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Interaction Mindsets, Interactional Behaviors, and L2 Development: An Affective-Social-Cognitive Model

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This classroom-based study explored links among second language (L2) learners' interaction mindsets, interactional behaviors, and L2 development in the context of peer interaction. While peer interaction research has revealed that certain interactional behaviors (e.g., receiving corrective feedback and engaging in collaborative interaction) assist L2 learning, it is yet unknown why some learners exhibit these interactional behaviors or how learners' affective states impact their L2 development. The participants were two Grade 10 English as a foreign language classes in Chile ($N = 53$). Three data sets were collected: (a) interaction mindset data based on pretask interviews with focus groups from each class ($n = 10$); (b) interaction data pertaining to the communicative tasks of the focus groups; and (c) L2 development data from both classes consisting of oral and written production tests focusing on grammar and lexis. Results indicated that

I would like to thank the anonymous reviewers for their constructive comments and the journal editor, Pavel Trofimovich, for his extremely efficient and skillful editing. I owe Susan Ballinger and Neomy Storch a debt of gratitude for their useful advice on an earlier draft. This project was supported by the Fondo Nacional de Desarrollo Científico y Tecnológico from the Ministry of Education of Chile [1160838] awarded to the author.



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L2 development was mediated by learners' interaction mindsets, which in turn affected their interactional behaviors.

Keywords peer interaction; interaction mindsets; sociocultural theory; social interdependence theory; corrective feedback

Introduction

Peer interaction contributes to second language (L2) development¹ in unique ways. First, research comparing peer interaction and learner–native speaker interaction has reported that learners tend to receive corrective feedback (CF) on their incomprehensible/ungrammatical utterances more frequently when they work on a task with their peers (Gass & Varonis, 1990; Pica, Lincoln-Porter, Paninos, & Linnell, 1996). Learners also tend to modify their initial erroneous utterances when the feedback is given by their peers (Shehadeh, 2001). As corroborated by abundant interactionist research (for reviews, see Long, 2015; Mackey, 2012), these interactional moves facilitate L2 development in the context of peer interaction (McDonough, 2004; for recent reviews, see Philp, Adams, & Iwashita, 2014, and Sato & Ballinger, 2016). Researchers have discussed learners' affective states as a possible explanation for the benefits that peer interaction offers; that is, because learners tend to feel more comfortable and less threatened during peer interaction, they tend to provide more feedback and produce more output (e.g., Sato & Lyster, 2007; Toth, 2008). However, empirical evidence of the relationship between learners' affective states and their interactional behaviors has not been established. Furthermore, peer interaction effectiveness is susceptible to social relationships between the interactants, and certain patterns of relationships have been found to be more conducive to L2 learning than others (Moranski & Toth, 2016; Storch, 2002). While much research has investigated learner relationships with respect to their interactional behaviors (e.g., Fernández Dobao, 2014; Storch & Aldosari, 2013), an experimental study is called for that analyzes social relationships in relation to developmental outcomes.

By operationally defining a L2 learner's interaction mindset as a disposition toward the task and/or an interlocutor prior to and/or during the interaction, the present study examined potential causality links among interaction mindsets, interactional behaviors, and L2 development. On the one hand, it is possible that learners who approach the task with a collaborative interaction mindset tend to provide more feedback to their peers. It is also possible that the ultimate effectiveness of feedback increases when learners are willing to accept their peers' feedback. On the other hand, learners' excessive corrective behaviors

may represent a rather noncollaborative interaction mindset, and this type of feedback may hinder its effectiveness. To this end, the current study collected three data sets: (a) interaction mindset data based on pretask interviews; (b) interaction data from the learners who participated in the interviews; and (c) L2 development data including oral and written production tests targeting several aspects of L2 grammar and lexis, with the aim of exploring links among learners' interaction mindsets, interactional behaviors, and learning outcomes.

Literature Review

Peer Interaction and L2 Learning

The effectiveness of peer interaction on L2 development has been accounted for by two theoretical approaches—interactionist and sociocultural. Research comparing peer interaction and learner-native speaker interaction has reported that while learners are exposed to richer input, for example, in terms of a larger number of words with more grammatical variety during interaction with native-speaking interlocutors (Sato, 2015; but see García Mayo & Pica, 2000, for an exception with high-proficiency learners), they receive more feedback and produce more output during peer interaction. Pica et al. (1996) reported that the frequency of feedback was greater in peer interaction than in learner-native speaker interaction when the interactants encountered a communication breakdown. Alcón (2002) corroborated this finding in the classroom setting where learners employed more requesting strategies with their classmates than with their teacher. In Sato and Lyster (2007), learners provided an arguably more effective type of feedback (i.e., prompts) than other types (e.g., recasts), which led to more modification of their initial incomprehensible and/or ungrammatical utterances in peer interaction. In addition, learners tended to self-correct more while interacting with one another than when they interacted with native speakers (Kormos, 1999; Shehadeh, 2001). Those interactional moves have proven to positively affect L2 development (McDonough, 2004). The benefits of peer interaction have also been shown to be amplified in foreign language contexts where learners lacked sufficient input and feedback from the teacher (García Mayo & Pica, 2000) and where the classroom served a pivotal role for learners to engage in meaningful production practice (McDonough & Chaikitmongkol, 2010).

Some studies, however, reported conflicting findings with regard to the quality of peer CF and its effect on L2 development. Adams, Nuevo, and Egi (2011) investigated interaction between adult English-as-a-second-language (ESL) learners in the United States. The correlation analyses between the frequency of feedback received by learners and their gain scores yielded a

significantly negative correlation between the provision of an explicit type of feedback (i.e., explicit correction) and the development of past tense (especially irregular past tense). The researchers concluded that “feedback may not play as important a role in learner-learner interaction as it plays in NS-learner interactions” (p. 56). On the contrary, in a study where learners were trained to provide feedback to each other, Sato and Lyster (2012) showed significantly positive correlations between feedback and L2 development as well as between modified output and L2 development. Given the polar directions of the correlations in [Adams et al. \(2011\)](#) and in Sato and Lyster (2012), the differential finding in the two studies likely does not reflect the quantity of feedback; rather, it seems that the feedback that the learners gave to each other or how the feedback was processed during interaction was qualitatively different. One possible factor that may have contributed to the quality difference may have been the learners’ affective states. Put differently, because peer feedback is susceptible to social dynamics between the interactants, which might include learners’ distrust in each other’s linguistic abilities, social awkwardness in providing feedback, and embarrassment at being corrected by their peers (see Yoshida, 2008), learners (both providers and receivers of feedback) may have to approach the task and their partners with a collaborative affective state that will allow them to overcome the challenges of these social dynamics in order for feedback to be ultimately effective.

Meanwhile, researchers have drawn on sociocultural theory to explain the learning opportunity in collaborative interaction. From this perspective, scaffolding, whereby “students exteriorize their expertise and offer each other knowledge about language” (Swain, Brooks, & Tocalli-Beller, 2002, p. 175), is essential for learning to occur. While the theory is frequently discussed in relation to the zone of proximal development (ZPD) where a novice learner is provided support by an expert (see [Lantolf & Thorne, 2006](#)), Donato’s (1994) classroom observation of college learners of French revealed that scaffolding was not necessarily unidirectional, from expert to novice, but bidirectional in collaborative peer interaction. As Lantolf and Poehner (2011) put it, interaction in the ZPD is “an extensive and intensive collaborative experience” (p. 29). Scaffolding was conceptualized into four patterns by [Storch \(2002\)](#). First, the researcher coded language-related episodes (LREs) defined as “any part of dialogue where the students talk about the language they are producing, question their language use, or correct themselves or others” (Swain & Lapkin, 1998, p. 326). Then, based on the level of control or authority over the task (equality) and engagement with each other’s contribution (mutuality), Storch identified four patterns of interaction. The cross-analysis of the LREs and individual task

performance after the paired activities showed that when a dyad constructed either collaborative or expert/novice relationships, which entailed high levels of equality and/or engagement, peer interaction could bring about positive effects on language learning; that is, those learners were able to use L2 forms that they had discussed during peer interaction in another context individually, which implied transfer of knowledge.

A burgeoning amount of sociocultural research has shown that learners engage in problem solving and create learning opportunities during peer interaction (e.g., Brooks & Swain, 2009; Fernández Dobao, 2012; Foster & Ohta, 2005; Ohta, 2001; Swain & Lapkin, 1998). Guk and Kellogg (2007) compared teacher-fronted activities and group work in an English-as-a-foreign-language (EFL) class in Korea and reported that scaffolding was more evident in group work than in whole-class teacher–student interactions (see also Toth, 2008). In addition, it has been found that L2 learners use varying scaffolding strategies. In Guerrero and Villamil (2000), two EFL students worked on a peer revision activity in which the reader gave feedback on the writer’s compositions. The analysis of audio-recorded comments during revision processes revealed that, when the ZPD was activated, the reader gave the writer various types of assistance, such as advising, requesting clarifications, and providing mini grammar lessons. This assistance was taken up by the writer over time, and he began to take a more active role, for instance, by initiating revisions by himself. Guerrero and Villamil concluded that scaffolding occurred in a reciprocal manner when both of the learners were allowed “to consolidate and reorganize knowledge of the L2 in structural and rhetorical aspects and to make this knowledge explicit for each other’s benefit” (p. 65). While peer interaction studies conducted from the sociocultural perspective have detailed the way in which L2 learners support each other’s learning and how social dynamics affect the learning opportunities, their generalizability is limited. Specifically, the number of participants has tended to be small (e.g., two learners in Guerrero & Villamil), and the analysis has often been descriptive (e.g., a microgenetic analysis in Guerrero & Villamil). The current study, therefore, included (a) in-depth qualitative analyses of interaction data to examine learners’ social relationships and (b) robust statistical analyses of pretest–posttest data to investigate their L2 learning outcomes.

Proficiency Effects on Interaction

Learners’ proficiency is a variable that has been examined both in interactionist and sociocultural research due to its possible effects on interactional behaviors during peer interaction. Research comparing learner pairs with different

proficiency levels has reported mixed findings (for research comparing pairs with same vs. mixed proficiency, see Kim & McDonough, 2008). [Williams \(2001\)](#) analyzed the amount and types of LREs between adult learners of English. She found that the higher the learners' proficiency level was, the more LREs they produced. Also, the learners with higher proficiency levels scored better on the tailor-made posttest in which the grammatical or lexical items that appeared in the LREs were tested. Williams claimed that learners with higher proficiency could pay more attention to formal aspects of language during task-based interaction and thus were able to provide linguistic support for each other. [Leeser \(2004\)](#) supported this claim, reporting that higher-proficiency learners engaged in more grammatical as opposed to lexical LREs, and they were significantly better in resolving them than the pairs with lower proficiency levels. However, [Iwashita's \(2001\)](#) study with adult learners of Japanese failed to show such an effect for proficiency. She quantified the amount of CF and the subsequent modified output and found a nonsignificant difference between pairs with higher and lower proficiency levels. Moreover, in [Oliver's \(2002\)](#) study of younger learners, the lower the proficiency of a pair was, the more the pair negotiated for meaning (more clarification requests and confirmation checks). Oliver argued that when a learner pair's proficiency is low, there is "a greater chance that communication breakdown will occur and, hence, a greater need for the use of negotiation strategies" that push forward L2 development (p. 107).

One possible explanation for the mixed findings may lie in interaction mindsets. [Watanabe and Swain \(2007\)](#) investigated interlocutors' proficiency levels (by pairing the same learners with higher- or lower-proficiency learners) in relation to the degree of collaboration (via the quantity and quality of LREs). They found that learning outcomes were mediated more by how collaborative a pair was than by the different proficiency levels of partners. [Storch and Aldosari \(2013\)](#) also asserted that, to understand the proficiency effect on L2 learning, "it is not only proficiency difference which needs to be taken into consideration, but also the kind of relationship learners form when working in pairs" (p. 46). Furthermore, [Choi and Iwashita \(2016\)](#) conducted interviews with two low-proficiency learners who had participated in communicative tasks with three other learners grouped by high-proficiency dominance (with three high-proficiency learners), low-proficiency dominance (with one high- and two other low-proficiency learners), and low-proficiency (with three other low-proficiency learners). The researchers reported that the learners' attitudes toward the task, as opposed to the proficiency levels of the interlocutors, affected the type and outcomes of LREs. Amid the importance of collaborative

interaction, a theoretically and pedagogically relevant question is why certain learners tend to engage in more collaborative interaction than others.

Interaction Mindsets

The current investigation proposes and explores the construct *interaction mindset* by operationally defining it as a disposition toward the task and/or the interlocutor prior to and/or during the interaction. It is deemed necessary, therefore, to distinguish this construct from the psychological construct of *mindsets* (or implicit theories), which concerns individuals' beliefs regarding their own traits or goals.

Drawing on the theoretical framework of implicit theories (see Dweck, 2006, and, for a meta-analysis, Burnette, O'Boyle, VanEpps, Pollack, & Finkel, 2013) as well as empirical evidence suggesting the relationship between individuals' mindsets and their academic achievement, such as math and reading (e.g., [McCutchen, Jones, Carbonneau, & Mueller, 2016](#)), L2 researchers have operationalized mindsets in dichotomy—fixed mindset (a belief that intelligence is a fixed trait) and growth mindset (a belief that intelligence can be developed)—and investigated their impact on learners' approaches to L2 learning. Among a limited number of studies is Mercer and Ryan (2010) who operationalized mindsets as “assumptions individuals make about various human attributes, such as intelligence or personality” (p. 437). Mercer and Ryan interviewed 10 foreign language learners, focusing on beliefs regarding the roles of natural talent and effort in language learning. Results suggested that mindsets determined different psychological aspects, such as learning goals, learning processes, and perceptions of other learners' talents. Later, [Mercer \(2012\)](#) refined the definition of *language learning mindsets* as “the extent to which a person believes that language learning ability is dependent on some immutable, innate talent or is the result of controllable factors such as effort and conscious hard work” (p. 22) and argued that mindsets can be dynamic and change over time (see [Yeager & Dweck, 2012](#), for a review in psychology). Subsequent investigations examined whether growth mindsets can be fostered by intervention so that learners develop positive mood and motivation and, consequently, have better L2 learning outcomes (e.g., [Lou & Noels, 2016](#)).

Situated in L2 interaction research, including the interactionist and socio-cultural perspectives, *interaction mindsets* in the current investigation differ from the understanding of *mindsets* in psychology in that interaction mindset pertains to learners' affective states that may guide their social interaction entailing the interlocutor and the task.² While the current study newly conceptualizes the construct of interaction mindset, L2 researchers have investigated

similar (but different) affective states. Specifically, terms such as attitudes, perceptions, emotions, and orientations have been used to describe essentially how L2 learners' affective state is related to their interactional behaviors. The psychological formations reflected in L2 interaction have often been operationalized as learners' engagement within LREs, a construct that may "bring together attention to form with the affective, psychological and social dimensions that support effective learning" (Philp, 2016, p. 385).

L2 researchers have borrowed theories from other fields of psychology in order to understand learner engagement. For instance, drawing on activity theory, which pertains to an idea that human activity is substantiated by motives and goals (Leont'ev, 1981), Storch (2004) focused on the question of why certain pairs of interactants constructed a relationship that was more conducive to learning than others. Thirty-three college-level ESL learners engaged in paired activities, and their patterns of interaction were analyzed in light of the degree of equality and mutuality they exhibited. Storch then used a pretask survey, posttask interviews after each task throughout the intervention period, and exit interviews to understand the underlying reasons for learners constructing different pair dynamics. The combined analyses of interaction and perception data revealed that learners' "perceived goals and roles that determine how an activity will be carried out" (pp. 473–474) were reflected in the degree of engagement, operationalized as reciprocity in giving feedback and sharing of ideas during the task. For example, the learners in a collaborative pair emphasized the benefits of pair work and their intention to complete the task to the best of their ability. Watanabe (2008) interviewed learners after the task, focusing on their perceptions of partners with differing proficiency levels. She reported that, regardless of their partners' proficiency, learners who felt that they could share their ideas during the task tended to produce more collaborative LREs. Having operationalized affective engagement as learners' willingness to participate in interaction, Baralt, Gurzynski-Weiss, and Kim (2016) analyzed posttask questionnaires (see [Svalberg, 2012](#), for the theoretical framework of engagement with language). They postulated that affective factors influence the degree of language awareness observed in the way in which learners pay attention to linguistic forms during peer interaction; that is, the more a learner was willing to participate in interaction, the more attention was drawn to language forms. In these studies, the data pertaining to learners' affective states were collected after peer interaction tasks. This sequence of data collection may have influenced the findings related to causality between learners' affective states and their interactional behaviors. For instance, it is possible that learners who happened to have appreciated the interaction experience expressed positive perceptions.

It is also possible that learners who approached the task with a collaborative interaction mindset contributed to the higher level of engagement during the interaction. Hence, on the one hand, it can be hypothesized that interaction mindset is a dynamic construct that can change during interaction due to the task itself or the social experience with the interlocutor. On the other hand, the previous research designs warrant a study that examines learners' affective states prior to the task.

The Present Study

In conceptualizing the links among learner's interaction mindset, interactional behaviors, and L2 development, social interdependence theory from social psychology may be useful because, unlike the theories used in the L2 studies discussed above, this theory proposes a causal link from one's psychology, interaction with others, to individual achievement (see [Pai, Sears, & Maeda, 2015](#), for a review). The premise of the theory is that the social relationship between group members and the psychological processes that individuals experience while engaging in a group task define the individual learning outcomes. Central to the success of group work is positive interdependence whereby "individuals perceive that they can attain their goals if and only if the other individuals with whom they are cooperatively linked attain their goals" (Johnson & Johnson, 2009, p. 366). The effect of this psychology of cooperation, developed originally by [Deutsch \(1949\)](#), has been widely tested in different areas of development and/or learning (e.g., moral development and psychological health) using both quantitative (often through regression and hierarchical linear models) and qualitative (e.g., discourse analysis) methods. Johnson, Johnson, Roseth, and Shin's (2014) meta-analysis of 629 studies confirmed the link between cooperative group structures (e.g., operationalized as group cohesiveness and friendly interaction) and final achievements, such as critical thinking skills, level of creativity, and retention. Furthermore, the theory proclaims that affective states (either positive or negative) lead to specific types of interaction patterns that subsequently affect learning outcomes. Nihalani, Wilson, Thomas, and Robinson (2010) looked for interaction patterns within group work that determined academic achievement (measured, for instance, by class attendance and quiz scores in educational psychology and statistics classes) and reported that the groups who engaged in "a democratic discussion through which they were able to come to a consensus on a correct answer choice" (p. 522) reached higher achievements.

In the field of L2 teaching/learning, although researchers have discussed the importance of being (or feeling) collaborative in relation to L2 development,

no studies, to my knowledge, have empirically examined the interwoven links. Furthermore, it is an empirical question whether the links established using social interdependence theory in other educational contexts can be observed in the context of L2 development. The present study, therefore, was designed to answer an overarching question as to how learners' interaction mindsets affect their interactional behaviors and L2 development by obtaining three data sets operationally tapping into (a) learners' interaction mindsets (pretask interviews), (b) learning processes (interactions), and (c) learning outcomes (pretests and posttests).

Method

Context

The study was conducted in an EFL context in Chile. In this teaching/learning context, classrooms often contain more than 30 students, English is taught primarily in the learners' first language (L1, Spanish), lessons focus on grammar teaching and vocabulary memorization, and interaction between the teacher and students as well as between the students is limited (see [Kormos & Kiddle, 2013](#), for background and demographic information). In such a context, learners may develop receptive skills (listening and reading) but the development of communicative skills suffers (see Butler, in press). The results of a pilot Cambridge test given by the Ministry of Education in 2004 showed that the scores were so far below the threshold that a new category had to be created to classify the learners. Though a diagnostic test (TOEIC Bridge) given to 240,000 Grade 3 students in 2010 as well as ones administered in 2012 and 2014 showed some improvement (Sistema de Medición de la Calidad de la Enseñanza), the average English proficiency of EFL learners in Chile remains basic.

Although it is evident that a communicative approach is needed in this form-oriented context in order to help develop implicit knowledge (Loewen & Sato, in press; Lyster, 2007), with the government once supporting this direction in the 1990s, Chilean EFL education has reverted to focusing on the development of receptive skills.³ In McKay's (2003) survey of 50 Chilean EFL teachers, 83% of the respondents did not value group work. Rather, they showed appreciation for the national curriculum change in 1998 that shifted the focus from communication back to receptive skills. In general, both the curriculum and teachers are "de-emphasizing the use of CLT [Communicative Language Teaching] on the grounds that it is not appropriate to the local Chilean context" (McKay, 2003, p. 144). One of the concerns shared by the teachers in McKay's study was a skepticism about students' autonomy—students will not work without the teacher's control. Based on a belief that peer interaction creates

an ideal context where learners engage in authentic interaction, especially in foreign language contexts (García Mayo & Azkarai, 2016; Philp & Tognini, 2009; Sato & Lyster, 2012), the current study targeted communicative group work activities and investigated how learners create learning opportunities, operationalized as corrective feedback and collaborative interaction, and how those opportunities are mediated by their interaction mindsets.

Participants

Two Grade 10 (15–16 years old) EFL classes at a private school in Santiago, Chile, participated in the study ($N = 53$). The learners were all L1 speakers of Spanish who had studied English previously in elementary and secondary settings for a mean of 6.3 years ($SD = 1.2$). Following the national curriculum, the school implemented 5 hours of English classes (four 1 hour 15 minute sessions) per week with traditional teaching methods—teacher centered, grammar focused. The school administered biannual diagnostic tests and the current participants' proficiency was classified as B1 (independent users, according to the Common European Framework of Reference) at the end of Grade 9. Although all the learners had scored at the B1 level on the standardized test, the school divided them into three classes based on their course grades from the previous year. In the current study, the lowest and highest classes were chosen and named Class A ($n = 27$: 11 males and 16 females) and Class B ($n = 28$: 14 males and 14 females), respectively.

It is important to note that communicative group work was rather novel to the learners. While one may question the validity of interaction mindset data collected prior to task engagement due to the lack of experience with communicative activities, it was believed that this group of learners was suitable for exploring the link between their interaction mindsets and interactional behaviors because the learners possessed a modest predisposition toward group work formed by their previous experiences. Differently put, the current learners' interactional behaviors were hypothesized to reflect their interaction mindsets that were not contaminated by their past experiences with other tasks and/or other interlocutors.

Intervention

Class A was taught by a Chilean teacher with nativelike English proficiency while Class B had an American teacher who was a native speaker of English. During the intervention period, the classes were conducted entirely in English, which was an effort specific to the current project because classes were normally conducted using a mixture of Spanish and English. Forty

minutes of one of four classes every week was devoted to the intervention for a 4-week period (40 minutes \times 4 weeks, totaling 160 minutes of group work). For the intervention lessons, the classes were divided into groups of four to six students and the students stayed in the same groups during the intervention period.

With the aim of promoting autonomous and collaborative group work, peer interaction activities comprising four stages were developed. In the first stage, students were shown a movie clip that lasted around 5 minutes (Stage 1: Presentation). After watching the segment, they worked together on a fill-in-the-gap sheet in which sentences depicting the clip contained verbs in the base form that students were asked to put in the past tense (Stage 2: Awareness). Unlike a traditional decontextualized fill-in-the-gap task, students referred back to and discussed the movie to complete the task. The third stage was role play in which one of the group members played the main character of the movie and the rest asked questions as journalists (Stage 3: Guided Practice). In the final stage, discussion questions designed to connect the movie and the learners' personal lives were given (Stage 4: Transfer). Students were encouraged to communicate in the target language during all the stages.

All stages were carefully designed to help learners shift their attention to the target linguistic feature (i.e., English past tense) while maintaining their primary focus on meaningful communication. For instance, after the trial scene from the movie *The Shawshank Redemption* (King & Darabont, 1994) was shown, the following sentence among others was given in the awareness stage: "I ____ (go) to a few bars first. Later, I ____ (drive) to his house to confront them. They ____ (be) not home. I ____ (park) in the turnout and ____ (wait)." Then, in the guided practice stage, one of the students acted as the suspect, and the rest of the group took the role of the prosecutor interrogating the person; hence, the learners were guided to use the past tense. In the transfer stage, they were asked to discuss legal stories that they had heard of in real life and exchange their opinions. By providing opportunities for contextualized, meaningful practice (see [DeKeyser, 2010](#)) and implementing task features designed to elicit attention to formal aspects of language, it was hoped that learners would occasionally shift their attention to language forms while maintaining the primary focus on completing the task collaboratively.

Data Collection and Analysis

Interaction Mindsets

One day before the first intervention class, five learners from each class were individually interviewed. They served as the focus groups ($n = 10$).⁴ The

interview method was chosen for collecting interaction mindset data because of its open-ended and exploratory nature, allowing for the emergence of new dimensions in human psychology (Maxwell, 2013). Individual interviews were chosen, as opposed to group interviews, to avoid the possible influence of individuals on group dynamics during the intervention. During these semi-structured interviews, learners were encouraged to elaborate on a set of prepared guiding questions and prompts. The overall questions, adapted from Storch (2004) and Sato (2013), focused on the learners' perceptions related to: (a) peer interaction tasks (e.g., Do you think group work activities are helpful for learning English?), (b) provision and reception of peer CF (e.g., Do you feel comfortable correcting your classmates' mistakes?), and (c) interacting with their peers in the classroom (e.g., Do you enjoy talking to your classmates in English?). The interviews were carefully monitored to avoid altering the learners' interaction mindsets prior to the task engagement (see the interview protocol in Appendix S1 in the Supporting Information online).⁵ Conducted in the learners' L1 (Spanish), each interview lasted 15 to 20 minutes, yielding around 3 hours of interview data. The interview data were first transcribed. Grounded theory methodology (Corbin & Strauss, 2008) was employed so as to reveal what was happening in the data (Glaser, 1978). Specifically, recurring themes were first identified in each transcript (open coding). The themes that emerged were then explored again in the transcripts to increase the validity of the coding.

Interactional Behaviors

The classroom interactions of the focus groups ($n = 10$) were audio-recorded throughout the intervention. The 320 minutes of data (40 minutes per class \times 4 weeks \times 2 groups) were transcribed and coded for three interactional behaviors. First, the frequency of CF was tallied. Excerpt 1 from Class A shows an example of peer CF (all names appearing in this manuscript are pseudonyms). In Line 1, Pablo made a lexical error and Vale corrected the word *hurt* to *ache*. Pablo then modified his original lexical choice and used the correct version.

Excerpt 1

1. Pablo: I told her that I have a the stomach hurt so . . .
2. Vale: Stomach ache.
3. Pablo: *Eso*, stomach ache so I couldn't came out with her.

Excerpt 2 from Class A exhibits another CF episode but this time related to a morphosyntactic error. After José's error concerning third-person

singular *-s*, María gave a clarification request (Line 5). Her intention is not known; nonetheless, her feedback served a corrective purpose as José corrected his original erroneous utterance in Line 6 by adding *-s* to the verb *win*.

Excerpt 2

4. José: I have to say that she wants my money. My mother win more than you.
5. María: What?
6. José: Wins more money than you.

Second and third coding categories were qualitatively explored (for details and justifications of the coding procedure, see Sato & Viveros, 2016). The first conversational pattern was called language-related collaboration (LRC) in which learners together worked on communication and/or linguistic issues. This interaction pattern is operationally similar to LREs but LRC in the current study excluded self-corrections and included interaction in the L1. This was due to the focus of the investigation, namely, collaborative interaction. The second pattern, named collaborative sentence completion (CSC), was identified when a learner struggled to finish his or her utterance and another learner supplied the rest of the sentence. A similar pattern was identified by Foster and Ohta (2005) as co-constructions that allow learners “to participate in forming utterances that they cannot complete individually” (p. 420). This category was different from LRC in that the exchanges were relatively shorter without meaning or form negotiation. Examples of these patterns are included in the following section. Thirty-five percent of the transcripts were coded by two researchers, and the interrater reliability (Cronbach’s α) reached .92.

L2 Development

The pretests were individually administered to all learners ($N = 53$) 3 days before the first intervention and the participants took the posttests 3 days after the last intervention. Speech data were elicited by means of picture description tasks. The participants were given a picture in which multiple events could be identified (e.g., a family camping in the woods) and told that the picture depicted what had happened to them, their friends, and their family last weekend. They were given 2 minutes to include as much information as they could. Similar pictures with different events were used for the pretests and posttests. The speech samples were transcribed by using the CHAT transcription and coding

format under the CHILDES system (MacWhinney, 2012) to allow further lexical analyses.

Two linguistic features were examined. First, the development of English past tense, which corresponds to the linguistic target of the intervention material, was measured. Past tense was chosen based on the observation that Spanish L1 speakers have difficulty acquiring the structure especially when they lack sufficient exposure to it (García Mayo & Villarreal Olaizola, 2011). Percentage scores representing the ratio of correct usage to the total number of obligatory contexts were calculated. Two researchers independently scored 30% of the data set, and the inter-rater reliability using Cronbach's alpha was .95. In addition, learners' vocabulary productivity was analyzed based on the hypothesis that engagement in communicative interaction increases the variability in learners' word repertoires (Stæhra, 2008). Scores of vocabulary size were calculated using CLAN programs. To measure productive vocabulary size, the number of tokens and type-token ratios (TTR) were compared within and across group (for the rationale of this measurement choice, see van Hout & Vermeer, 2007).

In addition, written fill-in-the-blank tests were administered at pretest and posttest. Each test version consisted of 24 sentences with 30 verbs (15 regular and 15 irregular), and each sentence contained a contextual clue eliciting the past tense, such as *last year* (see Marsden & Chen, 2011). The posttest version followed the same format with different verbs. Scores were calculated as the percentage of correct usage.

In order to see the difference between the two groups as well as their change over time, mixed between-within analyses of variance (ANOVAs) were run on four developmental measures (i.e., oral past tense, written past tense, types, and TTR). Using pretest scores in a repeated measures design rather than as a covariate was chosen because (a) the two groups were presumably different in their proficiency levels at the time of the pretest given the way the learners had been placed in the groups by the school, (b) we did not expect to observe Class A outperforming Class B due to the initial proficiency difference, and (c) it was necessary to examine potential change over time (Keselman et al., 1998). The statistical assumptions of ANOVAs were met: Normality was observed in each group in each testing time, and all the Levene's tests were nonsignificant; sphericity was irrelevant as the participants were tested only twice. The alpha level for all tests of significance was set at .05. For post hoc pairwise comparisons, Bonferroni corrections were made. Effect sizes of pairwise comparisons are reported with Cohen's *d* (Cohen, 1988).

Results

Interaction Mindsets and Interactional Behaviors

Recurring themes from the individual pretask interviews were used to understand their interactional behaviors. The themes were: (a) English learning, (b) interaction mindsets toward interlocutor, and (c) interaction mindsets toward task (see more representative interview excerpts in Appendix S2 in the Supporting Information online).

Class A

The five learners chosen from Class A were Pablo, Carla, Vale, Pancha, and Melinda. The first overall interview question asked about the learners' interaction mindsets. All the learners, except Melinda, expressed a belief that group work was beneficial for their learning especially because it would provide them with opportunities to speak in the target language. Pablo, for example, stated (all interview comments are direct translations from Spanish): "We don't have a chance to speak English in English classes. Or, anywhere else. If there is a group activity, I will probably speak in English. It should be good for practicing English." The learners also specified how group work might affect their learning. All of them expressed the opinion that group work would force them to look for vocabulary in English, as summarized by Vale's comment: "We don't know how to say words in English. Maybe, if we worked together, we can find the right word that I don't know." Excerpt 3 represents such a tendency during an actual peer interaction in Class A.

Excerpt 3

7. Pablo: *Trip es . . .* (Trip is . . .)
8. Carla: *Trip es viajar.* (Trip is to travel.)
9. Vale: *¿Cómo va a ser viajar al suelo?* (How can it be to travel to the floor?)
10. Pablo: *¿Cómo dió un pequeño viaje en el piso? ¿Cierto?* (How did he take a small trip to the floor? Right?)
11. Carla: *Yo creo que . . .* (I think that . . .)
12. Pablo: *Se resbaló o algo así.* (He tripped or something like that.)
13. Pancha: *Si, I think, I think.*
14. Pablo: *¡Caerse!* (Fall down!)

First, we notice that turn taking among the four learners was fluid, and none of the members assumed an authoritarian role. Multiple learners tried to solve the linguistic problem—the word *trip*. In Line 7, Pablo initiated this exchange

by expressing that he was looking for the meaning of the word. The initiation was taken up by Carla who proposed her hypothesis (Line 8). Vale jumped in and tried to contribute to solving the issue (Line 9). In Line 13, Pancha acknowledged the contribution made by Pablo. Finally, Pablo, who initiated the exchange, reached the accurate meaning of the word. This type of interaction is categorically similar to a “collaborative pair” in Storch (2002) who is “willing to offer and engage with each other’s ideas” (p. 128).

The interaction mindset pertaining to sharing ideas and supporting each other’s contribution, particularly for vocabulary-related issues, was observed in CSC as well. There were a number of occasions where a learner stopped his/her sentence in order to look for a word. In Excerpt 4, Carla tried to express her idea (Line 15); however, she stopped and repeated an auxiliary verb *doesn’t*. Presumably, her lexical knowledge was insufficient to complete her utterance and she was unable to express her thoughts alone. Then, Pancha and Pablo supported Carla by supplying the words (Lines 16 and 18). Such instances exhibit the way in which learners provide attuned assistance to each other and co-construct knowledge. During the pretask interview, Pancha emphasized that she was “a good communicator” and that she “enjoy[s] helping other students.” Her active supplies of words may be a reflection of her collaborative interaction mindset.

Excerpt 4

- 15. Carla: He answered I don’t know! And the guard doesn’t, doesn’t.
- 16. Pancha: Permit.
- 17. Carla: So the wine is good for your . . .
- 18. Pablo: Health.

Another theme that emerged from the interviews was the learners’ willingness to work together. All the learners, except Melinda, shared the idea of *fun* or *excitement* when they were asked about their general opinions about group work. Excerpt 5 is another example of LRC in which CF was also coded (Line 20). This exchange also exhibits this group’s fluid and collaborative turn taking, as can be seen in their offering support to each other and acknowledging one another’s contribution. Not only did they successfully solve the grammatical issue but they ended the exchange with a remark suggesting that they were enjoying working on the task together.

Excerpt 5

- 19. Pablo: He didn’t watched TV?
- 20. Pancha: Watched TV.

21. Carla: *¿No era que cuando era negativo el verbo quedaba igual?*
(Wasn't it that when the sentence is negative, the verb stayed the same?)
22. Pancha: *Parece que sí.* (It seems so.)
23. Vale: *¿Quedaba en infinitivo?* (It stayed in infinitive?)
24. Pancha: Ah . . . yeah yeah.
25. Pablo: *Sípo, el pasado está en el didn't.* (Yep, the past tense is in didn't.)
26. Carla: Of course! Oh my god! I'm speaking in Spanish! I am sorry!

In sum, in Class A, the learners expressed their collaborative interaction mindsets, except Melinda. In fact, Melinda, who described herself as shy and expressed her concern about group work being socially awkward, did not participate in either LRC or CSC at all.

Class B

The five learners from Class B were Isidora, Matías, Jorge, Camila, and Boris. The first recurring theme in this group was related to their overall opinions about their English class. While the interview questions asked them to elaborate their feelings about group work, all the learners turned back to describing their reluctance to participate in any type of activities in the class. Matías expressed that he did not see the point of learning English: "We don't need English because we speak Spanish." Isidora said that she did not "like the English class because the teacher is boring." Boris's comment was directly related to learning: "I don't feel that I am learning anything from that class." Their interaction mindsets regarding group work were also noncollaborative overall: "I'd feel funny if I need to talk to my classmates in English" (Matías); "I think we will teach wrong English to each other" (Boris); "I want to communicate with the teacher if I need to speak English" (Camila). Excerpt 6 shows an interaction pattern, which was coded as neither LRC nor CSC, frequently observed in this group.

Excerpt 6

27. Jorge: Who will be the guilty men? You are going to be the guilty one. You.
28. Matías: No.
29. Isidora: I'm the guilty one. Who is the suspect of the murder? I . . . I . . . I . . .
30. Matías: No, no, no. I'm the guilty one.

In this exchange, the learners tried to complete the task by working together. However, Matías controlled the direction of the group while the other members did not have much opportunity to contribute to the exchange. Also, the learners disregarded what other members had to say. In Line 29, Isidora tried to express herself and stopped. Despite her struggle, no matter what the cause, Matías rejected her statement and insisted on his idea (Line 30). This type of relationship can be identified as passive/dominant according to Storch's (2002) categorization. Storch asserted that during this type of interaction, "the level of equality and mutuality are both moderate to low" and the dominant participant "takes an authoritarian stance and seems to appropriate the task" (p. 129).

Excerpt 7 shows a typical way of dealing with grammatical issues in this group. This exchange was coded as LRC and also CF was identified. First, Camila produced an error related to past tense, to which Boris provided CF (Line 32). Camila rejected Boris's CF and proposed another hypothesis. Meanwhile, Jorge continued working on the task regardless of what was going on between Camila and Boris. Camila insisted on her idea—the past tense in negation being *had*—and Matías agreed with her (Line 36). Boris also insisted on his idea, which was grammatically correct. Meanwhile, Jorge was focused on himself and completed his utterance (Line 40). Finally, Camila moved on by ignoring Boris' assistance and by going back to her original erroneous utterance (Line 41). Despite her persistent rejection of Boris's idea, Camila produced the correct form later during the lesson.

Excerpt 7

31. Camila: Well, he haven't, no?
 32. Boris: No, he didn't have.
 33. Camila: No. Had.
 34. Jorge: Nick didn't . . .
 35. Camila: Had.
 36. Matías: Had.
 37. Boris: No, didn't, because didn't is in the past. Didn't have.
 38. Matías: Had.
 39. Boris: Have. Didn't have.
 40. Jorge: Didn't hit the machine.
 41. Camila: He haven't pants.
 [11 minutes later]
 42. Camila: She didn't have a pants.

The effectiveness of peer CF can be argued for by Camila's delayed modified output. It is also possible that Jorge incorporated the CF, although he was not directly involved in the CF episode (i.e., he did not make the error). Nonetheless, the way in which they engaged in language exchanges was not collaborative in nature. In general, in this group, the learners' interaction mindsets—reluctance to engage in group work activities, social awkwardness in speaking English with their peers, and distrust in each other's L2 knowledge—were reflected in actual interaction as disengagement with each other's ideas, authoritative attitudes when encountering task-related and language-related issues, and rejection of CF.

Class A Versus Class B

In the 160-minute peer interaction data of the focus group from Class A, 32 instances of CF were identified. The learners in Class B provided CF nine times in total. Overall, the majority of CF was lexical (68%), but the learners gave CF on pronunciation (20%) and morphosyntactic (12%) errors as well. In terms of collaborative interactions, the learners in Class A engaged in LRC 21 times, while the group from Class B engaged in such interactions 9 times. Regarding the CSC instances, the learners in Class A supplied words or phrases to each other 13 times, while those in Class B did so 8 times. In sum, the results showed that learners' interaction mindsets toward peer interaction activities and toward group members (whether they were collaborative or not) accurately reflected how they interacted with each other. In addition to the link between learners' interaction mindsets and their interactional behaviors, the quantitative comparison revealed that the collaborative behaviors occurred more in Class A than in Class B.

L2 Development

Past Tense

The ANOVA targeting the correct usage of past tense during the oral tests yielded a significant main effect for time, $F(1, 43) = 4.81, p = .034, \eta_p^2 = .10$. Also, a significant interaction effect was observed, $F(1, 43) = 4.21, p = .046, \eta_p^2 = .09$. The post hoc pairwise comparisons revealed significant differences between the two groups at the time of both the pretests ($p < .001, d = 1.90$) and posttests ($p = .001, d = 1.10$). The comparisons between the pretests and posttests, however, showed a significant increase in Class A ($p = .005, d = 0.81$) but not in Class B ($p = .920, d = 0.03$).

The ANOVA targeting the written test scores also revealed a significant main effect for time, $F(1, 47) = 6.23, p = .016, \eta_p^2 = .12$, and a significant interaction

Table 1 Means and standard deviations for the L2 development test scores (past tense)

Test	Pretest				Posttest			
	Class A		Class B		Class A		Class B	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Oral	36.96	19.90	74.02	20.02	53.46	22.02	74.57	17.37
Written	67.41	11.43	81.98	11.60	80.28	7.00	81.80	19.82

effect, $F(1, 47) = 6.58, p = .014, \eta_p^2 = .12$. The pairwise comparisons yielded a significant difference between the two groups at the time of the pretest ($p < .001, d = 1.29$). However, at the time of the posttest, this difference became nonsignificant ($p = .715, d = 0.11$). Similar to the oral test, the comparisons over time detected a significant change only in Class A ($p = .001, d = 1.39$) but not in Class B ($p = .962, d = 0.01$). Table 1 presents the mean and standard deviations for the past tense scores.

Productive Vocabulary Size

The ANOVA targeting the productive vocabulary scores showed a significant effect for time, $F(1, 43) = 18.63, p < .001, \eta_p^2 = .30$. The post hoc comparisons revealed that both groups significantly increased their scores over time (Class A: $p = .018, d = 0.66$; Class B: $p = .001, d = 0.77$). A similar pattern was observed in the analysis of vocabulary size measured by TTR. The ANOVA yielded only a significant time effect, $F(1, 43) = 39.96, p < .001, \eta_p^2 = .48$. Both Class A ($p < .001, d = 1.31$) and Class B ($p < .001, d = 0.71$) significantly decreased the TTRs. Table 2 shows descriptive statistics for the scores.

Table 2 Means and standard deviations for the L2 development test scores (vocabulary size)

Measure	Pretest				Posttest			
	Class A		Class B		Class A		Class B	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Tokens	74.30	22.83	87.17	38.94	97.35	45.54	121.43	51.04
TTR	.62	.07	.62	.09	.53	.07	.55	.16

Discussion

Peer Interaction and Linguistic Features

The current study administered oral and written tests and examined the grammatical and lexical development of two groups. The results showed that peer interaction assisted grammatical and lexical development in different ways. Specifically, while significant grammatical development (both oral and written) was observed only in Class A, both groups improved their productive vocabulary size over time. Two accounts for a stronger impact of peer interaction on vocabulary development can be given. First, learners were exposed to vocabulary repertoires of multiple learners during peer interaction. As Schmitt (2014) explains, the key to continuous vocabulary development is the amount of exposure and its variety. While L2 learners' productive knowledge, as opposed to receptive knowledge (Webb, 2007), may be limited, it can be argued that the learners in the current study expanded their repertoires during group work. Peer interaction also provides opportunities for productive practice (Lyster & Sato, 2013). By trying to use words that they know (or they think they know) as well as new words that they encounter during meaningful interaction, learners can notice what they cannot express. Further, they can try out their linguistic hypotheses (Swain, 2005) in a nonthreatening environment.

Their lexical hypotheses, however, may turn out to be incorrect (either semantically or phonologically). When this happens, a learner's trial could fortunately be followed up by another learner, which leads to the second account for the effect of peer interaction on vocabulary learning. The interaction data revealed that the majority of CF occurrences targeted lexical errors (68%), supporting previous research that examined types of LREs, for example, lexical versus grammatical LREs (Choi & Iwashita, 2016; Fernández Dobao, 2016). More instances of peer CF, then, may explain more notable development of vocabulary over grammar. In addition, the transcript analysis pinpointed a discourse move specific to peer interaction—CSC. During this type of exchange, learners compensate for each other's lack of vocabulary knowledge, which in turn increases the amount of input and output in a reciprocal manner (see Excerpt 4). Hence, by being exposed to multiple knowledge sources, engaging in contextualized practice, and supporting each other's lack of knowledge, learners are afforded the opportunity to restructure and increase their vocabulary knowledge during peer interaction.

Interaction Mindsets, Interactional Behaviors, and Learning Outcomes

Despite the comparable effect of the intervention on vocabulary development, the two groups exhibited significant difference in terms of their grammatical

development. The L2 development tests of English past tense showed that Class A benefited from the intervention more than Class B did. One may argue that the initial proficiency levels caused the group difference. On the one hand, the present study does not support previous literature explaining that the more L2 knowledge that learners have, the better their learning outcomes are (e.g., [Williams, 2001](#)). On the other hand, the findings of the present study do support prior research showing that certain interactional behaviors lead to L2 learning (e.g., more LREs in higher- proficiency pairs in [Williams, 2001](#)). In the current study, the group that provided more CF to each other and that engaged in more LRC outperformed the other group. Hence, peer interaction, whereby learners occasionally shift their attention to language forms during meaningful communication, promotes L2 development. A theoretically and pedagogically valid question, then, is why the learners from Class A happened to interact with each other in that way.

While the data were collected from only 10 learners, the results suggest potentially causal links between learners' interaction mindsets and their interactional behaviors. Learners who exhibited a collaborative interaction mindset prior to their interaction (e.g., enjoyment of working together; support of each other's learning) tended to engage in collaborative interaction (CF and LRC). Furthermore, learners who expressed that they were skeptical of group work for learning or shy about speaking the L2 with their peers tended to produce less CF and engage in LRC less frequently. The comparatively more collaborative group belonged to the class that achieved higher learning outcomes. Hence, it may be the case that learners' pretask interaction mindset affected how they interacted with their peers during the activities which determined the ultimate effectiveness of interaction on L2 development.

Based on social interdependence theory premising that individual achievements are outcomes of the way in which learners form social relationships during group work, it can be claimed that positive interdependence was present in Class A. That is, the learners were willing to interact with each other and, presumably, they felt that collaboration was necessary to achieve task completion. As a result, learners in Class A engaged in collaborative interaction whereby they filled each other's gaps in vocabulary knowledge (CSC) and worked on grammatical issues by appreciating each other's ideas and contribution. In reviewing research on group work and learning, Nokes-Malach, Richey, and [Gadgil \(2015\)](#) divided the mechanisms of effective group work into social and cognitive aspects, arguing that cognitively effective group work involves use of collective knowledge "to *cue each other's prior knowledge* when trying to think of ideas, strategies, and solutions" (original emphasis, p. 4). Social

mechanisms included the joint management of attention and the construction of common ground where learners share and acknowledge each other's knowledge and negotiate different perspectives. The learners in Class A exhibited similar mechanisms in the context of L2 learning, which in fact were reflected in their final achievement.

The learners in Class B, on the other hand, shared noncollaborative interaction mindsets, which arguably governed the way they interacted with each other. Overall, the learners were reluctant to engage in the tasks and to share ideas. Also, they did not support or trust one another's contributions. This type of group relationship has been found to be un conducive to learning in the field of social and educational psychology as well. In Nihalani et al.'s (2010) group work data from a statistics class, the groups whose achievement levels (class grades) were significantly lower exhibited strikingly similar discourse patterns to those of Class B where one learner dominated the exchange (Excerpts 6 and 7). The groups that constructed negative interdependence "failed to display balanced team discussions whereby members contributed equally" (Nihalani et al., 2010, p. 523). The negative impacts of fear of negative evaluation from, or distrust between, group members on both the discourse and learning outcomes are abundantly documented in psychology fields (e.g., [Congleton & Rajaram, 2011](#)).

In addition to the quantitative difference, the quality of interactional behaviors—how such behaviors were responded to by individual learners—might have influenced the learning outcomes. Storch and Wigglesworth (2010) found that uptake (acceptance of teacher feedback) was observed more when the level of engagement (the number of turns within LREs) was high (for reformulation feedback). They concluded that uptake was dependent on whether the learners perceived the feedback as useful for their own goals and whether it accorded with their own understanding and beliefs about language use. Ballinger (2013) studied paired interaction of Grades 3 and 4 French immersion students and proposed that provision and acceptance of peer feedback may indicate either a collaborative attitude or excessive corrective behaviors depending on pair dynamics. In the current study, the learners whose interaction mindset was rather noncollaborative tended to reject each other's feedback. Though rejection of feedback does not necessarily mean a loss of feedback effectiveness (a learner may still incorporate it as shown in Excerpt 7), the developmental results of the two groups suggest that feedback in Class B might not have been processed in a beneficial manner. In a study where learners were trained to correct each other's errors, Sato and Lyster (2012) argued that learners' collaborative disposition was a prerequisite for peer feedback training to be

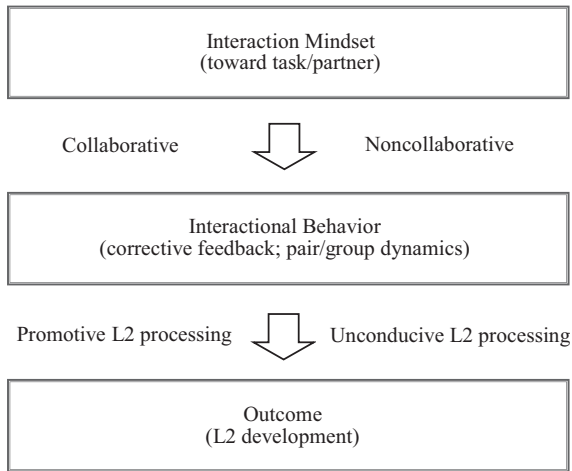


Figure 1 An affective-social-cognitive model, adapted from Johnson and Johnson (2009).

effective. The ultimate effectiveness of peer CF may be mediated by learners' interaction mindsets because they determine whether feedback will be (a) noticed/unnoticed and (b) accepted/discarded depending on how they approach the task or their partner.

To summarize, the three data sets in the current study suggested stepwise links from a collaborative interaction mindset (a positive peer relationship, according to social interdependence theory), to collaborative interaction (promotive interaction), to L2 development (achievement). The data also showed how vulnerable peer interaction is to social dynamics where L2 learning is concerned. In other words, the extent of cognitive processing seems to be mediated by social relationships that at least partly stem from the learners' interaction mindsets. The diagram in Figure 1, adapted from Johnson and Johnson (2009), depicts such an affective-social-cognitive model of L2 learning in peer interaction.

Limitations

While the present study showed possible causality between interaction mindsets and interactional behaviors as well as possible causality between interactional behaviors and L2 development, its design has weaknesses. First, the psychological and interactional data were collected from focus groups. It is indeed possible that the learners in the two groups were not representative

of their classes, leading to a possibility that there were other variables affecting their developmental outcomes. Future research could analyze learners' interaction mindsets and their interactional behaviors and have all learners participate in developmental tests. Second, the differential L2 development outcomes were based on group comparisons. This limits within-individual interpretations of the links. Future studies could employ a correlational design (e.g., hierarchical linear modeling) with quantifiable interaction mindset data (e.g., based on a questionnaire) to examine more direct empirical links. For the same issue, a study that includes a control group (no peer interaction) is deemed necessary to reveal peer interaction effectiveness (e.g., in terms of vocabulary development). Finally, while the newly adapted theory (social interdependence theory) was useful for conceptualizing the interwoven relationships among interaction mindsets, interactional behaviors, and L2 development, L2 knowledge may be fundamentally different from other types of knowledge (e.g., mathematical knowledge). To the best of my knowledge, the current study was the first to use this framework for L2 learning and teaching.⁶ Therefore, more investigation is necessary in order to further understand how learners' interaction mindsets affect their interactional behaviors and L2 learning.

Classroom Implications

L2 knowledge (or representation, whatever term is used) is owned by individual learners. However, whether and how much interaction affects the development of knowledge is mediated by the social dynamics that interactants construct together during the task. As Swain (2013) asserted, the affective state of a learner and his/her cognition are "minimally, interdependent; maximally, they are inseparable/integrated" (p. 196). The origin of social dynamics can partly be traced back to learners' interaction mindsets toward the task and/or their interlocutors. These links may be pronounced in peer interaction. While L2 learners presumably approach teacher-led activities with an intention to learn and presumably trust the teacher's linguistic ability and guidance, their interaction mindsets may prevent them from being engaged in interaction or from trusting the interlocutor's support during peer interaction. In other words, peer interaction is vulnerable to learners' psychological formations influencing how they behave during the task. This argument points to the crucial role of the classroom environment that the teacher can (and should) scaffold (see Sato & Viveros, 2016, for teacher effects on group work). That is, an important role played by the teacher in relation to peer interaction may be, prior to a peer interaction activity, to create a classroom environment where learners are

psychologically engaged in the activity and consider their peers to be valuable learning sources.

The directionality of interaction mindsets and interactional behaviors drawn in the current study requires careful interpretation as learners' interaction mindsets may be altered during interaction. That is, interaction mindset may be malleable. When group dynamics happen to be positive, "cooperative interactions both induce and are induced by positive social relationships" (Roseth, Johnson, & Johnson, 2008, p. 226). It is also possible, however, that learners find themselves bored or distrusting each other once they engage in group work, even though their initial interaction mindset was collaborative. Also, according to activity theory, learners' understanding of a situation (e.g., interaction with their peers) can actively change, reflecting their situation definition (Wertsch, 1985). The design of the current study, however, did not allow for exploring such inferences because the interaction mindset data were collected only before the task engagement. Although assessing interaction mindsets concurrently during interaction appears to be methodologically challenging, uncovering possibly dynamic, reciprocal interaction mindsets in future research may lead to pedagogical interventions that facilitate effective peer interaction.

Conclusion

To conclude, the current study provided preliminary evidence that L2 learners' interactional behaviors may be formed by their interaction mindsets. Given that peer interaction is a commonly used pedagogical tool in L2 classrooms, the current study's findings call out for a teacher who knows how to administer and monitor peer interaction activities so that limited instruction time is effectively consumed. That being said, such a pedagogical suggestion warrants future research examining the effect of teacher involvement in peer interaction generally and how it affects the learning outcomes specifically (e.g., Sharma, 2013). As Henderson and Palmer (2015) noted, peer interaction studies have consistently overlooked the teacher's role in supporting or scaffolding the quality and quantity of students' L2 production during communicative activities. Peer interaction should not be considered as a classroom activity in which learners are given a task and expected to autonomously work together. Rather, peer interaction is a type of interaction, a context of learning, and a pedagogical tool that may or may not assist L2 learning depending on how the teacher controls it before and during the interaction.

Final revised version accepted 12 August 2016

Notes

- 1 In the current study, the terms *L2 development* and *L2 learning* refer to the same construct and indicate the accumulation of *L2 knowledge*, with an acknowledgement of a theoretical conflict between cognitive and sociocultural theories that underpin the terms (see van Compernelle, 2015). It is my belief that L2 knowledge can be developed and owned by an individual (see Loewen & Sato, in press) and it can be deployed during interaction. Interaction, however, is a social act, and it affects the development of an individual's L2 knowledge.
- 2 In psychometric research as well, constructs such as foreign language anxiety/enjoyment have been operationalized as individual psychological dimensions unrelated to social interaction (see Dewaele, in press).
- 3 The government resumed the emphasis on communicative teaching and competence in 2009. Currently, Chilean schools are trying to incorporate the change but the transition has been largely unsuccessful as the results of the standardized test in 2014 demonstrated.
- 4 The focus groups were chosen based on the students' attendance rate prior to the intervention. It was deemed necessary to choose groups of students who would consistently participate in the activities from which the interaction data were to be obtained.
- 5 The researcher was present while a research assistant conducted the interviews in Spanish.
- 6 Although the idea of cooperative/collaborative learning has been used by L2 acquisition researchers, none of the previous research has operationalized interaction mindsets and empirically examined their effect on L2 development.

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Supporting Information

Additional Supporting Information may be found in the online version of this article at the publisher's website:

Appendix S1. Interview Protocol.

Appendix S2. Interview Results.