Varonis, 1994; Schmidt, 1990, 1994; Schmidt & Frota, 1986). Gass (1991) pointed out that "nothing in the target language is available for intake into a language learner's existing system unless it is consciously noticed" (p. 136). Noticing or attention to form may be facilitated through negotiated interac-

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tion.[3] It has been argued that during negotiation for meaning, when learners are struggling to communicate and are engaged in trying to understand and to be understood, their attention may be on language form as well as meaning (Gass, 1997; Long, 1996; Pica, 1994). White (1991) has also suggested that, for some SL structures, it may be necessary for there to be incomprehensible input—that is, for there to be a problem in order for learners to develop.

Previous Empirical Studies of Interaction and SLA

The current study aims to directly empirically test the interaction hypothesis. Previous studies that have explored the issue of conversational interaction and learner comprehension, production, and development will therefore be briefly reviewed before the research questions and predictions are laid out for the current study. One of the earliest studies to explore the issue of conversational interaction and SL production and development was carried out by Sato (1988). She explored the connection between conversation and SLA in a longitudinal study in a naturalistic setting. She focused on past-time reference, examining the early stages of ESL acquisition by two Vietnamese brothers. She found no connection between NS input or naturalistic interaction and the grammatical encoding of past-time reference. She pointed out, however, that the past-time reference was largely recoverable from situational knowledge and discourse context. It was generally not necessary to provide or require past-time reference marking in the conversations. Thus, on the basis of these detailed case studies, Sato's conclusion was that conversation might be selectively facilitative of linguistic development (see also Gass, 1997; Long, 1996; Pica, 1994).

There were three interesting studies in 1994 that may have helped to jumpstart much current work that attempts to explore a direct link between interaction and L2 development. One of these was the exploration of interaction and learner production by Gass and Varonis (1994). Although one aspect of their study of the effects of interaction on SLA—learner comprehension—had been the topic of prior work, learner production was relatively underexplored. Gass and Varonis compared prescripted modified and unmodified input with and without the opportunity for interactional modifications on (a) comprehension, as measured by the performance of learners when receiving directions on a task, and (b) production, as measured by their NS partner's success in following the directions. They found that both negotiated and modified input positively affected comprehension and that prior negotiated interaction but not prior modified interaction significantly affected production, measured by the ability to give directions. Gass and Varonis (1994, p. 299) suggested that interaction with the opportunity for modifications may affect later language use. Polio and Gass's (1998) partial replication study found a positive effect for negotiated interaction on SL production and comprehension as indicated by NSs' comprehension of that production. As for Gass and Varonis, the de-

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pendent variable was the ability to follow directions rather than a direct linguistic measure of change.

The measure for production improvement in the studies above was NS ability to follow directions given by learners: If the learners' directions were comprehensible, the NS could follow them. In two more studies published in 1994, more direct measures of production and acquisition were used. The findings were somewhat contradictory. Loschky (1994) considered the effects of comprehensible input and interaction on comprehension, the retention of vocabulary items, and the acquisition of two locative constructions in Japanese as a second language (JSL). His study showed that negotiated interaction had a positive effect on the comprehension of the vocabulary but no effect on the retention or acquisition of the vocabulary items or the acquisition of grammatical structures. Ellis et al. (1994), however, found that interactionally modified input resulted in both (a) better comprehension and (b) more new words being acquired than was the case with premodified input. Ellis et al.'s study was based on the ESL of two groups of Japanese L1 learners and provided evidence for a link between interactionally modified input and lexical acquisition. They argued that interaction gives learners control over the input and enables them to identify and solve problems. Like Gass (1988) and Gass and Varonis (1994), Ellis et al. suggested that interaction allows learners to comprehend items in the target language and that comprehended input is important for SLA. As Ellis et al. pointed out, it is difficult to know why their study found a link between interaction and development but Loschky's (1994) study did not. One explanation for the different findings of these two studies that was put forward by Ellis et al. is the difference in target items used to measure development. Loschky's measure of acquisition was locative constructions; Ellis et al. used vocabulary items. Schwartz's (1993) claim, summarized here, that negative evidence may affect vocabulary acquisition rather than grammatical structures may also be relevant. The measure of development, developmental readiness (Pienemann & Johnston, 1987), and differences in the interactional situation might also account for the different findings in the studies by Ellis et al. and Loschky.

Swain and Lapkin (1998) took a sociocultural perspective on interaction and SL development processes. They examined data from eighth-grade students in a French immersion classroom who were engaged in a jigsaw task, and they presented an in-depth analysis of language-related "episodes," which they define as instances in which the speakers' focus is on the language being produced. One dyad from their database was singled out to demonstrate how the mental processes (e.g., hypothesis generation, hypothesis testing, and extension of knowledge) involved in dialogic communication mediate actual learning. Pretest-posttest comparisons were made to explore ways in which knowledge may be gained through interaction and may in some cases extend to new SL contexts.

Two recent studies of one aspect of interaction, recasts, have shown promising results in terms of their effect on SLA. Mackey and Philp (1998) studied

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learners who received interactionally modified input while carrying out information-gap tasks that were designed to both promote interaction and provide contexts for the targeted forms to be produced. Another group of learners took part in the same interaction with one exception. Their interactions contained intensive recasts. The study explored the effect of recasts on learners' short-term interlanguage development, and the nature and content of learners' responses to recasts. Their results suggested that, for more advanced learners, interaction with intensive recasts was more beneficial than interaction alone in facilitating an increase in production of higher level morphosyntactic forms. However, for the less advanced learners in their study, recasts were not as effective. A second study of recasts, carried out by Long et al. (1998), also focused on an examination of their effects on SL development. This study compared models with recasts and addressed the question of the relative contributions of models and recasts to foreign language development. The treatment in the Long et al. study was delivered via an information-gap communication game, played in either a model or a recast version. They carried out two studies focusing on models prior to an utterance and recasts after an utterance using Japanese and Spanish as foreign languages. They found evidence in the Spanish study that recasts were more effective than models in the development of a previously unknown SL structure, adverb placement. However, on the second structure in the Spanish study, object topicalization, they did not find any (measured) effect on SL learning for recasts. They found some limited evidence for improvement in the treatment groups in the second study of Japanese. However, they noted that those results for Japanese were difficult to interpret, owing to the presence of individuals in the group with prior knowledge of these structures. Long et al. concluded that, although possibly aided by a triggering effect of the pretest, recasts produced some learning or resuscitation of latent prior knowledge of the structures in the Japanese study. Taking both studies together, they claimed that their results provide support for the claim that implicit negative feedback plays a facilitative role in SLA. However, Long et al. did caution against using their results as conclusive evidence and pointed out the need for detailed longitudinal case studies in this area.

Finally, a qualitative study by Mackey (1997) aimed to identify whether learners developed in terms of question structures that they modified in their responses to implicit negative feedback. Her analysis examined the production of a small set of (a) learners who demonstrated a pattern of producing modified responses and (b) learners who demonstrated a pattern of not modifying any responses. She found that learners who modified question forms in their responses increased their production of one type of higher level question form. She concluded that having the opportunity to receive implicit negative feedback through signals of negotiation and then actually modifying output in response to such feedback may be a factor in the link between interaction and particular question forms, but only for some question forms. This finding seems to support the positions of Sato (1986), Pica (1994), Gass (1997),

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and Long (1996) that interaction may be facilitative of some interlanguage forms and may not be as important or necessary in the development of others.

The studies reviewed above demonstrate that, although some aspects of the interaction hypothesis have been explored, to date the central claim made by the hypothesis—that taking part in interaction can facilitate second language development—has not been fully tested empirically. The current study aims to test that claim. The following research questions were addressed: (a) Does conversational interaction facilitate second language development? and (b) Are the developmental outcomes related to the nature of the conversational interaction and the level of learner involvement? These questions led to the central prediction that interaction would lead to development, and an associated prediction that the extent of the development would be related to the nature of the interaction and the role of the learner, such that learners who actively participated in interaction would receive the most benefit and learners who did not actively participate, namely those who observed interaction without taking part in it, or who took part in scripted interaction, would receive less benefit.

METHOD

Challenges in Investigating a Link between Interaction and Development

Although empirical explorations of the relationship between conversational interaction and grammatical development are beginning to blossom, methodological challenges have represented a problem in this area. This is due in part to two issues: (a) difficulties associated with devising tests that can directly measure development of the structures that occurred in the interaction, and (b) difficulties associated with operationalizing second language development.

These two issues were addressed in this study in two ways. First, tasks were designed for tests and treatment that targeted question forms and also promoted the interactional modifications that are claimed to be important in second language learning (Pica, 1994; Long, 1996). These tasks were empirically tested in a series of studies (Mackey 1994a, 1994b) to ensure that they did target the forms. Second, this study operationalized development as advances in question formation in ESL within the developmental framework proposed by Pienemann and Johnston (1987).

Operationalizations

Interaction. The study was designed to investigate the connection between interaction and SL development. Interaction was operationalized following Long (1996), who claimed, as discussed above, that it is beneficial because it

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Table 1. Examples of interactional modifications/negotiation sequences

Description	Example (a): Negotiation/Recast	Example (b): Negotiation
The initial utterance that is not understood	A-NNS: *So your dogs are in space . . . vee er vee er ship?*	A-NNS: *I have a kind dog man.*
Implicit reactive negative feedback: The utterance that lets the first speaker know that her message was not understood	B-NS: *Are my dogs in a spaceship or space vehicle you mean?*	B-NS: *You have a what?*
The first speaker's reaction to the feedback; responses can be modified, as in (a), or unmodified, as in (b)	A-NNS: *Yes are your dog in space ship?*	A-NNS: *A kind dog man.*

can provide implicit reactive negative feedback that may contain data for language learning. Such feedback can be obtained through interactional adjustments that occur in negotiated interaction. In Table 1, from data used for this study, both examples are of negotiated interaction containing question forms. Example (a) shows implicit negative feedback in the form of negotiation (which is also a recast), and example (b) shows implicit negative feedback in the form of negotiation (without a recast). Both types of feedback follow the NNS's nontargetlike utterance. In example (a) the NNS's modified response takes the form of a question. In example (b) the response is not a modified question form.

Second Language Development. Question forms were chosen as the measure of development, the dependent variable in the current study, because previous research had shown that they were readily elicited (Mackey, 1994a, 1995; Spada & Lightbown, 1993) and that different question forms were present at all stages of learning, and because question forms fall into the category of complex structures that some researchers have suggested may be affected by interaction (see, e.g., Pica, 1994). Additionally, empirical research for the stages of acquisition of question formation is relatively robust (Mackey & Philp, 1998; Pienemann & Johnston, 1987; Pienemann, Johnston, & Brindley, 1988; Pienemann & Mackey, 1993; Spada & Lightbown, 1993), and they have been fairly well studied in terms of their phonology, morphosyntax, and semantics. Also, the issue of readiness to acquire certain forms could be controlled.

All question forms targeted in treatment and tests were part of the developmental sequence for question formation in ESL identified by Pienemann and Johnston (1987) and illustrated in Table 2.[4] This sequence was adapted by Spada and Lightbown for their 1993 study of the effects of instruction on question formation and used by Mackey (1995) and Mackey and Philp (1998).

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Table 2. Examples of question forms and developmental stages

Stage	Description of stage	Examples
2	SVO Canonical word order with question intonation	*It's a monster?* *Your cat is black?* *You have a cat?* *I draw a house here?*
3	Fronting: *Wh*/Do/Q-word Direct questions with main verbs and some form of fronting	*Where the cats are?* *What the cat doing in your picture?* *Do you have an animal?* *Does in this picture there is a cat?*
4	Pseudo Inversion: Y/N, Copula In yes/no questions an auxiliary or modal is in sentence-initial position. In *wh*-questions the copula and the subject change positions.	(Y/N) *Have you got a dog?* (Y/N) *Have you drawn the cat?* (Cop) *Where is the cat in your picture?*
5	Do/Aux-second Q-word → Aux/modal → subj (main verb, etc.) Auxiliary verbs and modals are placed in second position to *wh*-questions (and Q-words) and before subject (applies only in main clauses/direct questions).	*Why* (Q) *have* (Aux) *you* (subj) *left home?* *What do you have?* *Where does your cat sit?* *What have you got in your picture?*
6	Cancel Inv, Neg Q, Tag Q (Canc Inv) *Can you see what the time is?* Cancel Inv: *Wh*-question inversions are not present in relative clauses. Neg Q: A negated form of *do*/Aux is placed before the subject. Tag Q: An Aux verb and pronoun are attached to end of main clause.	(Canc Inv) *Can you tell me where the cat is?* (Neg Q) *Doesn't your cat look black?* (Neg Q) *Haven't you seen a dog?* (Tag Q) *It's on the wall, isn't it?*

Development was operationalized as movement through this sequence. Only development in terms of question forms was investigated. Pienemann and his colleagues suggested that two different usages of two different structures is sufficient evidence that a stage has been acquired. The current study imposes the more stringent criterion of requiring the presence of at least two examples of structures in *two* different posttests, to strengthen the likelihood that sustained development had occurred.

Materials. The tasks used in this study were developed to (a) provide contexts for the targeted structures to occur and (b) provide opportunities for the interactional adjustments described above to take place. The tasks were used for both tests and treatment. They were produced and tested in a number of research projects with both adults and children (Mackey, 1994a, 1994b; Pienemann & Mackey, 1993). Conversational tasks with face validity as familiar classroom materials, for example, "spot the difference," were used to promote

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Table 3. Task materials used for tests and treatment

Task	Description	Structures targeted
Story completion	Working out a story by asking questions	*Wh*-questions, *Do*/Aux questions, SVO questions, Neg/*Do*-second questions
Picture sequencing	Discovering the order of a picture story	SVO questions, Negatives (Neg & SVO and Neg & verb)
Picture differences	Identifying the differences between similar pictures	*Wh*-questions, Copula inversion questions, Yes/no inversion questions, *Wh/Do*-fronting questions, Negatives (Neg & SVO and Neg & verb), Neg/*Do*-second questions
Picture drawing	Describing or drawing a picture	*Wh*-questions, Copula inversion questions, Yes/no inversion questions, *Wh/Do*-fronting questions, Negatives (Neg & SVO and Neg & verb)

production of the targeted forms. Examples of the task types, classification features, and structures that they targeted can be found in Table 3.

Participants.

ESL learners. Participants in this study were 34 adult ESL learners from a private English language school in Sydney, Australia. Participants were selected at random on the basis of enrollment in lower proficiency level programs in the school. Total enrollment in these programs was 147 students, who all had the option of volunteering for the study or writing an essay for extra credit. They all volunteered for the study. All participants were from beginner and lower-intermediate intensive English language classes. Participants were from various L1 backgrounds (including Korean, Japanese, Spanish, French, Arabic, Cantonese, Mandarin, Indonesian, Thai, and Swiss German). There were equal numbers of male and female participants. Their ages ranged from 16 to 32 years. Length of residence was 6.1 months on average. Length of residence corresponded with amount of instruction in Australia, although not in the country of origin. In terms of level, 27 participants were classified by the school as lower-intermediate and 7 participants were classified as beginners. A before and after proficiency test[5] was administered to confirm the school's rating. All participants scored within a similar range for their level. The lower-intermediate participants were randomly assigned to four groups: three treatment and one control group. The beginner participants were assigned to a group that received identical treatment to one of the experimental groups but was at a lower developmental level. The average length of resi-

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dence for this low-level group was 1.7 months. The study took place during the summer vacation when students were not receiving formal instruction.

Native speakers. The native speakers included six native speakers of English. There were four females and two males. The native speakers were between the ages of 24 and 36. Test and treatment sessions were counterbalanced so that all learners were randomly assigned to interact with all NSs. The NSs were trained in the use of the pre- and posttest task materials. This training consisted of the following: (a) reading a written overview of the tasks and a description of the targeted structures, (b) viewing videos of the tasks being carried out by NSs and Spanish L1 children, (c) reading transcripts of the tasks being carried out by adult NSs and NNSs, and (d) carrying out examples of each of the different task types in NS pairs. This training was carried out 2 days prior to the beginning of the study. Step (a) was repeated the evening before each session.

Design

Interactors: Interactionally Modified Input through Tasks (n = 7). This group carried out the tasks in NS-learner pairs. The learners asked whatever questions were necessary in order to carry out the tasks and the NSs answered, asking their own questions when necessary. This treatment was termed "interactionally modified input." Any interactional adjustments that took place in response to communication breakdowns arose naturally through the interaction.

Interactor Unreadies: Interactionally Modified Input through Tasks (n = 7). This group received the same input as the interactors. In terms of their developmental level (Pienemann & Johnston, 1987), these participants were lower than the other groups and were not developmentally ready to acquire structures at the highest level. The group was termed "Interactor Unreadies" because they were different from the interactors group only in that respect of readiness.

Observers: Watch Interactionally Modified Input (n = 7). This group observed the same input that was given to the interactors. They had a copy of the same pictures for the task that was being carried out and could hear and see both the learner and the NS. However, they were not permitted to interact in any way. It was considered important to monitor the involvement and attention that this group paid to the task. A pilot study had shown that some observers were observing other things, for example, the scene outside the classroom window, rather than the task, so a post hoc L1 comprehension check was administered. Participants were told that they would need to (a) supply the missing information for the task completion (usually one simple sentence, e.g., *The cat ate the lost dinner*) in their L1 and (b) draw the picture that had been described.

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Table 4. Experimental procedure

Week	Day	Test/ treatment	Activity	Examples
1	1	Pretest	Picture differences	3 examples
1	2	Treatment 1	Story completion	1 example
			Picture sequencing	1 example
			Picture drawing	1 example
1	3	Treatment 2	Story completion	1 example
			Picture sequencing	1 example
			Picture drawing	1 example
1	4	Treatment 3	Story completion	1 example
			Picture sequencing	1 example
			Picture drawing	1 example
1	5	Posttest 1	Picture differences	3 examples
2	5	Posttest 2	Picture differences	3 examples
5	5	Posttest 3	Picture differences	3 examples

Scripteds: Premodified (Scripted) Input through Tasks (n = 6). This group carried out the same tasks in NS-learner pairs. However, the input that the learners received from the NSs was premodified using the system outlined in such studies as Pica, Young, and Doughty (1987), Pica (1992), and Gass and Varonis (1994). This system produces a script that was followed by the NSs. The NNSs interacted naturally. In effect, the instructions were so detailed that communication breakdowns and negotiation for meaning were rendered highly unlikely.

Control (n = 7). It is widely accepted that taking part in a number of tests may provide a so-called *training effect*. The control group therefore received no treatment so that any gains or changes in performance could be compared to any gains or changes in other groups.

Procedure

Each test and treatment session lasted approximately 15–25 minutes.[6] The study consisted of one session per day for 1 week, one session 1 week later, and a final session 3 weeks later. Both the treatments and the tests consisted of different examples of information-gap tasks, as can be seen in Table 4. Order of task presentation was counterbalanced. Working in NS-NNS dyads, participants were given three tasks to perform. In the test sessions, participants carried out "spot the difference" tasks, in which each participant had a similar picture with 10 differences. The pictures were hidden from the view of the partner. The NNS was required to find the differences between the two pictures by asking questions. In the treatment sessions, participants performed three tasks. These were a picture-drawing task, a story-completion task, and a story-sequencing task. A variety of tasks was used to allow a range of contexts to occur for eliciting the targeted forms.

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Table 5. Sustained stage increase by group

	Interactors	Controls	Interactor unreadies	Scripteds	Observers
Percent	71%	14%	86%	16%	57%
Ratio	(5/7)	(1/7)	(6/7)	(1/6)	(4/7)

Coding

The pre- and posttests were coded for the two measures of development: (a) developmental stages of participants, and (b) different stages of questions produced. Seventy-four hours of data were coded and used for this study. A selection (25%) of these transcriptions was coded by two other researchers (across all utterances). Interrater reliability was calculated using simple percentage agreement. Agreement for the coding of questions in the tests was 95%.

RESULTS

Developmental Stage Increase

Table 5 reflects sustained stage increase. As discussed above, in order to be designated as having increased in stage, a subject had to produce at least two different higher level question forms in at least two of the posttests. This sustained stage increase analysis can be described in terms of individuals who changed as well as by percentages. The results for each group in terms of the number and percentage of participants who increased in developmental stage is summarized in Table 5. Figure 1 graphically represents this information. It can clearly be seen that the interactor groups developed the most. The Interactor and the Interactor Unready groups made large gains: 5 out of 7 Interactors (71%) and 6 out of 7 Interactor Unreadies (86%) increased in stage. The Observer group made some gains: 4 out of 7 (57%) showed an increase in stage. The Scripted group and the Control group made very little gains in stage: Only 1 person in each group increased in stage (14% and 16%, respectively).

In order to carry out statistical testing for the central prediction concerning development, a single group that took part in interaction was formed by combining the Interactor and the Interactor Unready groups.[7] The groups that did not take part in interaction (the Observer, Scripted, and Control groups) were also combined. The two groups were compared using the chi-square test. Results showed that the group that took part in interaction was significantly more likely to demonstrate sustained stage increase than the group that did not take part in interaction ($\chi^2 = 7.77$, $df = 1$, $p = .0053$). Figure 2 illustrates this finding.

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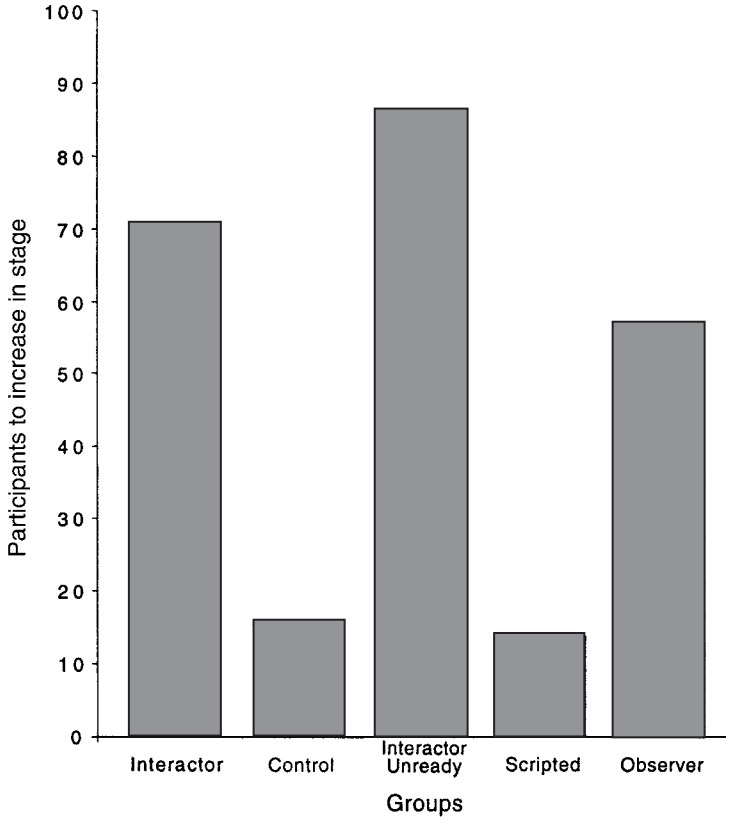


Figure 1. Number of participants to increase in stage in each group.

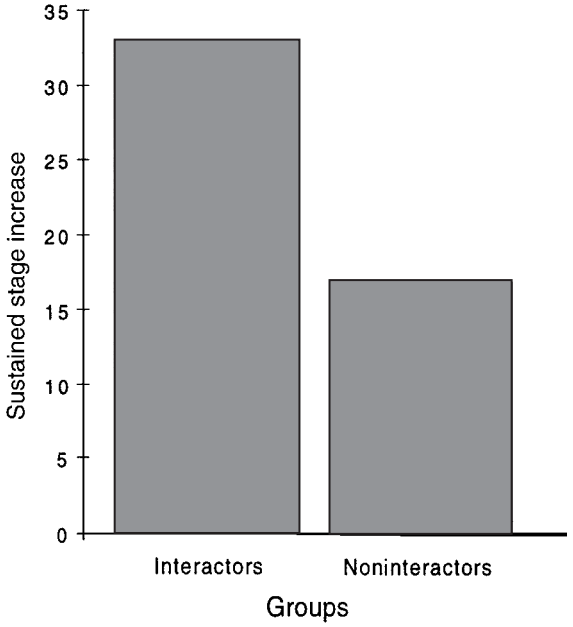


Figure 2. Summary of sustained stage increase for interactor and noninteractor groups.

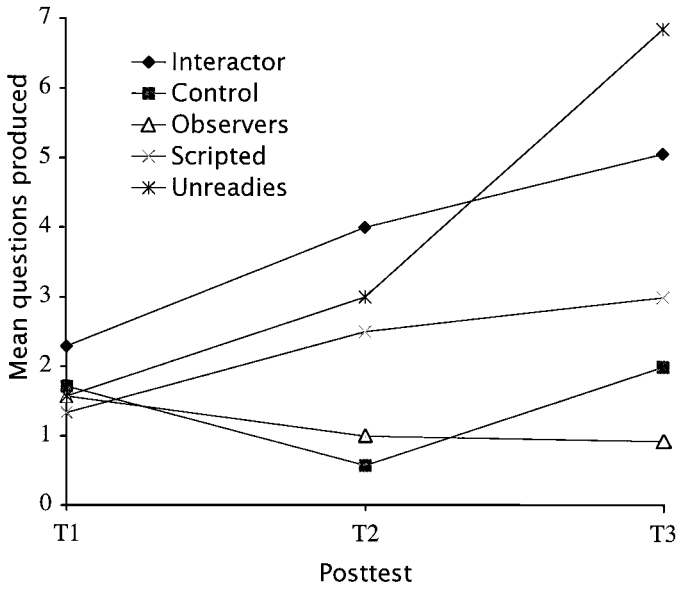


Figure 3. Increase in questions at stages 4 and 5 produced by each group in the posttests.

Developmentally More Advanced Questions

Group and Test Comparison. Because second language development is a complex construct,[8] both overall stage increase and specific question forms produced were analyzed in an effort to achieve a detailed picture of any interlanguage change or any development that took place. The analysis of developmental stage increase was reported above. The next analysis reported will focus on the production of higher level question forms.

The production of each of the groups for questions at stages 4 and 5 in each of the tests was also analyzed. Only questions at stages 4 and 5 are reported because the questions at stages 2 and 3 did not represent developmentally more advanced questions for any of the groups and were thus not a dependent variable in this study. Figure 3 shows the average number of questions (stages 4 and 5 combined) produced by each group at each test relative to initial pretest levels. To directly compare each group on the dimension of interest and change over time, difference scores were calculated by subtracting each participant's pretest scores from their posttest scores. Using difference scores minimizes initial group differences while providing a clear estimate of development, or change over time. The difference scores were analyzed using a 5 (Group) × 3 (Posttest) repeated-measures ANOVA. There was no main effect of Group, $F(4, 29) = .786$, $MSE = 42.5$, $p = .5$; however, there was

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a marginally significant Group × Test interaction, $F(8, 58) = 1.99$, $MSE = 5.89$, $p = .080$. Examination of Figure 3 shows that, although all groups appear to slightly increase production of question forms during the first posttest, it is only the two interactor groups and the Scripted group that appear to maintain this increase during the subsequent tests. Although the Scripted group shows a very shallow rate of increase between posttest 2 and posttest 3, the two interactor groups appear to increase their rate of development across all tests.

Although the Control and Scripted groups do show some signs of increased production, the Observers, the only group not to actively participate in any form of interaction, have a flat or slightly negative trajectory of development. However, the fact that four of the five groups do show some increase in number of structures development is reflected in a significant main effect of Test, $F(2, 58) = 5.56$, $MSE = 5.89$, $p = .006$.

Group Analysis. To further explore these patterns of development, separate one-way repeated-measures ANOVAs were conducted for each group. These analyses examined the production of stage 4 and 5 question forms at each of the four test intervals. Significant differences in production of questions at stages 4 and 5 were only found for the groups that took part in interaction. These changes are described in more detail below.

Observer, scripted, and control groups. A one-way repeated-measures ANOVA was conducted for the Scripted group comparing their production of structures at stages 4 and 5[9] across the four tests. Despite the trends apparent in Figure 3, there was no evidence of significant change across the four testing periods, $F(3, 15) = 1.8$, $MSE = 5.94$, $p = .19$. The same analysis was carried out for the Control group, $F(3, 18) = 1.3$, $MSE = 10.78$, $p = .32$, and the Observer group, $F(3, 18) = .236$, $MSE = 5.85$, $p = .87$, with neither showing any evidence of an increase in question-form production.

Interaction group: Questions at stages 4 and 5. A one-way repeated-measures ANOVA for the Interactor group, in contrast, provided clear evidence of change over time, $F(3, 18) = 4.3$, $MSE = 8.66$, $p = .018$. As can be seen in Figure 4, this change took the form of a general tendency for production to increase at each time interval. This tendency is reflected in a significant linear trend, $F(1, 18) = 12.07$, $MSE = 8.66$, $p = .002$. However, further analysis of this trend indicates that question-form production does not begin to significantly differ from pretest levels until posttest 2, $F(1, 18) = 8.44$, $MSE = 8.66$, $p = .009$. A very similar pattern of results emerged with the Interactor Unready group. Although this group produced a greater number of question forms than the Interactor group, their overall development was less systematic, which resulted in a significant, though somewhat weaker, main effect of test interval, $F(3, 18) = 3.22$, $MSE = 11.39$, $p = .048$. Again, there was a significant linear trend, $F(1, 18) = 9.49$, $MSE = 11.39$, $p = .006$, but question-form production for this group did not significantly differ from pretest levels until the final posttest, $F(1, 18) = 9.06$, $MSE = 11.39$, $p = .008$.

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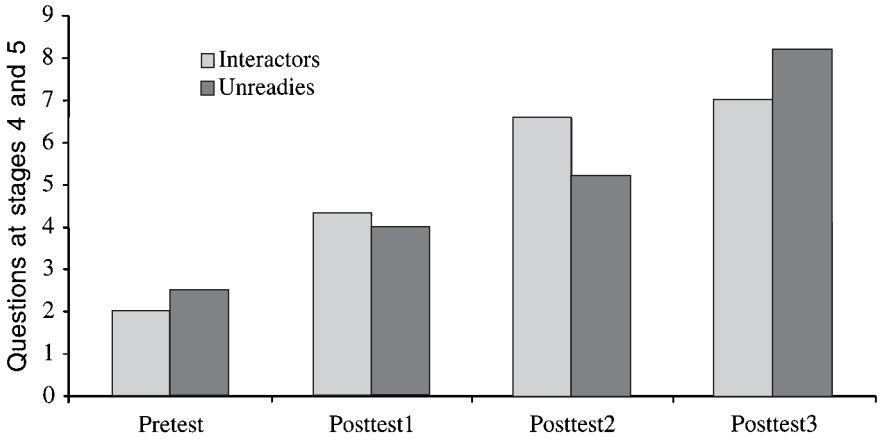


Figure 4. Production of questions at stages 4 and 5 by the interactor groups.

DISCUSSION

To summarize, the results of this study show that the central prediction was confirmed. Conversational interaction did facilitate second language development. This can be seen in the finding that only the groups that actively participated in the interaction demonstrated clear-cut evidence of development. These interactor groups: (a) increased significantly in terms of developmental stage, as measured by the chi-square test, and (b) produced significantly more higher level structures, as shown by the one-way ANOVAs. Taken as a whole, both measures of development demonstrate unequivocally that the interactor groups developed.

The results also confirmed the related prediction—that the extent of the increase would be related to the nature of the interaction and the role of the learner. Research on interaction reviewed in the introduction to this paper suggests that learners who actively participated in interaction would receive the most benefit and that learners who did not actively participate—for example, those who observed interaction without taking part in it, or who took part in scripted interaction—would receive less benefit. In the current study, it was useful to have measured development in terms of both movement of subjects between stages and numbers of higher level structures produced. The Observer group, who watched interaction but did not participate in it, did change somewhat on measure (a) in that four out of seven participants increased in developmental stage. However, when the Observer group was compared with the other groups, as shown in Figure 3, a slightly negative trajectory can be seen: Even the Control group was marginally higher than the Observers. Also, on measure (b) there was no significant increase in the amount of higher level structures produced by the Observers. The Scripted group, who participated in interaction but did not negotiate, showed no

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change on either measure (a), the developmental stage, or on measure (b), for higher level structures produced. To summarize, then, the Observer and Scripted groups behaved in a similar way to the Control group, who changed very little. None of the groups demonstrated unambiguous development except the Interactors.

Active Participation in Interaction

This study suggests that actively participating in conversational interaction has a positive effect on the production of developmentally more advanced structures. Learners who interacted with a NS using goal-based tasks that encouraged negotiated interaction involving a range of question forms increased in both their production of those question forms at higher levels and their developmental stage. Interaction without active participation—that is, watching interaction or taking part in interaction without negotiation—had some limited effects, and may have been better than nothing at all, but did not result in development.

To illustrate this finding, four examples are presented below. These are extracts from the pretest, the treatment, and the posttests of one learner from the Interactor group. This group showed a significant increase in stage 5 questions in the second posttest. This learner was at stage 3 in terms of developmental level before treatment and at stage 5 after treatment. The examples from this learner illustrate the general pattern of an increase in production of structures at higher developmental levels that was reflected in the finding that interaction can facilitate development. The examples also illustrate the process of negotiation for meaning whereby interactional modifications can bring about structural modifications (Gass, 1997; Long, 1996; Pica, 1994).

In the pretest, the task was based on pictures showing that an elaborate dinner had been prepared but disappeared. The missing information was that the cat had eaten the meal while the cook answered the door. In the treatment session, the task was based on pictures that showed a child crying during a trip to the zoo. The missing information was that the reason the child was crying was because of a sign indicating that there would be no bears on view. No stage 5 forms were produced by this learner in the pretest, despite contexts for their occurrence. In all the examples below, the learner was trying to find out what happened in different versions of an information-gap task. In the pretest, the forms used predominantly by this learner are at stage 2. In the extract from the pretest, the learner produced three stage 2 questions; canonical word order sentences with rising intonation, for example, *The meal is not there?* In the treatment, the learner used four stage 3 questions, for example, *What the animal do?* These involve fronting of *wh*-units. In both the pretest (turn 56) and the treatment (turns 7 and 11), the learner heard and had the opportunity to answer three stage 5 questions that were asked by the NS, for example, *What do you have in your picture?* Stage 5 questions involve placing

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auxiliary verbs and modals in second position after question words and before the subject. In turn 9, the learner heard a stage 5 question repeated by the NS, following the learner's signal of negotiation in turn 8. This interactional modification resulted in the learner receiving an additional targetlike version of the stage 5 question produced in turn 7. In the first posttest, the learner produced a stage 5 form for the first time. In the second posttest the learner produced two stage 5 forms, both of them targetlike in form.

(4) Pretest
55 NNS: *The meal is not there?*
56 NS: *No it's gone, what do you think happened?*
57 NNS: *Happened? The cat?*
58 NS: *Do you think the cat ate it?*
59 NNS: *The meal is the is the cat's meal?*
60 NS: *It's not supposed to be the cat's dinner. I don't think so.*
61 NNS: *But although this, this cat have eaten it.*

(5) Treatment
4 NNS: *What the animal do?*
5 NS: *They aren't there, there are no bears.*
6 NNS: *Your picture have this sad girl?*
7 NS: *Yes, what do you have in your picture?*
8 NNS: *What my picture have to make her crying? I don't know your picture.*
9 NS: *Yeah ok, I mean what does your picture show? What's the sign?*
10 NNS: *No sign? . . . No, ok, What the mother say to the girl for her crying?*
11 NS: *It's the sign "no bears" that's making her cry. What does your sign say?*
12 NNS: *The sign? Why the girl cry?*

(6) Posttest 1
NNS: *What do your picture have?*

(7) Posttest 2
NNS: *What has the robber done?*
NNS: *Where has she gone in your picture?*

In these examples, it can be seen that developmentally more advanced structures were produced by this learner after the treatment. In the treatment, the learner was provided with examples of stage 5 questions. These examples were both negotiated and nonnegotiated. The learner attempted a stage 5 question (turn 10) in this extract from the treatment. In the first posttest extract, the learner produced a nontargetlike stage 5 question. In the second posttest extract, the learner produced two targetlike examples of stage 5 questions.

By taking part in interaction, this learner received examples of advanced structures. Through interactional modifications that arose through negotiation of meaning, some of those structures were repeated or rephrased. The learner also had the opportunity to produce questions and receive feedback through the answers. Structures that were more developmentally advanced were produced after treatment. This pattern was true for the two groups of learners who took part in interaction.

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Observing Interaction Had Some Limited Effects on Development

Although they could not take part in the interaction, the Observer group did have the opportunity to hear the forms negotiated, segmented, repeated, and recast in the interaction. These are all processes hypothesized by Pica (1994) to be potentially helpful in language learning. In watching interaction, the Observers also had the opportunity to hear the output (Swain, 1995) of the learners. These opportunities may explain the limited increase on one measure, that of developmental stage, by this group. Also, the pushed output observed by these experimental learners may have been more intensive than pushed output that might occur as part of interaction that was not task-based, in the classroom, for example (see Lyster, 1998a). As discussed earlier, a post hoc comprehension check was administered to the Observer group in their L1. To complete the check, learners needed to supply the missing information necessary to complete the task. Although this did not provide them with opportunities for output in the target language, it did ensure that the Observers were paying attention to the input. For example, one of the tasks observed was a picture-drawing task, in which the NS provided information to the learner about a picture that the learner had to draw, and the learner asked questions to ensure that it was understood. The Observers also had to draw the picture but had only their observations of the interaction to provide the input. The completed picture served as a comprehension check. Analysis showed that, in almost all cases (98%), the Observers successfully completed the tasks, producing accurate drawings or missing information, thereby showing that they were listening to the input. Thus this finding is considered worthy of replication studies that might add different amounts and types of observed interaction, and that might attempt to ascertain the role of attention in this process.

Premodified Input (without Opportunities for Negotiation) Had Some Limited Effects on Development

The Scripted group interacted with a NS who was following a text and who essentially read directions to them. The text had been premodified to minimize the possibility of any breakdown in communication. If a learner did not understand the directions, the NS repeated them or moved on to the next part of the task.

In examples (8) and (9) from the treatment sessions, the differences in the interaction for the Scripted group and the groups that took part in interaction (or observed it) is illustrated. The learners are carrying out a picture-drawing task. The object being drawn in both cases is a pear. It can be seen that, for the Scripted group, the premodified input provides enough information for the word *pear* to be understood. It is clear that this kind of premodification can positively affect comprehension. Incomprehensible input (White, 1987) is not

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a feature of this premodified input. It is also clear that, when comprehension is achieved, there is little opportunity for the negotiation of meaning process.

(8) Scripted group
18 NS: *and now under it draw a pear. A pear is a fruit. It is like an apple. The color is green. Draw the pear under the book. Can you draw it?*
19 NNS: *Ok ok I got it. Look like apple* (draws).
20 NS: *Good. Now on the right of the pear draw an umbrella.*

(9) Interactor group
78 NS: *Underneath it is a pear, it's green.*
79 NNS: *What is it a bear?*
80 NS: *A pear, pears are fruit, it's a fruit, juicy like an apple.*
81 NNS: *Ok pear, fruit like Japanese fruit nashi very delicious. You saw this in Japan? Have you eat one?*
82 NS: *Yeah I did but a nashi is round yeah? Pears are round on the bottom, narrow on top. Have you eaten one here in Australia?*
83 NNS: *Yes thank you. I had a pear in my lunch (time) not . . . juicy?* (draws) *Like this?*

There are considerable differences in the interaction engaged in by the two learners. However, both learners successfully complete the task. The learner in the Interactor group receives far more varied input and produces a great deal of pushed output (Swain, 1985, 1995).

First, in turns 78–80, the learner in the Interactor group receives the information that the plosives /p/ and /b/ are hard to distinguish and successfully produces the voiced plosive in her output. In turn 80, she receives the same simile as the learner in the Scripted group: *like an apple*. In turns 78 and 80, she receives information in both singular and plural forms *pears are round*, *it is a pear*, and *it is green*. In turn 81, she has the opportunity to produce two questions and receive the NS's response. In turn 82, she receives information about the shape of the pear and she also receives indirect negative feedback on her question asked in turn 81 in the form of a targetlike version of her question *have you eat one* with the past participle suffix included: *have you eaten one*. She is also given the opportunity to respond to this question in turn 83: *I had a pear*. She receives an additional adjective, *juicy* (turn 80), and later uses this adjective (turn 83), although it is unclear whether she understands the term as she uses rising intonation, which may signal hesitancy.

By contrast, the learner in the Scripted group receives a very limited subset of this input and more limited opportunities for output. In terms of input, he is presented with the noun in a singular form only and receives the *like an apple* phrase. He also gets information about color and food group. This learner has only one opportunity for output and responds with a signal that he understands. He does not produce the third person singular *-s* form. In terms of the question forms in the interaction, the learner in the Scripted group hears one and does not produce any. The learner in the Interactor

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group hears one and produces four, one of which is a targetlike version of a question she produced.

Effects over Time

It is interesting to note that the significant increase in production of questions for the interactor groups was found in delayed posttests.[10] As noted in the Method section, this study took place over the summer vacation and there was no instruction during the experimental period. There was an increase in production of questions at stages 4 and 5 in the second and final posttests, which were 1 week and 1 month after treatment for the Interactor group; and in the final posttest for the Interactor Unreadies, there were no significant changes for the control group at any time. These findings suggest that an increase in developmentally more advanced structures was not an immediate effect of treatment but a more delayed one.

Why did the developmentally more advanced structures increase in the delayed posttests and not immediately after treatment? Some researchers have noted that it is possible that effects of treatment on development may be delayed. Gass and Varonis (1994) cautioned that "the absence of short term effects does not exclude the possibility of long term effects when the learner has had sufficient time to process and incorporate the feedback" (p. 286). Although the effects described as delayed in this study are in fact only delayed by 1 week and 1 month, the possibility that it may take time for processing and incorporation seems plausible. It is also possible that learners may hold features in memory until they are developmentally ready (Lightbown, 1994, 1998).[11]

Taking Part in Interaction Led to a Clustering Effect

One way that interaction may have facilitated SL development is through providing the learner with practice in the production (or perception) of these structures through repetition. The interaction used in this study often involved learners struggling to produce a particular question form. Through interactional modifications they were able to hear and repeat question forms and often eventually produced their question either in a more targetlike form or in a form that was comprehensible to their NS interlocutors. Many learners used the same question form, often one with which they had previously struggled, in a number of subsequent turns, clustering the form. This clustering process was observed with forms at stages 2 and 3 and, to a lesser extent, stage 4, but it was rarely observed with stage 5 forms.

It is possible that this process was enabling the learners to become familiar with a form by trying it out in a variety of linguistic contexts. It is also possible that learners were developing a form of sociolinguistic or pragmatic competence through the continued use of these forms. Learners may have been com-

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ing to an understanding of which forms are most successful at eliciting the information they need for successful task completion. It is possible that, in addition to morphosyntactic development, another way in which learners were developing through interaction was in terms of learning effective ways of getting the information they needed.[12] It is also possible that learners who clustered question types were experimenting with them in order to find out in which contexts they could use the question forms and discovering limitations on how effective a form was. Learners may have clustered forms that they came to realize were efficient at eliciting task information from the native speakers. In short, the tasks may have been allowing learners to focus on sociolinguistic form as well as on linguistic form. The clustering and increased production of questions at lower levels may have reflected the sociolinguistic explorations of the learner.

Spada and Lightbown (1993) reported a finding that may be similar to the clustering effect described here. In their classroom study, they found a preference for certain question forms by different classes with different teachers. They noted that this was particularly marked in the oral communication tasks for yes/no questions (stage 3), for which 35–65% of experimental students used the form *Do you have a . . . ?* and only 3–11% of the comparison group used this form, preferring instead to front the auxiliary *does* and later *is*. Spada and Lightbown suggested that the individual speech patterns of different teachers is a subject that requires closer scrutiny. Their finding of a pattern suggesting a preference for particular forms by certain classes may be related to what has been termed clustering here. In both cases, lower level structures formed the preferred patterns. In this study, however, the clustering could not be traced to an individual teacher because these groups interacted on the tasks with a number of NSs and learners had a range of different teachers prior to the study.[13] It is possible that learners may have been clustering forms when they were concentrating on new or unfamiliar information such as vocabulary items or producing question forms that were familiar to them and less complex in structure in order to create a lighter cognitive load for themselves and free up more processing space (Gass, 1988, 1997).

Example (10) shows an example of clustering in an extract from the treatment for a learner in the Interactor Unready group. The NS produced a stage 3 *how many* question in turn 8. The learner then produced a stage 3 *how many* question in turn 9. The learner continued to use this *how many* form in the next 5 turns and repeated the question form at close intervals throughout the next 15 turns. The learner seems to have realized that this form worked well to elicit the information required by the task and may have continued to use the form on that basis. However, it is interesting to note that, even when the information needed to complete the task would seem to call for a different question form, the form being clustered is still used. In turns 20 and 26, the learner asked *How many blue sky?* and *How many sun?* From the contextual information present in the picture, it would seem that a blue sky and a sun are more likely to be present in singular than plural forms, unlike the *birds,*

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trees, and *small animals* that the learner previously used with the *how many* form. Other questions at both higher and lower stages would have been more linguistically appropriate to elicit the information about whether or not a sun or a blue sky were present; for example, *Is there a sun?* (stage 4) and *your picture has a sun?* (stage 2). These question types were used (and clustered) by this learner in other treatment sessions. It seems possible, therefore, that the learner could be trying out the *how many* stage 3 form in a variety of linguistically different contexts as well as exploring whether it was pragmatically appropriate.[14]

(10) Treatment

7	NNS:	*You have girl too?*
8	NS:	*Yeah I do, how many girls in yours?*
9	NNS:	*I have a one girl my picture. How many girl?*
10	NS:	*I've got three girls in my picture.*
11	NNS:	*Ok two difference. Another one. How many?*
12	NS:	*How many what?*
13	NNS:	*How many bird birds in you picture?*
14	NS:	*Birds? There are lots of birds. . . .*
15	NNS:	*Ok, same. How many tree?*
18	NNS:	*How many flower in your picture?*
20	NNS:	*In your picture, how many blue sky?*
24	NNS:	*How many small animal?*
26	NNS:	*How many sun?*
32	NNS:	*How many lines . . . sun lines?*

In a different example of the same task used in the pretest, only 11% of this learner's questions were *how many* stage 3 questions. In this task the figure was 51%.

As discussed in the introduction, one of the processes that is claimed to be important for SL learning is that the learners need to notice the gap between their IL form and the target language alternative (Gass, 1991; Gass & Varonis, 1994; Schmidt 1990, 1994; Schmidt & Frota, 1986). It is also claimed that opportunities for noticing the gap are present in interaction. Noticing or attention to form may be facilitated through negotiation. It has been argued that, during negotiation for meaning, when learners are struggling to communicate and engaged in trying to understand and to be understood, their attention is on language form as well as meaning (Gass & Varonis, 1994; Pica, 1994). Negotiated interaction, during which learners' attention may sometimes be drawn to form, provides an important opportunity in which learners may be led to notice a gap between their IL grammar and the target language. A related benefit for interaction is that learners are able to specify what they do not understand at exactly the right time, continuing to signal their requirement for input until they do understand. Through interactional modifications, learners may have the immediate opportunity to receive input on the necessary element of language, which is as extended as they need and can be customized to fit their level.

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CONCLUSIONS

This study addressed the question of whether any relationship could be found between conversational interaction and SL development. This study provides direct empirical support for the claims of the interaction hypothesis (Long, 1996): Interactional modifications led to SL development and more active involvement in negotiated interaction led to greater development. Clearly, the nature of the interaction and the role of the learner are important factors, together with the type of structures that may be affected through interaction.

Inevitably, there are a number of limitations to this study. One of these involves the nature of the interlanguage development that took place. Although it was necessary to operationalize development very narrowly in order to be able to construct tests of the hypothesis, this perspective on development does limit the generalizability of the findings. It would be desirable for future studies to address the issue of interaction and SLA using other measurements of development besides the formation of questions in ESL. Using larger and more diverse groups of subjects is obviously also desirable, as would be more qualitative in-depth explorations. The introspective think-aloud protocols and the construction of tailor-made tasks described by Swain (1995) would seem to be encouraging steps in the latter process (see also Mackey, Gass, & McDonough, in press). Also, the nature of the task-based interaction could be further explored. The conversational interaction in the current study was achieved by using tasks that targeted structures in dyadic NS-learner settings. The negotiation and interactional adjustments that occurred while the tasks were being carried out, although primarily meaning-based, did usually involve use of the targeted forms. Tasks can be both an input and an interactional construct. It is important, as Pica (1992) pointed out, to further explore the relationship between input and interactional modifications. One way to explore this is to focus on the specific contributions of the tasks. It would also be interesting to explore the effects of a wider range of interaction—for example, to explore whether interactional modifications involving other structures also have positive effects on interlanguage development, or whether these results hold for the classroom context or in naturalistic settings. Recent work by Lyster (1998a, 1998b), extending our databases to the second language classroom, for example, is important in this area. It is also important to explore learner-learner dyadic interaction. Another limitation is suggested by Long (1996), who urged caution in the interpretation of findings relating environmental conditions to language learning. He pointed out that many researchers have stressed that care must be exercised not to attribute exclusive causative status to qualities of input to the learner or to qualities of the learner's conversational experience: "The search is for those features of the input and the linguistic environment which best interact with learner-internal factors to facilitate subsequent language development" (p. 39).

This study suggests that one of the features that best interacts with the learner-internal factors to facilitate subsequent language development is

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learner participation in interaction that offers opportunities for the negotiation of meaning to take place. This interaction is effectively obtained through the use of tasks.

As connections between interaction and SL development are being explored, problems concerning the cognitive processes that underlie both interaction and development are coming into focus. It has been known for some time now that taking part in interaction with opportunities for negotiation for meaning can provide comprehensible input, pushed output (Swain, 1985, 1995), and opportunities for noticing the gap (Schmidt & Frota, 1986), and that these are important parts of the language-learning process. It is known that interaction with these conditions can have a facilitative effect on SLA. Empirical research is now beginning to demonstrate that taking part in different types of interaction can have positive developmental effects. Researchers are beginning to isolate some of the particularly useful aspects of interaction and, equally important, some of the SL structures that are susceptible to interaction. However, exactly how these positive effects of interaction on language learning outcomes are achieved is still not known. The interactional processes that are claimed to promote noticing or attention to form are clearly worthy and important areas for future investigation.

As part of this exciting interactional research agenda, many questions can be addressed: How does development come about? What are the cognitive processes involved in recognizing and using feedback? How can insights and research designs from cognitive psychology and psycholinguistics be used to further fuel explorations of interactional processes? More finely grained analyses of the specific contribution of individual interactional features need to be carried out. For example, does the existence, quantity, quality, or nature of learner responses that are modified after feedback affect development? What is the contribution and role in development of positive and negative evidence in interaction? Do learners' perceptions about interaction affect their subsequent development? What is the role of learner-learner interaction in developmental processes? It seems that this area will continue to provide many challenges as well as potentially profitable avenues for future exploration of the interaction hypothesis in SLA.

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NOTES

1. The terms *negotiated interaction*, *conversational interaction*, and *negotiation* have often been used throughout the literature to refer to the same concept. The term *negotiated interaction* is used in this paper.

2. Although a fuller discussion is beyond the scope of this paper, empirical work by Lyster (1998a, 1998b; Lyster & Ranta, 1997) on the use and perception of implicit negative feedback in classrooms as opposed to experimental contexts is clearly an important next step in deciphering the complex puzzle of implicit negative feedback and second language acquisition.

3. The cognitive-science literature on attention, noticing, and potential effects on learning is obviously relevant, although constraints of space preclude further discussion here. See, for example, Cowan (1993) and Tomlin and Villa (1994) for a starting point on this topic.

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4. This table is based on Pienemann and Johnston (1987) and Pienemann, Johnston, and Brindley (1988). (See also Spada & Lightbown's 1993 adaptation; Mackey, 1995; and Mackey & Philp, 1998).

5. This was the Australian Second Language Proficiency Rating Scale (DIEA, 1984).

6. As discussed in the section on materials, previous studies with the tasks (see, e.g., Mackey, 1994a, 1994b) had ascertained that similar ranges and types of structures would be used during the tasks.

7. Owing to the small number of tokens and the nature of this data, it was not possible to carry out a between-groups analysis using the five original groups. Thus, in order to explore the first prediction, the groups were combined.

8. Unfortunately, space does not permit a more complete discussion of the complex nature of development and its relationship to acquisition or learning. The term *development* is used throughout this study in preference to *acquisition* because development was carefully and cautiously operationalized in terms of movement through stages and increased production of more advanced forms in the shorter term.

9. These comparisons were made using raw scores of structures at stages 4 and 5 individually, as well as for the combinations of structures at stages 4 and 5. The combinations of 4 and 5 would be more likely to show change, owing to the increase in contexts and tokens. There was no main effect for test on any comparison. The combination is reported here.

10. It is important to note that, without the delayed posttest design of this study, development would not have been detected.

11. The findings of this study suggest that longitudinal examinations of the effects of structure-focused interaction would be worthwhile. Sato's longitudinal study (see Sato, 1986, 1990) of interlanguage development and the processes of syntactization and conversation showed that various challenges in carrying out longitudinal research can be met.

12. This claim, however, is not meant to constitute an argument that learners first acquire forms and then learn how to use them in appropriate ways. Indeed, this study supports the notion that the processes of communication facilitate the acquisition of linguistic forms (Hatch, 1978; Long, 1996).

13. It should be noted that in this study one of the directions given to the NSs was to try to avoid the case where learners carried out a whole task using only one or two question forms.

14. The responses by the NS to turns 20 and 26 were first *one blue sky* and second *how many sun? one sun*. The second response could be considered to convey the information that the question was not appropriate.

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