University of Groningen

Language complexity during read-alouds and kindergartners' vocabulary and symbolic understanding

Mascareño Lara, Mayra; Snow, Catherine E.; Deunk, Marjolein I.; Bosker, Roel J.

Published in:
Journal of Applied Developmental Psychology

DOI:
[10.1016/j.appdev.2016.02.001](https://doi.org/10.1016/j.appdev.2016.02.001)

IMPORTANT NOTE: You are advised to consult the publisher's version (publisher's PDF) if you wish to cite from it. Please check the document version below.

Document Version
Publisher's PDF, also known as Version of record

Publication date:
2016

[Link to publication in University of Groningen/UMCG research database](#)

Citation for published version (APA):

Mascareño Lara, M., Snow, C. E., Deunk, M. I., & Bosker, R. J. (2016). Language complexity during read-alouds and kindergartners' vocabulary and symbolic understanding. *Journal of Applied Developmental Psychology*, 44, 39-51. <https://doi.org/10.1016/j.appdev.2016.02.001>

Copyright

Other than for strictly personal use, it is not permitted to download or to forward/distribute the text or part of it without the consent of the author(s) and/or copyright holder(s), unless the work is under an open content license (like Creative Commons).

The publication may also be distributed here under the terms of Article 25fa of the Dutch Copyright Act, indicated by the "Taverne" license. More information can be found on the University of Groningen website: <https://www.rug.nl/library/open-access/self-archiving-pure/taverne-amendment>.

Take-down policy

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

Downloaded from the University of Groningen/UMCG research database (Pure): <http://www.rug.nl/research/portal>. For technical reasons the number of authors shown on this cover page is limited to 10 maximum.

Language complexity during read-alouds and kindergartners' vocabulary and symbolic understanding☆

Mayra Mascareño^{a,*}, Catherine E. Snow^b, Marjolein I. Deunk^a, Roel J. Bosker^a

^a Groningen Institute for Educational Research (GION), University of Groningen, Grote Rozenstraat 3, 9712 TG Groningen, The Netherlands

^b Harvard Graduate School of Education, Larsen 313, Cambridge, MA 02138, United States

ARTICLE INFO

Article history:

Received 2 March 2015

Received in revised form 6 January 2016

Accepted 6 February 2016

Available online 19 March 2016

Keywords:

Verbal interactions

Kindergarten

Read-alouds

Language

Literacy

Language complexity

ABSTRACT

We explored links between complexity of teacher–child verbal interaction and child language and literacy outcomes in fifteen whole-class read-aloud sessions in Chilean kindergarten classrooms serving children from low socioeconomic backgrounds. We coded teacher and child turns for function (initiation, response, and follow-up), type (e.g., open vs. closed questions), and complexity (literal vs. inferential initiations/responses; evaluative vs. elaborative follow-ups). Almost half of the teacher–child talk was inferential, and elaborative follow-ups occurred only occasionally. Repeated patterns of verbal interaction were detected, typically with a teacher initiation/child response/teacher follow-up format; these could be either consistently literal, consistently inferential, or mixed (containing a shift up/down in complexity). The proportion of inferential teacher–child talk and the occurrence of mixed patterns was positively related to child vocabulary and symbolic understanding. Results highlight the relevance of inferential talk during read-alouds, and of the adjustment of language complexity to the child's level of understanding.

© 2016 Elsevier Inc. All rights reserved.

The practice of reading aloud or shared reading may be one of the most widely used instructional activities in early childhood education classrooms. Extensive research suggests that the success of read-alouds on promoting children's language and literacy skills does not rest on the act of reading itself but on *how* the teacher conducts the activity and engages children in a productive interaction (e.g., Teale, 2003). Verbal interaction during read-alouds has salient characteristics that make it particularly relevant for language and literacy development. As compared to other routine early childhood classroom activities, read-alouds are more likely to host information that poses high cognitive demands to children (Gest, Holland-Coviello, Welsh, Eicher-Catt, & Gill, 2006; Massey, Pence, Justice, & Bowles, 2008) due to the integration of unusual words and content departing from the here-and-now in the book-related conversations (De Temple & Snow, 2003). These conversations are usually triggered by the teacher's questions and patterned around teacher initiations, child responses, and teacher follow-ups (IRF, Sinclair & Coulthard, 1975). While the cognitive complexity of verbal interaction in reading sessions has been more frequently explored at the utterance level, less is known about what the typical teacher–child transactions in these conversations are and

how these 'patterns' of verbal interaction may be related to child language and literacy outcomes.

In this study, we took a micro-analytic approach to examine the complexity of verbal interaction during whole-class reading sessions in Chilean kindergarten classrooms serving children from low socioeconomic backgrounds. We take two approaches to explore the verbal interaction, both with an emphasis on IRF cycles. First, we explored whether utterances representing teacher initiations, child responses, and teacher follow-ups were more or less cognitively complex. At a higher level of analysis, we explored the existence of recurrent IRF patterns, which could embody different levels of complexity depending on their components. By extending our exploration to recurrent patterns as units of analysis—rather than counts of its isolated components—we attempt to capture more information about the regularities in teacher–child verbal interaction throughout the sessions. Drawing on the explorations at these two levels, we examine the relation between language complexity and patterns of verbal interaction of diverse complexity, and child language and literacy scores at the end of kindergarten.

Throughout the study, we draw mainly on read-aloud research in educational settings, both in pre-kindergarten and kindergarten classrooms. Although the focus of the study is on kindergarten children, there are substantial and empirical reasons to expect that the mechanisms of read-alouds documented—much more profusely—in preschool settings would extend to the kindergarten year. Just as it occurs with preschool children, the role of read-alouds is key for kindergartners, as the main way to be exposed to new words and meaning is through

☆ The present study used data collected within the Un Buen Comienzo project, funded by a grant from the Fundación Educacional Oportunidad to the Harvard Graduate School of Education.

* Corresponding author. Tel.: +1 31 50 3636912; fax: +1 31 50 363 6670.

E-mail addresses: m.n.mascareno.lara@rug.nl (M. Mascareño), snowcat@gse.harvard.edu (C.E. Snow), m.i.deunk@rug.nl (M.I. Deunk), r.j.bosker@rug.nl (R.J. Bosker).

oral activities (Coyne, Simmons, Kame'enui, & Stoolmiller, 2004; Justice, Meier, & Walpole, 2005). Moreover, a recent meta-analytic review has concluded that the effects of read-aloud interventions are similar in pre-kindergarten and kindergarten years, although relatively smaller in the latter (Lonigan, Schatschneider, Westberg, & Literacy, 2009).

Read-alouds: language complexity and child outcomes

Although the magnitude of the contribution of reading aloud to language and literacy development in pre-literate children has not been conclusively established (Teale, 2003), there is consensus that this practice has the potential to be an effective instructional activity. Meta-analytic evidence indicates that read-aloud interventions in early childhood classrooms have positive effects on children's vocabulary and oral language, both for pre-kindergarten and kindergarten children (Lonigan, Shanahan, & National Institute for Literacy, 2009). Studies of naturalistic storybook reading with preschool children have reported positive associations between reading practices and the development of vocabulary (e.g., Dickinson & Smith, 1994; Hindman, Wasik, & Erhart, 2012; Zucker, Cabell, Justice, Pentimonti, & Kaderavek, 2013) and comprehension skills (e.g., Dickinson & Smith, 1994; van Kleeck, 2008). Something that is salient in the read-aloud literature is the conclusion that overall exposure to books is not enough to produce the desired effects (Teale, 2003). Just as it has been suggested by analysis of parent–child read-alouds (e.g., De Temple & Snow, 2003), research on whole-class reading in early childhood classrooms indicates that quality talk is at the core of the short- and long-term effects of read-alouds on child developmental outcomes (Dickinson & Smith, 1994; Hindman et al., 2012; Zucker et al., 2013).

As previously stated, the characteristics of shared book readings offer the possibility to engage in verbal exchanges that require the child to think beyond the limits of the information that is perceptually available (De Temple & Snow, 2003). The information exchanged in these conversations has been variously labeled as inferential language (van Kleeck, Vander Woude, & Hammett, 2006), decontextualized language (Snow, 1983), non-immediate talk (De Temple & Snow, 2003), representational talk (Sigel, 2002), and abstract language (van Kleeck, 2003). When teachers prompt children to make predictions, distinguish fact and fiction content, identify cause–effect relationships, infer the moral of the story, or explain the characters' points of view, they are initiating inferential exchanges. These exchanges are more cognitively challenging than literal ones (van Kleeck et al., 2006)—such as labeling objects, describing their perceptual qualities, or immediate information recall—because they demand not only acknowledging perceptual information, but also reflecting upon it. In order to meet this demand, the child has to take psychological distance from the available literal information and use his/her representational competence to construct an answer (Sigel, 2002).

There is no complete agreement about the relative effects and prevalence of inferential and literal language in read-alouds with young children. As for the relative effects of each type of language, research has revealed stronger links between inferential language and child outcomes. Inferential conversations with preschoolers have shown effects on their vocabulary development (De Temple & Snow, 2003; Dickinson & Porche, 2011; Gonzalez et al., 2014; Hindman et al., 2012), language production (de Rivera, Girolametto, Greenberg, & Weitzman, 2005), and story comprehension (Gonzalez et al., 2014; Strasser, Larraín, & Lissi, 2013). Literal-level elicitations trigger more contrasting opinions. They have been regarded as “counterproductive to the development of cognitive growth in general” (Sigel, 2002, p. 204); however, research in preschool settings shows that this type of exchange may be necessary to facilitate the acquisition of new words (Sénéchal, 1997), to enable more complex verbal interaction (Hindman et al., 2012; van Kleeck, 2008), and to promote young children's classroom participation and engagement (Blewitt, Rump, Shealy, & Cook, 2009; van Kleeck, 2008).

As for their prevalence, studies with preschoolers in whole-class settings (Zucker, Justice, Piasta, & Kaderavek, 2010) and in parent–child reading (Danis, Bernard, & Leproux, 2000) indicate that children can participate in book-related inferential conversations provided that they are prompted. Some pieces of evidence from studies on preschool read-alouds have found that teacher inferential talk and prompts are more prevalent than literal ones (Hindman, Connor, Jewkes, & Morrison, 2008; Zucker et al., 2010); however, more evidence seems to be indicating the contrary. Research in kindergarten (McKeown & Beck, 2003) and preschool read-alouds points to a lower prevalence of inferential language, ranging from 21% (Wasik, Bond, & Hindman, 2006) to 26% of the exchanges (Dickinson, McCabe, & Anastasopoulos, 2003). This is also supported by research on general classroom quality, which repeatedly indicates that interaction in kindergarten lacks opportunities to develop higher-order thinking skills, and advanced language modeling (La Paro et al., 2009; Yoshikawa et al., 2015).

In sum, both literal and inferential exchanges seem to have complementary functions in the interaction. While effects on child outcomes seem to stem more directly from the less frequent and more complex inferential exchanges, the more prevalent literal content might facilitate the occurrence of more complex interaction.

Sequencing of interaction

It seems that beyond the sheer presence or absence of more and less complex talk during read-alouds, the way it is prompted and sequenced during the conversation may make a difference on its effects on child outcomes. To our knowledge, there are no studies that tackle this issue directly and in the context of whole-class read-alouds in kindergarten. However, empirical and theoretical pieces of evidence suggest that sequencing may be a relevant issue to take into account when analyzing read-aloud interactions. An experimental study by Blewitt, Rump, Shealy and Cook (2009) touches upon the issue of sequencing in a one-to-one shared-reading experiment with 3-year olds. Experimenters read books to children in three different conditions: only low-demand (literal) questions, only high-demand (inferential) questions, and a progressive condition from low to high demand—scaffolded-like condition, as defined by the authors. Children who were exposed to demands of gradually increasing difficulty acquired more words than children exposed to only low or high cognitive demands. In this case, the progression of the cognitive demand during the reading session facilitated assuring basic grounds for more complex understanding, and contributed to maintaining child engagement.

Outside the context of an experimental design, sequencing of verbal interaction may also expose the natural, micro-time transactions between the child and his/her immediate learning environment, which are crucial for child development (Bronfenbrenner & Morris, 2006). Successful learning episodes—or teachable moments—are sometimes described as a set of exchanges with an optimal timing in the interaction that properly matches content and readiness to learn (Glasswell & Parr, 2009). A proper timing requires adjustments in the micro-time reflected in notions such as fine-tuning, which describes the dynamic regulation of complexity of the adult's elicitation to the child's comprehension level (Snow, 1989). Such adjustment affords an optimal discrepancy between the level of understanding of the child and the complexity of the conversation, generating opportunities for learning (Bruner, 1983; Snow, 1989). Sequential analyses of read-aloud conversations reveal that adults tend to adjust the complexity of the conversation to the level of understanding of the child, and eventually to increase the level of complexity from literal to inferential (Danis et al., 2000).

Although evidence of fine-tuning and of sequential adjustments in conversation complexity is drawn from studies of one-to-one verbal interaction between a parent and a preschool child, some elements of this mechanism could potentially be identified in whole-class read-alouds. One main element is the teacher's proper assessment of the moment-to-moment level of understanding of children; another one is to act

upon it by adjusting the conversation's complexity. Whole-class contexts test the teacher's efficacy at engaging children with diverse ability levels in verbal interactions that provide them with appropriate learning opportunities (Zucker et al., 2010). It also has been suggested that whole-class interaction can particularly reduce the likelihood of open-ended, inferential initiations, which are more naturally displayed in dyadic interaction (De Temple & Snow, 2003). Perhaps rather than the assessment of needs of each child, what the teacher may be able to do in the context of whole-class reading is appraising a general level of understanding of salient responses and conversational engagement based on both verbal and non-verbal cues of children. These difficulties challenge the efficacy of whole-class activities, yet this instructional format remains the most common in language and literacy instruction (Connor, Morrison, & Slominski, 2006). Therefore, analyzing sequences of interaction in whole-class settings may yield indications of relevant teachable moments involving the majority of children in a classroom.

Initiation–response–follow-up sequences

An organizing structure to analyzing the sequence of verbal interaction is the 'initiation, response, follow-up' pattern (Cullen, 2002; Sinclair & Coulthard, 1975), which is typical of teacher-directed verbal interaction in educational contexts, particularly in whole-class settings. The IRF structure is said to play two main roles in the classroom. First, it allows the teacher to manage the classroom interaction; second, it positions the teacher as the primary knower of the contents of the interaction, which allows the teacher to evaluate the child's contribution to it (Nassaji & Wells, 2000).

As in other instructional settings, teachers typically initiate conversations during book-readings by means of questions. In preschool classrooms, questions represent around a third of teacher verbalizations (Massey et al., 2008), and given their role as triggers of conversation, they largely determine the level of complexity of the content of the verbal interaction. This is reflected in strong sequential associations between language complexity in the first turn and that of the second turn in the sequence, both in one-to-one parent–child settings (Danis et al., 2000), and in whole-class read-alouds with preschool children (Zucker et al., 2010). The most widespread distinction of initiation types is that between closed and open questions (e.g., de Rivera et al., 2005). Although not deterministically, these types of questions are usually associated with different levels of language complexity. Because open initiations—typically *why*, *how*, or *what* questions—pose lower answering constraints than closed questions, they provide children with more opportunities to think (Sigel, 2002), are more likely to prompt inferential responses (de Rivera et al., 2005), and allow for more sustained and complex verbal exchanges (Massey et al., 2008). Closed questions, such as yes–no questions, or *fill in the blank* initiations have constrained or predefined answer possibilities, and they are typically used by teachers to check for child understanding (de Rivera et al., 2005).

The third element of this sequence—the follow-up—is characterized by being contingent on the child's contribution, which potentially may make the teacher's input in this turn more apprehensible to the child (Radford, Ireson, & Mahon, 2006). Follow-ups may have either a less complex, evaluative or a more complex, elaborative role (Cullen, 2002). In its evaluative role, the follow-up provides feedback to the child about his/her contribution, either confirming or disconfirming it. An elaborative follow-up focuses on extending the content of the child's contribution so as to include it in the classroom conversation. This may occur as reformulations and expansions of the previous child response, or hints that stimulate the child to think further. Evaluative follow-ups are more commonly associated with a closure of a topic in the dialogue, whereas elaborative versions help extend the topic of conversation. Extended conversations raise the likelihood of inferential content and sophisticated words in the dialogue, which in its turn has been

associated with child vocabulary development (Dickinson & Porche, 2011; Snow & Beals, 2007). Moreover, extensions or reformulations in dialogs with young children facilitate comparisons between the child's own input and the more sophisticated utterances provided by the teacher, thereby promoting language development in young children (Nelson, Camarata, Welsh, Butkovsky, & Camarata, 1996; Wells, 1985). These follow-up turns are stronger than evaluative ones at informing about the interpretations given to the child's own input (Wells, 1985), playing a key role in scaffolding the co-construction of knowledge and meaning in the interaction (Mercer, 2004; Wells, 1985). Elaborative turns, therefore, allow for sustaining genuine conversational exchanges that keep the child motivated and open to exercise their communicative intentions (Wells, 1985).

Simple evaluative follow-ups are much more frequent than elaborative ones in preschool (Dickinson et al., 2003) and kindergarten classrooms (authors). Interventions also reveal that teachers have difficulties incorporating elaborative follow-ups in their common reading practices (McKeown & Beck, 2003). Finally, quality of feedback is also one of the dimensions that have shown poor development in kindergarten classrooms, as observed in studies tackling the overall quality of teacher–child interaction (e.g., La Paro et al., 2009; Yoshikawa et al., 2015).

The present study

The study was carried out in urban Chilean kindergarten classrooms serving children from low socioeconomic levels. Chile's educational system is characterized by great socioeconomic inequality (Levin, 2011; Matear, 2007). The classrooms in our study belong to public schools, which serve mostly students from the bottom third of the family income distribution (García-Huidobro, 2007). Teachers in early-education classrooms in Chile devote little to no time to instructional activities (Strasser & Lissi, 2009), offer poor opportunities for language and literacy development (Eyzaguirre & Fontaine, 2008; Strasser & Lissi, 2009), and hold low expectations of what children can accomplish (Eyzaguirre & Fontaine, 2008). Overall, Chilean children enter kindergarten with lower emergent literacy skills, and they are in general less exposed to book-readings—both at home and at school—than those in developed countries (Strasser & Lissi, 2009).

In this study, we concentrate on investigating whether the level of complexity of the verbal interaction in read-aloud sessions is related to child language and literacy outcomes at the end of kindergarten. We operationalize complexity of verbal interaction in two ways: first, as the proportion of inferential teacher–child talk (vs. literal talk), and the proportion of elaborative follow-ups (vs. simple evaluative ones); second, as higher order patterns of verbal interaction, which typically contain a teacher initiation, a child response, and a teacher follow-up—but can occur at diverse levels of complexity, depending on their components. With this double exploration, we wanted to acknowledge that not only the exposure to a higher amounts of complex language may be relevant for child outcomes but also the exposure to particular teacher–child exchanges that recurrently unfold over the session.

We had three research questions: (1) What is the most predominant level of complexity of teacher–child verbal interaction in read-aloud sessions?; (2) What types of teacher–child interactional patterns emerge from the focused read-aloud sessions?; (3) What is the association between the complexity of the verbal interaction during the reading sessions and child language and literacy outcomes? Responding to the twofold operationalization of complexity of verbal interaction, this question had two branches: (a) we explored whether the proportion of complex talk in each session was associated with child vocabulary and symbolic understanding. Based on extant literature, we expected that larger proportions of complex talk (i.e., inferential initiations/responses and elaborative follow-ups) would be positively related to child outcomes; and (b) we explored whether there was an association between the frequency of emergent

patterns of verbal interaction in reading sessions and child outcomes. Due to the novelty of this line of inquiry, we decided not to state hypotheses and conduct it in an exploratory manner.

Method

Participants

Our sample consisted of fifteen kindergarten classrooms participating in the *Un Buen Comienzo* project (UBC) (for details of the intervention and evaluation, see Yoshikawa et al., 2015). This was a randomized intervention whose core was an intensive professional development program for pre-kindergarten and kindergarten teachers, with an emphasis on supporting children's language, literacy, health, and socioemotional development. The program worked for two years in the intervention schools—training and coaching sessions—and offered initial general training and reading materials to schools in the comparison group. Children entering pre-kindergarten in the beginning of each cohort were followed during a period of two years. They were assessed at three time points—beginning of pre-kindergarten, end of pre-kindergarten, and end of kindergarten—on their language and socioemotional development, and health conditions. Also, video recordings of classroom activity were taken at each of these moments.

The kindergarten classrooms participating in this study belonged to the second cohort of the UBC program evaluation. Within these fifteen classrooms—each from a different school—265 children were evaluated on their individual language and literacy development as part of the UBC assessments at the end of kindergarten. Girls made up 52.1% of the sample, and the mean age of children at the end of kindergarten evaluation was 5 years 11 months ($SD = 4.1$ months).

Eight classrooms participated in the intervention condition, and the other seven were part of the comparison group. The mean class size on the day of the video recording was 22.67 ($SD = 8.32$). All teachers in the sample were female, and their mean age was 46 years 2 months (range 28 years 10 months to 60 years 10 months). Eleven teachers had more than 15 years of teaching experience, while two had between 6 and 15 years, and other two had less than 5 years of experience. Only one out of the fifteen teachers had graduate studies (master's degree).

Reading sessions

As part of the program evaluation, video recordings of a full day of natural classroom activity at the end of kindergarten were available for forty-seven classrooms (in this cohort). Read-aloud sessions occurred in twenty-four of the forty-seven classrooms observed. Of these twenty-four read-alouds, fifteen teachers focused the session on comprehending the meaning of the text as the main instructional goal, while the remaining nine teachers used the text to practice children's coding/decoding skills. In this study, we focus exclusively on the fifteen meaning-oriented sessions.¹

Since these were naturally occurring reading sessions, they differed in the books read, the extension of the read-aloud, and in some cases in structure. In fourteen sessions, the book read was of a narrative type, while one classroom conducted the reading of a rhyming book. Although the reading session in this classroom was not code-oriented but focused on meaning, we take this exception into account on further analysis, as book genre is expected to influence the characteristics of the read-aloud interaction (van Kleeck, 2003). One book was used in more than one classroom (four classrooms, from UBC intervention group). Non-parametric comparisons of the two groups (same book

$n = 4$ vs. different book $n = 11$) yielded no significant median differences on relevant variables, therefore we did not make analytical distinctions in this respect.

The beginning of a read-aloud was the moment when the teacher introduced the activity, and only when the group was in the classroom setting in which the reading actually took place (i.e., excluding transitions). The typical session had an introduction, a reading part, and a discussion; however, this structure was not necessarily present in all sessions. Follow-up activities conducted in the same classroom setting (e.g., vocabulary discussion), were also considered part of the reading session, whereas activities in different classroom settings (e.g., small group or individual seatwork) were not coded because it was technically impossible to capture the verbal interaction.

Due to technical issues, some video clips were not complete. In order to observe a sufficient amount of interaction, we defined a minimum of five minutes of video data as an inclusion requirement. The session durations ranged from 6 min 40 s to 22 min 28 s, with a mean of 12 min 30 s.

Measures

Book reading interaction

Based on previous research (Cullen, 2002; de Rivera et al., 2005; Massey et al., 2008; Pentimonti & Justice, 2010; Pentimonti et al., 2012; Zucker et al., 2010), we developed a coding scheme to tackle the verbal interactions between teacher and children during the shared-reading sessions. The unit of analysis is the utterance—uninterrupted verbal turn representing a unit of meaning—and the coding was exclusive (although multidimensional) and exhaustive. Table 1 presents a summary of the codes considered in this study; the full coding scheme is available upon request. The coding scheme is consistent with the IRF structure, and therefore focuses on teacher initiations, child responses, and teacher follow-ups:

- Teacher initiations correspond to content-related, single verbal utterances that prompt a response from the child or group of children. These could be *closed questions*—high answer constraint, such as yes–no queries or questions with predefined alternatives; *open questions*—low answer constraint, requesting extended descriptions, definitions, opinions, or explanations; and *directives*—or instructions.
- Children typically react to teacher initiations with an *answer*, although they could also participate providing *information* when they explicitly elaborated on a topic on their own initiative.
- Teacher follow-ups could be: *confirmation* of the child's answer, by means of an explicit validation or by a repetition in a confirmatory tone; positive or negative *evaluation* of the quality of the child's answer; *elaboration* of the child's answer by means of a reformulation or expansion of its content; *falsification* of the child answer; providing a *hint* to stimulate the child to think further, in general after an incorrect answer; providing an *answer* to the question that was posed, in general after a child has unsuccessfully attempted to answer.

We further coded the complexity of teacher initiations and child responses using the *literal-inferential* distinction. Consistent with the literature, we coded a turn as *literal* when it referred to perceptually available information from the text or illustrations, or to immediate information recall. An *inferential* turn implied taking distance from the text or illustrations, and reflecting on the information available in order to draw cause–effect relationships, predictions, evaluations, synthesis, conclusions, story–life connections, among other inferences. We also grouped forms of follow-up into *low* and *high* levels. Low-level follow-ups are those that offer a simple evaluation of the child's input (Dickinson et al., 2003), without extending the information available or promoting further thinking (i.e., confirmations, evaluation, falsification, and answering). High-level follow-ups reformulate or

¹ There were two reasons for this decision. First, the characteristics of the interactions in these two types of session differed considerably, making a joint analysis of them not sensible. Second, multilevel regression analysis were the appropriate analytic strategy, but conducting separate multilevel analysis of these two groups of sessions would have left no statistical power. We did not have enough coding/decoding-oriented sessions to make reliable estimations.

Table 1

Main coding scheme dimensions, codes and inter-rater agreement coefficients (Cohen's kappa).

Code group (actor)	Code	Definition	Level	Example(s)
Initiation (teacher)	Closed question	Question with high answer constraint	Literal	<i>Is this big or small? / This is an invi...? [...tation]</i>
	Open question	Question with low answer constraint	Inferential	<i>Do you think he is going to fall?</i>
	Directive	Request to perform an activity	Literal	<i>What animals do you remember from the story?</i>
	Other (pseudo) initiations	Rhetorical utterances with question format but not requiring actual response	Inferential	<i>What do you think will happen in the winter?</i>
Response (child/ren)	Answer	Verbal response to initiation	Literal	<i>Show me where the bear is</i>
			Inferential	<i>Come to show us how you stamp your feet</i>
	Information	Remark or comment adding information to what teacher requested	-	<i>And you know what?... they got trapped!</i>
Follow-up (teacher)	Confirmation	Explicit validation or confirmatory repetition of the child's answer	Literal	<i>[What color is this?] Red</i>
	Evaluation	Explicit positive or negative appraisal of answer	Inferential	<i>[What do you think will happen?] I think they will eat the carrot</i>
	Falsification	Explicit disapproval or disproving repetition of the child's answer	Inferential	<i>There is an elephant (on the cover)</i>
	Answering	Provision of the correct answer to a question	Simple	<i>You can make cakes with walnuts</i>
	Elaboration	Provision of extra information, complementing existing one	Simple	<i>That is correct / okay</i>
	Hint	Suggestion or extra information to stimulate further thinking	Elaborative	<i>What a nice idea / how smart of you</i>
	$\kappa = .78$		$\kappa = .79^*$	<i>No, that's not how you call this</i>
				<i>This glass is FULL</i>
				<i>[The water is cold indeed]. And if it is very cold, it is frozen</i>
				<i>If this is narrow, what is the other one then?</i>

Note: * In the Complexity dimension, the kappa coefficient corresponds to the literal/inferential distinction. The complexity of follow-up turns corresponds to a grouping of types, and not to a code.

extend the information available in the conversation, and/or provide stimulation for further thinking (i.e., elaboration and hint).

The number of data points (i.e., codes) per session ranged from 39 to 301 ($M = 192.07$), and the data points per minute ranged from 3.86 to 25.92 ($M = 15.96$). Scores derived directly from the coding were the *proportion of inferential teacher–child talk* (as compared to literal), and the *proportion of elaborative follow-ups* (as compared to evaluative ones).

Child language and literacy

Language and literacy outcomes were measured with two subtests of the Woodcock–Muñoz Language Survey-Revised (WMLS-R), Spanish form (Alvarado, Ruef, & Schrank, 2005). This battery was selected for the UBC measurements because it provides norms based on Latin American samples (Yoshikawa et al., 2008). In this study, we considered:

- *Picture vocabulary*: Measures language development and lexical knowledge. The subject has to identify objects pictured in the test booklet and provide the corresponding word. The task begins with very simple and common objects, and it increases its difficulty presenting objects that are progressively less familiar. Median split-half reliability in non-adult samples is .91.
- *Passage comprehension*: Although in its complete form this test measures text comprehension ability, the items reached by pre-literate children require the subject to associate a spoken concept

(e.g., “the big house”) with a picture, therefore tackling symbolic understanding. Median split-half reliability in non-adult samples is .82.

Here, we use the raw scores of the measurements at the end of pre-kindergarten (pre-test scores) and the end of kindergarten (outcome variables). Descriptives and bivariate correlations are presented in Table 2.

The tests were administered individually at school by a qualified examiner. Each test has its own interruption criteria which establishes each child's ceiling score. Examiners were previously trained by the UBC team, and participated in pilot assessment sessions and weekly supervision meetings to monitor the evaluation process.

Quality of classroom interaction

As part of the UBC evaluation, all classrooms were assessed with the Classroom Assessment Scoring System (CLASS, La Paro, Pianta, & Stuhlman, 2004). Classroom assessment was conducted on the same video captures used to find the reading sessions, corresponding to a whole day of natural classroom interaction. The evaluations were conducted using the live observation instructions described in the instrument manual (Pianta, La Paro, & Hamre, 2008). The coding strategy based on videos was taken by the developers of the UBC program evaluation, following the CLASS authors' report that no meaningful differences have been detected between live and video-based coding

Table 2

Descriptive statistics and bivariate correlations of child-level outcome and control variables.

	<i>n</i>	Mean/proportion	SD	1	2	3	4	5	6	7
1. Age	265	5 years 11 months	4.08 months	–						
2. Child sex ^a	265	47.9%	–	–.05	–					
3. Mother secondary education ^b	230	52.2%	–	–.05	–.13	–				
End of pre-kindergarten										
4. Picture vocabulary	244	22.00	4.81	.20**	–.10	.31**	–			
5. Passage comprehension	244	3.31	1.06	.15*	.004	.13	.27**	–		
End of kindergarten										
6. Picture vocabulary	204	26.50	5.30	.05	.005	.36**	.73**	.15*	–	
7. Passage comprehension	214	3.98	1.73	–.04	.005	.10	.28**	.19**	.16*	–

Note: ^a Dummy variable, with 1 = boy; ^b Dummy variable, with 1 = secondary education complete or higher.

* $p < .05$; ** $p < .01$.

(Pianta et al., 2008). See Leyva et al. (2015) and Yoshikawa et al. (2015) for details on the evaluation. The CLASS comprises three domains of classroom interaction: emotional support, classroom organization, and instructional support. Each of these domains is assessed on several subdomains and indicators, which finally make up for an average domain score ranging from 1 to 7. Scores around 1 and 2 are considered to reflect *low* quality; scores from 3 to 5 indicate *middle range* quality; and scores of 6 and 7 correspond to *high* quality of interactions. Given its strong connection to the topics addressed in this study, we use only the classroom scores on the instructional support domain, which appraises interactions related to concept development, quality of feedback and language modeling. Although there is overlap in the data coded with our scheme and that evaluated by means of CLASS, the focus of both evaluations was rather different. The CLASS was intended to offer a general appraisal of the interaction quality in these classrooms, covering several instructional and non-instructional moments of an average day. The focus of the coding scheme developed in the context of this study aimed at revealing a deeper layer of classroom interaction, and with particular focus on reading sessions.

Other child and teacher/classroom variables

Data on child's age, sex, and level of education of the mother—here dichotomized as *at least secondary education completed*—were obtained from parent questionnaires used in the UBC evaluation. These variables were included in prediction models only when they correlated with the child outcomes. Data on teacher's age, years of experience, intervention group, and class size were also available from the UBC study. Classroom and teacher covariates were only included in the prediction models when they correlated with the main predictors of the models (i.e., classroom interaction characteristics). The modeling strategy is further explained in the sub-section 'Multilevel analysis'.

Missing data

Missing data were present in the outcome variables (23% in vocabulary measure; 19% in symbolic understanding measure). We explored whether missing data indicators were associated with child's age, sex, pre-test scores, intervention group, and district. No associations were identified with any of these variables. Overall, the proportion of missing data in these models was around 4%, small enough not to compromise the statistical estimations according to common standards (Dong & Peng, 2013). Furthermore, our analytical choices help diminishing potential effects of missing data (see Multilevel analysis section).

Procedure

Coding

The first author and a research assistant—both native Spanish speakers—double-coded 25% of the video data to determine inter-rater agreement. The first author parsed the verbal interaction into coding units (i.e., utterances), and the research assistant coded pre-parsed utterances. Given the fact that parsing of verbal interaction into coding units had only an instrumental value in our study, this approach was taken in order to avoid an extra source of disagreement in the coding. The second coder reported situations in which the parsing generated complications in the coding. The process to obtain an acceptable level of agreement took three rounds of coding, followed by an analysis of the disagreements, and refinement of the coding rules. After each round, the previous coding was revised independently and new video data was coded. The coding was done with the software The Observer XT (Noldus Information Technology, 2011).

Pattern analysis

We used the software Theme 6 (Pattern Vision Ltd., n.d.) for the detection of interactional patterns (i.e., IRF-like sequences) in the read-aloud sessions. This software detects temporal patterns, or T-patterns:

sets of events that occur repeatedly in the interaction, in the same order and within significantly invariant time intervals (Magnusson, 2005). Using computational algorithms, the software first detects critical time intervals from the structure of the data. The detection of this time interval is done bottom-up, starting from pairs of event types (codes). Two events have a significant relation when, within the detected critical time interval, the occurrences of an event *A* are followed by an event *B* significantly more often than would be expected by chance ($p < .001$, in the present study). In this case, the pattern (*AB*) is identified. Following a bottom-up approach, the pattern (*AB*) can be significantly related to an event *C*, so that a pattern ((*AB*) *C*) can be also detected. This bottom-up search occurs successively until no more significant relations are found (Magnusson, 2000). Therefore a T-pattern can be described as a hierarchical tree of significant binary relations between pairs of branches (Magnusson, 2006). Note that the detection of a pattern such as ((*AB*) *C*) does not mean that in the actual data stream there are no other codes in between these elements. It rather means that those other codes are not part of the regularity of this behavioral string. In that sense, this technique differs from sequential analysis, in which the analysis is based on predefined lags (Bakeman & Quera, 2011).

Before the pattern identification procedure, we concatenated the observational data of the fifteen reading sessions, which allowed us to obtain a comparable output. Search parameters have to be defined in the software so as to circumscribe the pattern detection. We defined the search parameters as follows: only patterns with a significance level of .001 or lower were kept. This significance level was considered appropriate for conversational patterns, which are naturally not random. We defined a lumping factor of 0.90, which means that if in 90% of its occurrences *A* is significantly associated with *B*, they were lumped and considered jointly. This is based on manual suggestions, and it was considered appropriate to eventually eliminate redundant information. Additionally, we allowed for the detection of bursts, which correspond to repeated occurrences of the same code in time periods that are much shorter than average (.005 level) (Magnusson, 2006). We set a minimum pattern occurrence of 15, allowing each pattern to occur at least—although not necessarily—once in each session. This is because the pattern identification was done across classrooms, and aimed at comparing sessions in their relative frequency of the same patterns.

Once we obtained the output of this search, we conducted further pattern selections. A first selection was to set a minimum and maximum number of levels in the patterns. We set a minimum of two levels, which means that a single binary relation (*AB*) was discarded, but higher order patterns ((*AB*) *C*) or ((*AB*)(*CD*)) were kept. The maximum was set at three levels, which implies that patterns with more than three binary relations (i.e., maximum six codes) were discarded. The aim of these selections was to capture the smallest possible *interactional* units (i.e., units that could contain at least an IRF exchange). Additionally, we focused only on patterns that started with a teacher move. Two reasons motivated this decision. First, the verbal interaction observed in these sessions was almost exclusively teacher-initiated, so this selection allowed us to better account for the directionality of the observed interaction. Second, since the pattern search is based on recurrent binary relations, the output usually yields patterns that overlap in content, such as patterns ((*AB*) *C*), (*A* (*BC*)) and ((*BC*) *A*). Selecting only patterns that started with a teacher move allowed us to avoid this redundancy.

With the final selection of patterns, we adjusted the raw frequencies per session in order to account for the fact that read-alouds differed in duration. Under the assumption that longer observational time increases the probability of finding interactional patterns, we calculated a unique weight for each session. This weight allowed us to proportionally scale up or down the raw frequencies of a given session so as to make it comparable to a session of average duration. Finally, we aggregated the weighted frequencies of these patterns into three groups of patterns: *literal patterns*, in which both the teacher prompt and child

Table 3 Descriptives and bivariate Spearman correlations among class-level teacher–child verbal interaction variables ($n = 15$).

	Mean/proportion	Min	Max	1	2	3	4	5	6	7	8	9	10
1. UBC: intervention group ^a	0.53	–	–	–									
2. Teacher age	46 years 2 months	28 years 10 months	60 years 10 months	.30	–								
3. Teacher experience ^b	0.73	–	–	–.40	.54*	–							
4. Class size	29.47	13	42	.02	–.44	–.42	–						
5. CLASS instructional support	1.68	1.08	2.56	–.43	.21	.25	–.15	–					
6. Weighted freq. literal patterns	7.60	0.80	22.80	–.53*	–.08	.38	–.10	–.14	–				
7. Weighted freq. inferential patterns	9.89	0.00	34.30	–.31	–.21	.28	.13	–.09	.58*	–			
8. Weighted freq. mixed patterns	3.01	0.00	11.80	–.39	–.05	.49	–.16	–.03	.62*	.81**	–		
9. Proportion inferential t–ch talk	0.47	0.00	0.79	.05	–.06	.28	.36	.02	.13	.69**	.60*	–	
10. Proportion high-level follow-up	0.24	0.00	0.40	–.03	.24	.24	–.32	.08	.15	.23	–.07	–.05	–

Note: ^a Dummy variable, with 1 = intervention group; ^b Dummy variable, with 1 = more than 15 years.* $p < .05$; ** $p < .01$.

response are at an literal level; *inferential patterns*, in which both the teacher prompt and child response are at an inferential level; and *mixed patterns*, in which there is a combination of turns at different levels of complexity.

Multilevel analysis

We conducted a series of multivariate multilevel regression analysis to explore the association between characteristics of the verbal interaction and vocabulary and symbolic understanding jointly. Taking a multivariate approach allowed us to more optimally use the data available, thereby increasing statistical power (Snijders & Bosker, 2012). We fitted 3-level multivariate random intercept models, nesting the outcomes within children and these within classrooms. Estimations were conducted using the software MLwiN (Rasbash, Browne, Healy, Cameron, & Charlton, 2012). In order to estimate the models, the outcome variables were transformed into z-scores so that they shared the same metric.

An empty model indicated that 9% of the variance of picture vocabulary scores was associated with the classroom level, whereas for passage comprehension scores no variance was allocated at the classroom level. Since our questions were about interactions at the classroom level, we decided to still include this level of aggregation in our models. Due to reduced statistical power given by the fairly small number of level 3 units (i.e., classrooms) in our models, we also considered coefficients to be significant when they reached the .10 level. Since our analyses were exploratory, we considered this an appropriate way to balance the risk for Type I and II errors.

The inclusion of control variables at the child level was determined by their correlations with the outcomes (see Table 2). Mother education was only related to picture vocabulary, and therefore included as a separate coefficient. Correlations between age and the outcomes were very weak and non-significant; therefore, it was excluded from the models. The same applies for child sex. At the classroom level, two controls were considered theoretically relevant in the modeling regardless of their correlations: intervention condition of the classroom (dummy coded, intervention group = 1), and CLASS scores on the instructional support domain. For parsimony, controls for class size, teacher age, and teacher experience were not included as they showed weak and non-significant associations with the main classroom predictors (Table 3). All continuous variables were centered at the grand mean.

In our first model, we included two variables representing the proportion of complex verbal interaction in each session. One variable was the *proportion of inferential teacher–child talk* (teacher initiations and child responses) in the total number of teacher initiations and child responses. The second variable was the *proportion of high-level follow-ups* (i.e., elaborations and hints) in the total number of follow-ups in the session.

In our second (series of) models, we included the weighted frequencies of the three types of interactional patterns as the main predictors, that is, *literal*, *inferential*, and *mixed* patterns. A matter of concern during this series of models was the threat of multi-collinearity due to the significant, positive correlations between our three interactional pattern types

(see Table 3). We explored this issue so as to evaluate the robustness of our estimations. We explored the changes of the model when excluding one of the two variables with the strongest bivariate correlation (mixed and inferential patterns), which indicated that the inclusion of the weakest coefficient (inferential patterns) once the mixed patterns was already entered in the models reduced the proportion of unexplained variance in 0.01% for picture vocabulary and 0.04% for passage comprehension. This indicated that we could trim this coefficient due to redundancy. Alternatively, we also tested a model based on the proportion of mixed patterns (in contrast with consistently literal or consistently inferential patterns) as the main predictor. Since mixed patterns were the strongest predictors in different models, this approach allowed us to isolate its relative effect against other patterns. We integrated the information provided by all these procedures when drawing conclusions about the associations between interactional patterns and child outcomes.

As a way to control for the fact that one classroom read a book of a different type (i.e., rhyming book vs. narrative books), we conducted a whole set of models excluding that classroom from the analysis. We integrate the information coming from these models in the text (full models available upon request).

Results

Descriptive results

Language complexity in teacher–child verbal interaction

Table 4 shows an overview of descriptive statistics and bivariate correlations of classroom teacher–child verbal interaction variables. On average, 47% of teacher initiations and child responses were inferential. Overall, the proportion of teacher inferential initiations ($M = 52\%$, range 0%–92%) was higher than the proportion of child inferential responses ($M = 41\%$, range 0%–61%). However, considering that there was a strong sequential association between the level of the initiation and the level of child responses in the following two turns (1-lag association, $\chi^2[1] = 155.64$, $p < .001$, $\phi = .72$; 2-lag association, $\chi^2[1] = 21.73$, $p < .001$, $\phi = .55$), we decided to compute an aggregated proportion of inferential teacher–child talk. Regarding the use of elaborative follow-ups, on average these corresponded to 24% of teacher follow-ups.

Patterns of verbal interaction

Table 4 presents an overview of the interactional patterns in our sample of reading sessions. The column *pattern* shows the string of codes that constitute each pattern; for example, pattern IRF1 contains the string of codes (*teacher closed question*, *child literal response*, *teacher confirmation*). Table 5 presents some example patterns from our data.² There it can be seen that out of the nine patterns detected, five represent verbal exchanges that are consistently at an inferential

² A detailed description of the pattern frequencies per session is available upon request.

Table 4

Description, raw frequencies, and descriptive statistics of interactional patterns at the classroom level.

Level	Name	Pattern	Total	Mean	Min.	Max.
Literal	IRF1	((t,clq,lit - c,resp,lit) t,conf)	90	6.00	1	15
Literal	IRF6	(t,clq,lit (c,resp,lit - t,elab))	20	1.33	0	3
Inferential	IRF2	(t,opq,inf (c,resp,inf - t,conf))	70	4.67	0	11
Inferential	IRF3	(t,opq,inf (c,resp,inf - t,elab))	28	1.87	0	2
Inferential	IRF5	(t,clq,inf (c,resp,inf - t,elab))	21	1.40	0	3
Inferential	IRF8	((t,opq,inf - c,resp,inf) t,eval)	17	1.13	0	3
Inferential	IRFF2	((t,clq,inf - c,resp,inf) (t,conf - t,elab))	15	1.00	0	3
Mixed	IRF4	(t,opq,inf (c,resp,lit - t,conf))	26	1.73	0	6
Mixed	IRF11	((t,clq,lit (c,resp,lit - t,conf)) t,clq,inf)	16	1.07	0	4

Note: t = teacher; c = child; clq = closed question; opq = open question; resp = response; conf = confirmation; elab = elaboration; eval = evaluation; lit = literal; inf = inferential.

level, whereas two patterns are consistently literal. The other two patterns show a shift on the level of complexity of the verbal interaction: one (IRF4) contains an inferential initiation and literal child response followed by a teacher confirmation; the other (IRF11) encompasses a full IRF cycle at the literal level, followed by a new initiation at an inferential level. Classrooms varied significantly in their total number of patterns. After weighting raw frequencies to correct for the differences in observation durations, classrooms still showed important variation in the frequencies of each type of pattern.

Intervention and control classrooms had equivalent ranked distributions of inferential (Mann–Whitney $U = 18$, $SE = 8.63$, $p = .28$) and mixed patterns (Mann–Whitney $U = 15.5$, $SE = 8.56$, $p = .15$). Classrooms in the comparison group had a higher mean rank of literal patterns than intervention classrooms, which was significant at the .10 level (Mann–Whitney $U = 11$, $SE = 8.64$, $p = .05$).

Relation to language and literacy outcomes

Table 6 shows the multivariate model for the two outcome variables, considering as main predictors the proportions of inferential teacher–child talk and of high-level follow-ups. The model suggests a positive significant association between the proportion of inferential teacher–child talk and the outcomes ($t[10] = 1.85$, $p = .05$, one-tailed). The magnitude of this effect can be regarded small, with $d = 0.15$.³ No significant association was detected between the proportion of elaborative follow-ups and child outcomes. When the same model was tested excluding the classroom that read the rhyming book, the results were very similar, with a coefficient for inferential talk of $t[9] = 1.97$, $p = .04$ (one-tailed), $d = 0.18$, and a coefficient for the proportion of high-level follow-ups nearing zero. We calculated 90% confidence intervals for equivalent coefficients in models with and without the rhyming book session. Important overlap between these confidence intervals confirms that these differences are only marginal.

Our second series of models explored the association between patterns of diverse types and the outcome variables. Table 7 lists the full model with the frequencies of three pattern types as main predictors. The model revealed that neither the frequency of literal patterns nor the frequency of inferential patterns were significantly related to the outcomes. The frequency of mixed patterns, however, showed a positive significant relationship to the outcomes, with $t[9] = 2.18$, $p = .06$. This represents an effect of a medium magnitude, with $d = 0.41$. Similar results were found in the model fitted excluding the classroom that read the rhyming book, with $t[8] = 2.15$, $p = .05$, $d = 0.50$. The

differences between coefficients are marginal, as revealed by a large overlap of confidence intervals of these estimates.

Given the threat of multi-collinearity, we also estimated an alternative model (Table 8) as robustness check. In this model, the frequency of mixed patterns was turned into a proportion, to capture their effect relative to the frequency of the other two types of consistent patterns. This model indicated that higher proportions of mixed patterns—as compared to consistent patterns—were associated with child vocabulary and symbolic comprehension scores; the magnitude of this effect was small ($t[11] = 2.29$, $p = .02$, $d = 0.17$). Also in this case, the results are similar when the model was tested without the classroom reading the rhyming book: $t[10] = 2.27$, $p = .05$, $d = 0.21$, yielding only marginal differences when confidence intervals were compared.

Discussion

With the present study, we sought a deeper understanding of how teacher–child verbal interaction during whole-class, book-reading sessions relates to child language and literacy outcomes at the end of kindergarten. The focus was on the level of complexity of teacher initiations and child responses—literal vs. inferential—and of teacher follow-up turns—evaluative vs. elaborative. At the level of verbal turns, we found that almost half of the teacher–child verbal interaction in these sessions occurred at the inferential level, and that there was a slight preponderance of teacher inferential initiations over literal ones. Previous evidence on read-alouds has generally focused on the proportion of teacher inferential talk rather than teacher-and-child talk. In that light, our descriptive findings resemble those reported by Hindman et al. (2008) and Zucker et al. (2010) in the context of preschool classrooms. We also found a strong prevalence of simple confirmatory turns, with no elaborative function, a finding that confirms previous indications that teachers have difficulties incorporating this type of turn in their reading practices with young children (Dickinson et al., 2003; McKeown & Beck, 2003). At a higher level of analysis, we took a novel approach to identify patterns of verbal interaction that occurred repeatedly across sessions. Most of these had an initiation/response/follow-up format, and they could be consistently *literal patterns*, consistently *inferential patterns*, or *mixed patterns*, depending on the complexity of their components. This is in itself a novel finding, as it adopts a unit of analysis that goes beyond the scope of single utterances in order to better capture typical verbal transactions during the read-aloud interaction.

We conducted two lines of exploration of the association between the complexity of verbal interaction and child vocabulary and symbolic understanding. Overall, our exploration revealed associations between teacher–child verbal interaction indicators and child outcomes. Although the associations found had a small-to-medium magnitude, they can still be considered practically relevant as the outcomes are scores on standardized tests—independent from the readings—and, therefore, they are more difficult to influence. In the first line of exploration, we found that a higher proportion of teacher–child inferential talk was significantly related to child's vocabulary and symbolic understanding (i.e., passage comprehension test). This exploration responded to the widespread idea that a higher exposure to more cognitively challenging verbal interaction is conducive for child language and literacy development (De Temple & Snow, 2003; Dickinson et al., 2003). The associations between inferential talk and child vocabulary are well documented (e.g., Dickinson & Smith, 1994; Hindman et al., 2012; Wasik et al., 2006), but those with child symbolic understanding and story comprehension are less abundant (Dickinson & Smith, 1994; Gonzalez et al., 2014), particularly in kindergarten classrooms. Recent experimental findings in a Chilean preschool sample indicate that the elicitation of a particular type of inference—i.e., coherence questions—during shared readings is associated with young children's improved narrative comprehension (Strasser et al., 2013). Our comprehension test, however, tackles basic symbolic understanding, considered a foundation for later

³ According to Borenstein, Hedges, Higgins and Rothstein (2011), Cohen's d was calculated using the following formula: $d = 2r_{xy}/\sqrt{1 - r_{xy}^2}$. Since the models were fitted on standardized outcome variables (i.e., $Y_{SD} = 1$), regression coefficients were standardized by multiplying them by the standard deviation of each predictor.

Table 5
Examples of patterns of verbal interaction.

Literal					
IRF1	t,clq,lit: c,resp,lit: t,conf:	where does he [the bear] go ice-skating? to the pond to the pond	IRF6	t,clq,lit: c,resp,lit: t,elab:	who is Lito?[immediate recall] the lion the good lion
Inferential					
IRF2	t,opq,inf: c,resp,inf: t,conf:	how was the mother of the little bear toward him? she was loving loving	IRF3	t,opq,inf: c,resp,inf: t,elab:	what is an example of 'supplicating'? I want to supplicate... to go to the beach ahh, he really wants to go to the beach. [He is supplicating 'I want to go to the beach!']
Mixed					
IRF4	t,opq,inf: c,resp,lit: t,conf:	who can tell me what you learnt from here? the boy wanted a teddy-bear [immediate recall] yes, he did	IRF11	t,clq,lit: c,resp,lit: t,conf: t,opq,inf:	what did the friend who could not escape from the bear do? [immediate recall] he played dead he played dead and how do you play dead?

Note: t = teacher; c = child; clq = closed question; opq = open question; resp = response; conf = confirmation; elab = elaboration; lit = literal; inf = inferential.

reading comprehension. Indeed, the ability to understand and produce symbols requires the stimulation of the representational skills that are stimulated by inferential talk (Sigel, 2002; Sulzby, 1985). Our findings contribute to enlarging the body of research documenting associations between inferential language and child symbolic skills.

The proportion of elaborative follow-ups, on the other hand, appeared to be unrelated to the outcome variables. The lack of association between elaborative types of follow-up and child outcomes contrasts with links previously reported in read-aloud research with preschool children (Wasik et al., 2006). However, it may be that the lack of association was due to the fact that overall elaborative follow-ups represented a small proportion of the observed follow-ups. The lack of variability between classrooms may have hampered the power to establish a statistical association. Our descriptive results extend to the Chilean context the finding that simple, confirmatory forms of follow-up are the most typical choice of early childhood education teachers to close the IRF sequence (Dickinson et al., 2003). As in previous research, it seems that teachers are more focused on judging the appropriateness of child input, particularly stressing their role as primary knower in the interaction rather than as a conversational partner (Hall & Walsh, 2002; Nassaji & Wells, 2000). The prevalence of evaluative strategies reveals then a dominant practice of classroom interaction as transmission of knowledge rather than co-construction of it (Hall & Walsh, 2002). Our

explorations and previous research show that children at this age are able to participate in genuine, complex conversations, but the role of the teacher is critical in initiating and sustaining them, particularly in whole-class interaction. Our results suggest that teachers are more prone to incorporate complex verbal turns when they initiate conversations than when they follow-up on children's responses. High complexity content elicited in the first turn is then likely to be limited by the often non-elaborative third turn, also limiting child engagement in genuine and motivating conversations (Wells, 1985), and potentially the achievement of better language outcomes (Hall & Walsh, 2002).

In the second line of explorations, the presence of mixed patterns—which had a shift upward or downward in complexity—showed overall a stable association with the outcome variables. We found literal and inferential patterns to be unrelated to child outcomes in the study. The exploration based on patterns of verbal interaction acknowledges the idea that learning is influenced by transactional processes that occur over micro-time units (Bronfenbrenner & Morris, 2006). In other words, by identifying patterns of verbal interaction, we attempted to capture a unit of analysis that embodies more information about the exchanges that take place between teacher and children in the classroom. The fact that our two lines of exploration yielded different findings seems to reflect that these units of analysis—although derived from the same basic analytic

Table 6
Multivariate multilevel models, with proportion of inferential teacher–child talk and proportion of high-level follow-ups as main predictors.

	Common coefficients			Separate coefficients					
	Coeff.	SE	p	Picture Vocabulary			Passage Comprehension		
				Coeff.	SE	p	Coeff.	SE	p
<i>Fixed part</i>									
Intercept				−0.15	0.09		−0.03	0.08	
Child level									
Mother educ.: Secondary or more				0.34	0.10	.007			
Pre-test (end pre-K)				0.15	0.01	<.001	0.18	0.06	.014
Classroom level									
Group: Intervention	0.03	0.08	.77						
CLASS Instructional support	−0.03	0.11	.36						
Prop. inferential talk	0.33	0.18	.02^a						
Prop. high follow-up	0.12	0.32	.18 ^a						
<i>Random part</i>									
Classroom level									
$\tau_h^2 = \text{Var}(U_{hj})$				0			0		
$\tau_{12} = \text{Cov}(U_{1j}, U_{2j})$	0								
Student level									
$\sigma_h^2 = \text{Var}(R_{hij})$				0.42	0.04		0.93	0.09	
$\sigma_{12} = \text{Cov}(R_{1ij}, R_{2ij})$	−0.05	0.05							

Note: ^a One-tailed test.

Exact p-values are provided. Highlighted in bold are p-values <.10 and smaller.

Table 7
Multivariate multilevel models, with weighted frequencies of patterns of interaction as main predictors.

	Common coefficients			Separate coefficients					
				Picture Vocabulary			Passage Comprehension		
	Coeff.	SE	p	Coeff.	SE	p	Coeff.	SE	p
<i>Fixed part</i>									
Intercept				−0.19	0.09		−0.09	0.08	
Child level									
Mother educ.: secondary or more				0.30	0.10	.02			
Pre-test (end pre-K)				0.15	0.01	<.001	0.17	0.06	.02
Classroom level									
Group: Intervention	0.16	0.11	.17						
CLASS Instructional support	−0.09	0.11	.46						
Literal patterns	−0.01	0.01	.55						
Inferential patterns	−0.01	0.01	.66						
Mixed patterns	0.06	0.03	.07						
<i>Random part</i>									
Classroom level									
$\tau_h^2 = \text{Var}(U_{hj})$				0			0		
$\tau_{12} = \text{Cov}(U_{1j}, U_{2j})$	0								
Student level									
$\sigma_h^2 = \text{Var}(R_{hij})$				0.42	0.04		0.93	0.09	
$\sigma_{12} = \text{Cov}(R_{1ij}, R_{2ij})$	−0.06	0.05							

Exact p-values are provided. Highlighted in bold are p-values <.10 and smaller.

strategy—indeed contain information about different dimensions of the verbal interaction. For example, according to the findings of the first line of exploration, we could have expected patterns that were consistently inferential to be related to the outcome variables. However, across our explorations, we found that patterns that contained a shift in their complexity were associated with the outcomes. Therefore, one could theorize that although the amount of inferential talk matters for child learning, it also matters how it is presented and unfolds throughout the session.

A closer examination of the patterns of mixed complexity reveals potential interpretations of this finding. Our first mixed-pattern, IRF4, encloses a downward shift in complexity given by the child's literal response to an inferential teacher initiation (e.g., t: *what do you think this book is about?* [showing book cover]; c: *an apple* [labeling]). In the third turn, this sequence contains a confirmatory follow-up by which the teacher acknowledges the child's contribution even though its complexity did not reach the level prompted by the initiation (t: *yes, an apple*). An interpretation of this first pattern may be that the discrepancy between the prompt and the child's understanding appeared to be too large, so the teacher resolved to accept the attempt of the child in response to the prompt. This could, eventually, allow raising the level by using a reformulated initiation while keeping children actively on-task. Accepting the child's contribution may reflect the teacher's intention to recruit children, "helping them adhere to the requirements of the task" (van de Pol, Volman, & Beishuizen, 2010, p. 276). Such acceptance could also characterize a classroom environment that supports exploration and provides opportunities to participate, promoting child engagement and motivation to learn (Downer, Sabol, & Hamre, 2010). Pattern IRF11 represents the teacher prompting a full literal IRF cycle (e.g., t: *where did the bear go with his mother?*; c: *to the pond*; t: *to the pond...*), and only then raising the complexity of the conversation by asking an inferential question (t: *... and how does the water of the pond have to be for the bear to ice-skate?*). In this case, we could hypothesize that the initial literal IRF sequence represents a strategy of the teacher to assure an initial ladder of understanding before increasing the challenge, resembling a scaffolded-reading strategy (Blewitt et al., 2009). This sequence could respond to the intent to offer cognitive structure to accomplish the task (van de Pol et al., 2010). All these are speculative interpretations, as our data does not allow us to test any of these ideas. Main limitations here are the impossibility to follow the participation of individual children in the verbal interaction, and the lack of data on teachers' intentionality in the verbal interaction

observed. However, they do seem to point out potential lines of future research that explore teacher use of complexity adaptation strategies in the course of classroom interaction.

All the explorations conducted revealed similar results when the only classroom that read a rhyming book was excluded. Given the naturalistic approach we took—which implied that teachers selected the books to read and the focus of the reading—any inference about genre effects on the interactions we observed is based on this fairly limited comparison. The lack of changes between the models with and without the rhyming book read-aloud may be reflecting previous findings indicating that teachers tend to focus read-alouds on meaning comprehension rather than on code aspects, even when books have prominent code features (e.g., rhyming books) (Hindman et al., 2008; van Kleeck, 2003). Moreover, our findings relating verbal complexity and child language and literacy outcomes did not seem to be (partially) explained by the overall instructional quality of the classroom (as measured by the CLASS domain instructional support). Although theoretically this domain of classroom interaction reflects core concepts in our inquiry, such as quality of feedback, language modeling, and concept development, there were at least two interrelated limitations of the CLASS scores in our sample that could explain the lack of associations with child outcomes and with indicators derived from our coding. The range of CLASS scores in the sample was rather restricted, and corresponded to the low range of the CLASS quality scale for all classrooms. While the low level of instructional support is not surprising in these and similar classrooms (see Leyva et al., 2015), the restriction of range at the low level suppresses possible statistical associations and obscures any inferences about the potential relationships that might be present at middle- and high-quality ranges of the CLASS scale. Indeed, given the indicators of the instructional support dimension, one could expect that read-alouds in classrooms with higher CLASS scores would show more frequent use of complex language and a predominance of well-tailored IRF patterns. Nevertheless, beyond the limitations of the CLASS scores in our sample, we argue that a high inference assessment such as CLASS and a fine-grained analysis such as the one presented here, focus on unveiling two different layers of the classroom interaction, which can eventually yield complementary insights on the quality of early childhood classrooms.

Though the frequency of inferential patterns was unrelated to child outcomes, it is nonetheless notable that recurrent inferential exchanges accounted for about half of the overall patterns observed. This reflects the strong sequential association between the level of the teacher

Table 8
Multivariate multilevel models, with proportion of mixed patterns of interaction as main predictor.

	Common coefficients			Separate coefficients					
				Picture Vocabulary			Passage Comprehension		
	Coeff.	SE	p	Coeff.	SE	p	Coeff.	SE	p
<i>Fixed part</i>									
Intercept				−0.15	0.09		−0.03	0.08	
Child level									
Mother educ.: Secondary or more				0.33	0.10	.006			
Pre-test (end pre-K)				0.15	0.01	< .001	0.18	0.06	.014
Classroom level									
Group: intervention	0.06	0.09	.26						
CLASS instructional support	−0.04	0.11	.37						
Prop. mixed patterns	1.08	0.47	.02						
<i>Random part</i>									
Classroom level									
$\tau_h^2 = \text{Var}(U_{hj})$				0			0		
$\tau_{12} = \text{Cov}(U_{1j}, U_{2j})$	0								
Student level									
$\sigma_h^2 = \text{Var}(R_{hij})$				0.42	0.04		0.93	0.09	
$\sigma_{12} = \text{Cov}(R_{1ij}, R_{2ij})$	−0.05	0.05							

Exact p-values are provided. Highlighted in bold are p-values <.10 and smaller.

prompt and the child response that was detected. These findings highlight the fact that, in spite of their lower exposure to language-learning opportunities, Chilean kindergarten children from low socioeconomic backgrounds can participate in inferential conversations. With this we extend similar findings from Anglo-American (Wasik et al., 2006; Zucker et al., 2010) and European (Danis et al., 2000) studies with pre-schoolers, to the Chilean early childhood education situation. Perhaps the inferential exchanges were not associated with child vocabulary and symbolic understanding because inferential sequences may have involved the participation of a reduced group of children in the classroom, most likely those with a high initial level of understanding. This could imply that the learning opportunities associated with these exchanges were not distributed across the whole classroom. Once again, this reveals the difficulties that whole-class verbal interaction represents to teachers to engage children with diverse skills, and for researchers to investigate the differential efficacy of classroom strategies. Whole-class interaction is, nonetheless, the most widespread organized instructional setting in kindergarten classrooms in Chile, and thus its examination is ecologically valid and relevant.

We acknowledge several limitations in our study. First, our findings are limited by the correlational design of the study, which had data from reading sessions and child outcome measures collected almost contemporaneously and at the end of the academic year. This means that the read-alouds observed might not be representative of the read-alouds conducted throughout the year. Due to our one-time measure, we have been cautious not to adventure causal relationships from the effects we detected, as we acknowledge that effects in both directions may be viable (e.g., Nurmi, Viljaranta, Tolvanen, & Aunola, 2012). For example, a higher proportion of inferential talk may be promoting child's skills. Yet, it is also possible that teachers of children with an overall higher vocabulary and symbolic understanding are more prone to elicit inferential language in reading sessions. Additionally, reciprocal effects may take place as well. Future explorations of the links between classroom verbal interaction and child learning and developmental outcomes will require designs that allow capturing the direction of these effects over time. Moreover, consistent with previous findings (Hindman et al., 2012; Reese, Cox, Harte, & McAnally, 2003), we would expect that the effects we detected in both lines of exploration depend on the child's initial skill level. Unfortunately, our analytic strategy—i.e., multilevel regression analysis—would have required a larger number of classrooms in order to estimate such coefficients with confidence. The analysis of larger observational datasets with a similar analytical approach would help in tackling these limitations,

and may shed light on how these findings can be generalized to wider contexts. The observation of more classrooms and more reading sessions per classroom could provide a deeper insight into the learning opportunities these children are exposed to, and eventually what conditions (i.e., teacher characteristics) are related to their occurrence. That would also allow the examination of how text-related interaction changes across diverse instructional contexts (diverse activities, different texts, reading occasions), and how the effects we detected in the micro-time relate to the always dynamic process of child development in the short and longer terms (Bronfenbrenner & Morris, 2006; Snow, Perlmann, & Nathan, 1987). The design of our study, however, compensates for these limitations to a certain extent. Given only one observation, taking a micro-analytic approach to the analysis of verbal interactions has been suggested as a more reliable method for identifying the regularities of interaction than holistic classroom assessments (Dickinson & Smith, 1994). Capturing regularities of interaction is precisely the goal of our pattern identification analysis, which yielded promising preliminary findings and opened a path for further studies. Particularly, these findings suggest the value of testing hypotheses about language complexity (i.e., inferential vs. literal language) and diverse patterns of interaction as predictors of child outcomes.

Finally, future studies may be devoted to exploring whether and how teachers fine-tune whole-class interaction, taking into account the presence of children with diverse levels of understanding in the classroom. These studies should attempt to identify how children with diverse characteristics differentially engage in the verbal interaction and, therefore, are exposed to different learning opportunities. Research in individualized instruction provides relevant input for future designs, as it has shown that children with diverse skills profit from different settings, types, and amounts of instruction (Connor et al., 2006, 2009). Being able to improve our understanding of what presents a learning opportunity for different children is a critical issue in future research. Such information would better unravel the links between whole-class verbal interaction and outcomes of children with diverse skill sets and classroom participation styles. This in turn would allow us to better inform practice about the most efficacious ways to provide young children with the learning opportunities they need.

References

- Alvarado, C. G., Ruef, M. L., & Schrank, F. A. (2005). *Comprehensive manual. Woodcock-Muñoz Language Survey-Revised*. Itasca, IL: Riverside Publishing.
- Bakeman, R., & Quera, V. (2011). *Sequential analysis and observational methods for the behavioral sciences*. New York: Cambridge University Press.

- Blewitt, P., Rump, K. M., Shealy, S. E., & Cook, S. A. (2009). Shared book reading: When and how questions affect young children's word learning. *Journal of Educational Psychology*, 101(2), 294–304. <http://dx.doi.org/10.1037/a0013844>.
- Borenstein, M., Hedges, L. V., Higgins, J. P. T., & Rothstein, H. R. (2011). *Introduction to meta-analysis*. Chichester, UK: John Wiley & Sons.
- Bronfenbrenner, U., & Morris, P. A. (2006). The bioecological model of human development. In R. M. Lerner, & W. Damon (Eds.), *Handbook of child psychology* (6th ed.). *Theoretical models of human development*, Vol. 1. (pp. 793–828). Hoboken, NJ US: John Wiley & Sons Inc.
- Bruner, J. S. (1983). *Child's talk: Learning to use language*. New York: W.W. Norton & Company.
- Connor, C. M., Morrison, F. J., & Slominski, L. (2006). Preschool instruction and children's emergent literacy growth. *Journal of Educational Psychology*, 98(4), 665–689. <http://dx.doi.org/10.1037/0022-0663.98.4.665>.
- Connor, C. M., Piasta, S. B., Fishman, B. J., Glasney, S., Schatschneider, C., Crowe, E. C., et al. (2009). Individualizing student instruction precisely: Effects of child × instruction interactions on first graders' literacy development. *Child Development*, 80(1), 77–100. <http://dx.doi.org/10.1111/j.1467-8624.2008.01247.x>.
- Coyne, M. D., Simmons, D. C., Kameenui, E. J., & Stoolmiller, M. (2004). Teaching vocabulary during shared storybook readings: An examination of differential effects. *Exceptionality*, 12(3), 145–162. http://dx.doi.org/10.1207/s15327035ex1203_3.
- Cullen, R. (2002). Supportive teacher talk: The importance of the F-move. *English Language Teachers Journal*, 56(2), 117–127.
- Danis, A., Bernard, J. M., & Leproux, C. (2000). Shared picture-book reading: A sequential analysis of adult-child verbal interactions. *British Journal of Developmental Psychology*, 18, 369–388. <http://dx.doi.org/10.1348/026151000165751>.
- De Rivera, C., Girolametto, L., Greenberg, J., & Weitzman, E. (2005). Children's responses to educators' questions in day care play groups. *American Journal of Speech-Language Pathology*, 14(1), 14–26. [http://dx.doi.org/10.1044/1058-0360\(2005/004\)](http://dx.doi.org/10.1044/1058-0360(2005/004)).
- De Temple, J. M., & Snow, C. E. (2003). Learning words from books. In A. van Kleeck, S. A. Stahl, & E. B. Bauer (Eds.), *On reading books to children: Parents and teachers* (pp. 16–36). Mahwah, NJ: Lawrence Erlbaum Associates.
- Dickinson, D. K., McCabe, A., & Anastopoulos, L. (2003). A framework for examining book reading in early childhood classrooms. In A. van Kleeck, S. A. Stahl, & E. B. Bauer (Eds.), *On reading books to children: Parents and teachers* (pp. 95–113). Mahwah, NJ: Lawrence Erlbaum Associates.
- Dickinson, D. K., & Porche, M. V. (2011). Relation between language experiences in preschool classrooms and children's kindergarten and fourth-grade language and reading abilities. *Child Development*, 82(3), 870–886. <http://dx.doi.org/10.1111/j.1467-8624.2011.01576.x>.
- Dickinson, D. K., & Smith, M. W. (1994). Long-term effects of preschool teachers book readings on low-income children's vocabulary and story comprehension. *Reading Research Quarterly*, 29(2), 104–122. <http://dx.doi.org/10.2307/747807>.
- Dong, Y., & Peng, C.-Y. J. (2013). Principled missing data methods for researchers. *Springer Plus*, 2(222), 1–17.
- Downer, J. T., Sabol, T. J., & Hamre, B. K. (2010). Teacher-child interactions in the classroom: Toward a theory of within- and cross-domain links to children's developmental outcomes. *Early Education and Development*, 21(5), 699–723. <http://dx.doi.org/10.1080/10409289.2010.497453>.
- Eyzaguirre, B., & Fontaine, L. (2008). Las escuelas que tenemos [The schools we have]. *Estudios Públicos*, 111, 287–313.
- García-Huidobro, J. E. (2007). Desigualdad educativa y segmentación del sistema escolar. Consideraciones a partir del caso chileno [Educational inequality and school system segmentation. Reflections upon the Chilean case]. *Revista Pensamiento Educativo*, 40(1), 65–85.
- Gest, S. D., Holland-Coviello, R., Welsh, J. A., Eicher-Catt, D., & Gill, S. (2006). Language development subtexts in Head Start classrooms: Distinctive patterns of teacher talk during free play, mealtime, and book reading. *Early Education and Development*, 17(2), 293–315.
- Glasswell, K., & Parr, J. M. (2009). Teachable moments: Linking assessment and teaching in talk around writing. *Language Arts*, 86(5), 352–361.
- Gonzalez, J. E., Pollard-Durodola, S., Simmons, D. C., Taylor, A. B., Davis, M. J., Fogarty, M., et al. (2014). Enhancing preschool children's vocabulary: Effects of teacher talk before, during and after shared reading. *Early Childhood Research Quarterly*, 29(2), 214–226. <http://dx.doi.org/10.1016/j.jecresq.2013.11.001>.
- Hall, J. K., & Walsh, M. (2002). Teacher-student interaction and language learning. *Annual Review of Applied Linguistics*. <http://dx.doi.org/10.1017/S0267190502000107>.
- Hindman, A. H., Connor, C. M., Jewkes, A. M., & Morrison, F. J. (2008). Untangling the effects of shared book reading: Multiple factors and their associations with preschool literacy outcomes. *Early Childhood Research Quarterly*, 23(3), 330–350. <http://dx.doi.org/10.1016/j.jecresq.2008.01.005>.
- Hindman, A. H., Wasik, B. A., & Erhart, A. C. (2012). Shared book reading and Head Start preschoolers' vocabulary learning: The role of book-related discussion and curricular connections. *Early Education & Development*, 23(4), 451–474. <http://dx.doi.org/10.1080/10409289.2010.537250>.
- Justice, L. M., Meier, J., & Walpole, S. (2005). Learning new words from storybooks: An efficacy study with at-risk kindergartners. *Language, Speech, and Hearing Services in Schools*, 36(1), 17–33. [http://dx.doi.org/10.1044/0161-1461\(2005/003\)](http://dx.doi.org/10.1044/0161-1461(2005/003)).
- La Paro, K. M., Hamre, B. K., Locasale-Crouch, J., Pianta, R. C., Bryant, D., Early, D. M., et al. (2009). Quality in kindergarten classrooms: Observational evidence for the need to increase children's learning opportunities in early education classrooms. *Early Child Development and Care*, 20(4), 657–692.
- La Paro, K. M., Pianta, R., & Stuhlman, M. (2004). The classroom assessment scoring system: Findings from the prekindergarten year. *The Elementary School Journal*, 104(5), 409–426.
- Levin, B. (2011). Chile, Latin America, and inequality in education. *Phi Delta Kappan*, 93(2), 74–75.
- Leyva, D., Weiland, C., Barata, M., Yoshikawa, H., Snow, C., Treviño, E., et al. (2015). Teacher-child interactions in Chile and their associations with prekindergarten outcomes. *Child Development*, 86(3), 781–799. <http://dx.doi.org/10.1111/cdev.12342>.
- Lonigan, C. J., Schatschneider, C., Westberg, L., & Literacy, N. I. for (2009a). *Identification of children's skills and abilities linked to later outcomes in reading, writing, and spelling*. Jessup, MD: National Institute for Literacy (Vol. Chapter 2).
- Lonigan, C. J., Shanahan, T., & National Institute for Literacy (2009b). *Developing early literacy: Report of the National Early Literacy Panel. A scientific synthesis of early literacy development and implications for intervention*. National Institute for Literacy, Jessup, MD: National Institute for Literacy.
- Magnusson, M. S. (2000). Discovering hidden time patterns in behavior: T-patterns and their detection. *Behavior Research Methods, Instruments & Computers*, 32(1), 93–110.
- Magnusson, M. S. (2005). Understanding social interaction: Discovering the hidden structure with model and algorithms. In L. Anolli, S. Duncan Jr., M. S. Magnusson, & G. Riva (Eds.), *The hidden structure of interaction: From neurons to culture patterns*. Amsterdam: IOS Press (p. e-book).
- Magnusson, M. S. (2006). Structure and communication in interactions. In G. Riva, M. T. Anguera, B. K. Wiederhold, & F. Mantovani (Eds.), *From communication to presence: Cognition, emotions and culture towards the ultimate communicative experience* (pp. 127–146). Amsterdam: IOS Press.
- Massey, S. L., Pence, K. L., Justice, L. M., & Bowles, R. P. (2008). Educators' use of cognitively challenging questions in economically disadvantaged preschool classroom contexts. *Early Education and Development*, 19(2), 340–360.
- Matear, A. (2007). Equity in education in Chile: The tensions between policy and practice. *International Journal of Educational Development*, 27(1), 101–113. <http://dx.doi.org/10.1016/j.ijedudev.2006.06.015>.
- McKeown, M. G., & Beck, I. L. (2003). Taking advantage of read-alouds to help children make sense of decontextualized language. In A. van Kleeck, S. A. Stahl, & E. B. Bauer (Eds.), *On reading books to children: Parents and teachers* (pp. 159–176). Mahwah, NJ: Lawrence Erlbaum Associates.
- Mercer, N. (2004). Sociocultural discourse analysis: Analysing classroom talk as a social model of thinking. *Journal of Applied Linguistics*, 1(2), 137–168. <http://dx.doi.org/10.1558/japl.2004.1.2.137>.
- Nassaji, H., & Wells, G. (2000). What's the use of "triadic dialogue"? An investigation of teacher-student interaction. *Applied Linguistics*, 21(3), 376–406. <http://dx.doi.org/10.1093/applin/21.3.376>.
- Nelson, K. E., Camarata, S., Welsh, J., Butkovsky, L., & Camarata, M. (1996). Effects of imitative and conversational recasting treatment on the acquisition of grammar in children with specific language impairment and younger language-normal children. *Journal of Speech & Hearing Research*, 39(4), 850–859.
- Noldus Information Technology (2011). *The Observer XT 10.5*. Wageningen, The Netherlands: Noldus Information Technology.
- Nurmi, J. -E., Viljaranta, J., Tolvanen, A., & Aunola, K. (2012). Teachers adapt their instruction according to students' academic performance. *Educational Psychology*, 32(5), 571–588. <http://dx.doi.org/10.1080/01443410.2012.675645>.
- Pattern Vision Ltd. (n.d.). Theme 6. Reykjavik, Iceland: Pattern Vision.
- Pentimonti, J. M., & Justice, L. M. (2010). Teachers' use of scaffolding strategies during read alouds in the preschool classroom. *Early Childhood Education Journal*, 37(4), 241–248. <http://dx.doi.org/10.1007/s10643-009-0348-6>.
- Pentimonti, J. M., Zucker, T. A., Justice, L. M., Petscher, Y., Piasta, S. B., & Kaderavek, J. N. (2012). A standardized tool for assessing the quality of classroom-based shared reading: Systematic Assessment of Book Reading (SABR). *Early Childhood Research Quarterly*, 27(3), 512–528. <http://dx.doi.org/10.1016/j.jecresq.2011.12.007>.
- Pianta, R. C., La Paro, K. M., & Hamre, B. K. (2008). *The Classroom Assessment Scoring System (CLASS) Manual*. Baltimore, MD: Brookes.
- Radford, J., Ireson, J., & Mahon, M. (2006). Triadic dialogue in oral communication tasks: What are the implications for language learning? *Language and Education*, 20(3), 191–210. <http://dx.doi.org/10.1080/095007806008668723>.
- Rasbash, J., Browne, W. J., Healy, M., Cameron, B., & Charlton, C. (2012). *MLwiN version 2.26*. Bristol: Centre for Multilevel Modelling, University of Bristol.
- Reese, E., Cox, A., Harte, D., & McAnally, H. (2003). Diversity in adult's styles of reading books to children. In A. van Kleeck, S. A. Stahl, & E. B. Bauer (Eds.), *On reading books to children: Parents and teachers* (pp. 37–57). Mahwah, NJ: Lawrence Erlbaum Associates.
- Sénéchal, M. (1997). The differential effect of storybook reading on preschoolers' acquisition of expressive and receptive vocabulary. *Journal of Child Language*, 24(01), 123–138.
- Sigel, I. E. (2002). The psychological distancing model: A study of the socialization of cognition. *Culture & Psychology*, 8(2), 189–214. <http://dx.doi.org/10.1177/13567X02008002438>.
- Sinclair, J. M., & Coulthard, M. (1975). *Towards an analysis of discourse: The English used by teachers and pupils*. London: Oxford University Press.
- Snijders, T. A. B., & Bosker, R. J. (2012). *Multilevel analysis. An introduction to basic and advanced multilevel modeling*. (Vol. 2nd) London/Los Angeles/New Delhi: SAGE Publications.
- Snow, C. E. (1983). Literacy and language: Relationships during the preschool years. *Harvard Educational Review*, 53(2), 165–189.
- Snow, C. E. (1989). Understanding social interaction and language acquisition; sentences are not enough. In M. H. Bornstein, & J. S. Bruner (Eds.), *Interaction in human development* (pp. 83–103). Hillsdale, NJ: Lawrence Erlbaum Associates.
- Snow, C. E., & Beals, D. E. (2007). Mealtime talk that supports literacy development. *New Directions for Child and Adolescent Development*, 115, 83–97. <http://dx.doi.org/10.1002/cad>.
- Snow, C. E., Perlmann, R., & Nathan, D. (1987). Why routines are different: Towards a multiple-factors model of the relation between input and language acquisition. In

- K. E. Nelson, & A. van Kleeck (Eds.), *Children's language*, Vol. 6. (pp. 65–98). Hillsdale, NJ: Lawrence Erlbaum Associates.
- Strasser, K., Larrain, A., & Lissi, M. R. (2013). Effects of storybook reading style on comprehension: The role of word elaboration and coherence questions. *Early Education & Development*, 24(5), 616–639. <http://dx.doi.org/10.1080/10409289.2012.715570>.
- Strasser, K., & Lissi, M. R. (2009). Home and instruction effects on emergent literacy in a sample of Chilean kindergarten children. *Scientific Studies of Reading*, 13(2), 175–204. <http://dx.doi.org/10.1080/10888430902769525>.
- Sulzby, E. (1985). Children's emergent reading of favorite storybooks: A developmental study. *Reading Research Quarterly*, 20(4), 458–481.
- Teale, W. H. (2003). Reading aloud to young children as a classroom instructional activity: Insights from research and practice. In A. van Kleeck, S. A. Stahl, & E. B. Bauer (Eds.), *On reading books to children: Parents and teachers* (pp. 114–135). Mahwah, NJ: Lawrence Erlbaum Associates.
- Van de Pol, J., Volman, M., & Beishuizen, J. (2010). Scaffolding in teacher-student interaction: A decade of research. *Educational Psychology Review*, 28(2), 193–205. <http://dx.doi.org/10.1007/s10648-010-9127-6>.
- Van Kleeck, A. (2003). Research on book sharing: Another critical look. In A. van Kleeck, S. A. Stahl, & E. B. Bauer (Eds.), *On reading books to children: Parents and teachers* (pp. 271–320). Mahwah, NJ: Lawrence Erlbaum Associates.
- Van Kleeck, A. (2008). Providing preschool foundations for later reading comprehension: The importance of and ideas for targeting inferencing in storybook-sharing interventions. *Psychology in the Schools*, 45(7), 627–643. <http://dx.doi.org/10.1002/pits.20314>.
- Van Kleeck, A., Vander Woude, J., & Hammett, L. A. (2006). Fostering literal and inferential language skills in Head Start preschoolers with language impairment using scripted book-sharing discussions. *American Journal of Speech-Language Pathology*, 15(1), 85–95.
- Wasik, B. A., Bond, M. A., & Hindman, A. H. (2006). The effects of a language and literacy intervention on Head Start children and teachers. *Journal of Educational Psychology*, 98(1), 243–250. <http://dx.doi.org/10.1037/0022-0663.98.1.63>.
- Wells, G. (1985). *Language development in the pre-school years. Language at home and at school*, Vol. 2, Cambridge: Cambridge University Press.
- Yoshikawa, H., Barata, M. C., Rolla, A., Da Silva, C., Ayoub, C., Arbour, M., et al. (2008). *Un Buen Comienzo, una iniciativa para mejorar la Educación Preescolar en Chile: resultados del primer año de implementación [Un Buen Comienzo, an initiative to improve early childhood education in Chile: Results from the first implementation year]*. Santiago: Report for the UNICEF Office.
- Yoshikawa, H., Leyva, D., Snow, C. E., Treviño, E., Barata, M. C., Weiland, C., et al. (2015). Experimental impacts of a teacher professional development program in Chile on preschool classroom quality and child outcomes. *Developmental Psychology*, 51(3), 309–322. <http://dx.doi.org/10.1037/a0038785>.
- Zucker, T. A., Cabell, S. Q., Justice, L. M., Pentimonti, J. M., & Kaderavek, J. N. (2013). The role of frequent, interactive prekindergarten shared reading in the longitudinal development of language and literacy skills. *Developmental Psychology*, 49(8), 1425–1439. <http://dx.doi.org/10.1037/a0030347>.
- Zucker, T. A., Justice, L. M., Piasta, S. B., & Kaderavek, J. N. (2010). Preschool teachers' literal and inferential questions and children's responses during whole-class shared reading. *Early Childhood Research Quarterly*, 25(1), 65–83. <http://dx.doi.org/10.1016/j.ecresq.2009.07.001>.