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ARTICLE

The dynamics of initiation in caregiver–child conversational interactions

양육자-아동 상호 작용에서 발화 개시와 연관된 역동성에 관한 연구

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Abstract

We investigated the dynamics of communicative initiation in infant–caregiver interactions across ages and language abilities. Analyses of 228 Language ENvironment Analysis (LENA) recordings from 141 Korean adult–child dyads (60 girls; aged 7–30 months) replicated the initiator effect reported in North American populations. This effect, demonstrated by longer utterances, more frequent speech, and shorter response times in self-initiated interactions for both children and adults, suggests potential cross-cultural consistency in this conversational dynamic and remained consistent across ages in most conversational measures. A focused analysis of 13–14 month-olds (N = 40) and their K-CDI scores revealed that the initiator effect in segment duration and number persisted across most vocabulary percentiles. Additionally, nuanced findings indicated that caregivers increased their input frequency and adjusted segment duration in adult-initiated conversations in tandem with children's higher receptive abilities. The robustness of the initiator role across cultures, ages, and vocabulary abilities points to a fundamental aspect of human communication.

초록

본 연구는 양육자-영유아 상호작용에서 의사소통 개시(communicative initiation)의 역동성이 연령과 언어 능력에 따라 어떻게 나타나는지 탐구했다. 한국인 양육자-유아 141쌍(60명의 여아; 7-30개월)의 228개 LENA (Language ENvironment Analysis) 녹음을 분석한 결과 북미 인구에서 보고된 개시자 효과(initiator effect)가 재현되었다. 즉 아동과 양육자 모두 자신이 개시한 상호작용에서 더 길고 빈번하게 발화하고, 응답 시간은 더 짧은 것으로 나타났다. 이는 대화의 역동성이 문화적 경계를 넘어 일관성을 가질 가능성을 시사하며, 이 효과는 대부분의 대화 측정 변수에서 연령에 상관없이 일관되게 유지되었다. 13-14개월 유아(N = 40)와 그들의 K-CDI (Korean Communicative Development Inventory) 점수를 중심으로 한 추가 분석에서는 대부분의 어휘 백분위에서 발화 (segment) 지속 시간과 수에 대한 개시자 효과가 지속되었다. 또한 양육자가 아동의 수용 능력이 향상됨에 따라 성인 주도 대화에서 더 빈번히 발화하고 발화

지속 시간을 조정함을 발견했다. 문화, 연령, 어휘 능력을 초월하여 관찰되는 개시자 역할의 견고함은 이 효과가 인간 의사소통의 본질적 측면일 가능성을 시사한다.

Keywords: caregiver–child interactions; LENA; initiator effect; naturalistic interactions

Introduction

Conversational exchanges (Snow, 1977) between children and their adult caregivers are filled with nuances that can significantly influence language growth. While research extensively examines various aspects of caregivers' speech patterns and responses, such as word count, lexical diversity (Bergelson et al., 2019; d'Apice, Latham, & von Stumm, 2019), and responsiveness (Begus et al., 2014; Tamis-LeMonda & Bornstein, 2002; Warrent & Brady, 2007), limited attention has been given to how infants contribute to and influence adults' responses (Murray & Trevarthen, 1986; Smith & Trainor, 2008). Although there is considerable research on infants' turn-taking skills via vocalisation and gaze within these exchanges (Bloom et al., 1987; Casillas & Frank, 2017; Bornstein et al., 2015; Rutter & Durkin, 1987; Levinson & Torreira, 2015; Lourenço et al., 2021), insufficient attention has been given to exploring the broader role infants play in shaping these interactions beyond their response patterns. While adults are typically perceived as the primary drivers of these interactions (Kochanska & Aksan, 2004; Vygotsky & Cole, 1978), further research is needed to elucidate the nuanced intricacies of dyadic interactions (Ko et al., 2016). This study aims to uncover the bidirectional nature of initiative in dyadic interactions, exploring caregivers' and infants' roles in shaping these exchanges, across children's ages and language abilities.

The initiator effect

The interlocutory order in dyadic turn-taking in conversations, in which each agent takes the role as an initiator and respondent, has been found to impact response patterns, with the initiator typically playing a more active role (hereinafter *initiator effect*; Ko et al., 2016). Ko et al. (2016) investigated adult–child interactions among monolingual English-learning toddlers aged 12–30 months and found that when individuals initiated a conversational block (defined as a series of exchanges separated by a pause of 5 seconds or longer, see Figure 1). They tended to produce longer utterances and respond more quickly than when they assumed the role of respondent – an indication of the active role of both the adult and the young children in the conversational exchange. However, the persistence of these interaction dynamics across development and their connection to children's language abilities remain unclear, necessitating further investigation into how conversational roles evolve and adapt as a function of children's age and language abilities.

In a study on conversational dynamics, VanDam et al. (2022) showed that older children (25–37 months old) initiated conversations more frequently than their parents, suggesting a developmental shift towards increased conversational autonomy. Yet, the relationship between interaction dynamics in dyadic conversational interactions and a child's language abilities remains to be further explored. Furthermore, Salo, King, Gotlib, and Humphreys (2022) reported that the number of adult-initiated conversations with infants at 6 months was positively correlated with expressive language skills of the infants at 18 months. This correlation remained even when controlling for infant-initiated conversations, highlighting the robustness of the association between adult-initiated interactions and language outcomes. Additionally, they found that adult-initiated

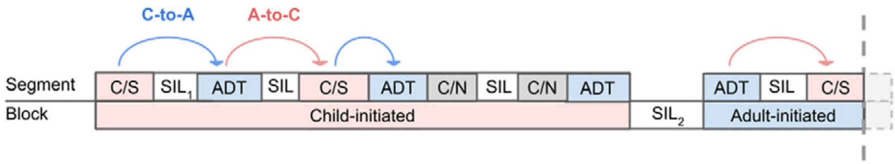

Figure 1. Example of adult-child dyadic interaction at the segment and block levels. At the segment level, C/S represents speech-related child vocalization, whereas C/N is non-speech related and ADT represents adult vocalization (female in female-child dyad or male in male-child dyad). In each segment, utterances from a single speaker are captured, where an individual utterance has a minimum duration of 50 ms. A subsequent utterance requires a silence of at least 300 ms for differentiation. Notably, for speaker classification, LENA defines a segment's minimum duration as 1000 ms for adult male (MAN), adult female (FAN), television (TVN), overlapping noise (OLN) categories, and 600 ms for key child (CHN). Segments are typically separated by periods of silence. When two segments are not separated by silence (i.e., they are back-to-back), they are distinguished based on changes in speaker. A silence of 800ms or more is represented with SIL_1 in our annotation. The segment that follows the end of a preceding segment by a different speaker is considered a response. Adult's responses to the child's speech-related vocalization (C-to-A conversational turn) are represented with blue curves, whereas red curves represent a child's response to an adult's vocalization (A-to-C conversational turn). Each block is separated by a minimum of 5000 ms of silence between the two blocks, represented with SIL_2. As illustrated here, the first conversational block begins with a child's vocalization, making it a child-initiated block, followed by SIL_2 then an adult's vocalization which starts an adult-initiated block.

conversations were more frequent, longer, and contained more adult words than infant-initiated conversations at 6 months.

While these findings shed light on the caregiver's role in conversational exchanges and its relation to child development, the complexities of this dynamic, particularly the initiator effect as observed in Ko et al. (2016), warrant a more in-depth analysis to understand how initiating conversations may shape the nature of children's language experiences and development. Although the findings in Salo et al. (2022) support the initiator effect reported in Ko et al. (2016), the nuances of these dynamics, including their variability across age and language abilities, remain largely unexplored. This study aims to further our understanding of how these social interactions are associated with children's language experiences, potentially shaping the context for language development through the role of interlocutory order in adult–child exchanges.

Theoretical contexts

While limited research exists on the social-cognitive foundation of the initiator effect observed in this study, Goffman's (1974) *frame analysis* offers a valuable perspective for comprehending the intricate dynamics of social interactions. Central to Goffman's framework is the notion of shared frames, wherein participants collectively construct a shared understanding of the situation or context. When an interaction begins, individuals establish a shared frame of reference, facilitating their interpretation and navigation of the ongoing exchange. The initiator's role in "keying", or establishing the framework for the interaction, is particularly relevant to the initiator effect investigated in our research. By initiating a conversation, individuals dictate its tone, shaping its trajectory and exerting influence over its dynamics and outcomes. This action establishes the framework for the exchange, affecting both the initiator's and respondent's behaviour. As the initiator steers the initial direction and focus of the conversation, they are more likely to take an active role in the interaction. This often manifests in prolonged speaking durations and quicker responses compared to the respondent, etc., i.e., the initiator effect. Further theoretical insights on this topic will be provided in the discussion section.

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The present study

We investigate the intricacies of dyadic conversational patterns within Korean parent–child interactions across various age groups, examining a spectrum of speech patterns extracted from Language ENvironment Analysis (LENA)-coded data. While our investigation does not encompass cross-cultural and cross-linguistic comparisons, our primary focus lies in investigating whether the initiator effect, as previously documented in studies conducted with North American populations (Ko et al., 2016), manifests similarly in our Korean dataset. Linguistic differences, such as Korean's practice of frequent subject/object drop – a grammatical feature not permissible in English – may lead to unique conversational patterns, such as Korean mothers' heightened repetition of nouns than American mothers (Ko et al., 2023). Cultural differences in parenting attitudes also exist: Korean mothers often prioritise children's conformity and character building (Rodd, 1996), while American mothers emphasise autonomy and enjoyment in learning (Vinden, 2001). Despite these cultural differences, we posit that the dynamics underlying interaction patterns may signify a broader cross-cultural phenomenon, potentially universal if the initiator effect's mechanism derives from general conversational dynamics (Tomasello, 1988) or social dynamics like framing (Goffman, 1974). This assertion finds support in the research of Stivers et al. (2009), who uncovered robust turn-taking patterns across 10 languages, characterised by a consistent aversion to overlapping speech and minimal pauses between turn transitions[1]. Should our hypothesis hold true, we anticipate identifying shared underlying mechanisms in dyadic conversational patterns concerning the manifestation of the initiator effect, transcending cultural boundaries.

Furthermore, we explore the presence of the initiator effect, extending beyond the variables examined in previous research, such as Ko et al. (2016) or Salo et al. (2022), and examine how these patterns may vary as a function of children's age. We hypothesise that as children's linguistic and cognitive development progresses, they become more active in their interactions. We expect that the mechanism governing the initiator effect in conversation is not age-specific and remains independent from age despite developmental changes.

In addition, we explore how initiator effects in specific conversational measures during dyadic interactions relate to children's language abilities. To avoid potential age-related biases associated with developmental stages, we focused our analysis on a single, coherent age group, i.e., children aged 13–14 months, where we had the largest dataset (N = 40). This age range is particularly interesting as it coincides with the onset of children's first words, offering a unique opportunity to observe the emergence of language skills and their relationship with parental behaviours.

Our research questions can be summarised as follows: *(1) Does the initiator effect, as observed in Ko et al. (2016), replicate in a different population, such as Korean caregiver-child dyads?* We hypothesise that the conversational initiator will demonstrate greater attentiveness when initiating conversations compared to when responding. This heightened attentiveness likely arises from the initiator's role in setting the initial frame for the interaction (Goffman, 1974). We expect this to be reflected in features such as longer utterance durations, a greater number of utterances, shorter response times, and a higher frequency of responses. *(2) Is the initiator effect robust across children's ages?* Ko et al.

[1] In the context of conversation analysis, the term "turn" typically refers to which participant is currently holding the floor or speaking. However, our paper employs the term "turn" as a shorthand for "conversational turn". That is, it denotes the shift between conversational participants, marking the transition as one person concludes their utterance and another begins theirs.

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(2016) were among the early studies to document the initiator effect in mother–child dyads but did not examine age-related influences, a gap our study seeks to address. We expect that the overall effect to remain consistent across children aged 7 and 30 months, with older children initiating more conversations, producing longer and more frequent utterances, and responding more quickly and more frequently than younger children. *(3) How do adult and child initiator effects in conversational dynamics vary across different levels of children's language abilities?* Since no prior research has explored the initiator effect in relation to children's language abilities, this is a new avenue of investigation, allowing for a range of hypotheses. If the initiator effect is indeed a fundamental aspect of human interaction, we might expect it to persist regardless of language abilities. However, it is also plausible that a child's language abilities could modulate the magnitude and characteristics of the initiator effect. For instance, children with lower language abilities might depend more on adult-initiated interactions, while those with more advanced skills may engage in more balanced conversations with less need for adult intervention. Conversely, it is possible that children who receive more support through adult-led exchanges could display stronger language skills.

Methods

Participants

228 daylong LENA recordings were collected from 141 Korean adult–child dyads (60 girls) with children aged between 7 and 30 months (M = 13.84, SD = 7.05) residing in the Gwangju area of South Korea between November 2018 and March 2021. The collection of the data was carried out in accordance with the ethical standards of the Institutional Review Board of Chosun University. (Approval No. 2-1041055-AB-N-01-2018-51). They were recruited through in-person campaigns at baby fairs and online advertisements on social networking platforms. Prior to participation, we sent out a pre-screening questionnaire and only the families with infants that were born full-term were invited for the study. One family did not submit their socio-economic status (SES) demographics (see Table 1 for full description).

In addition to analysing the full sample, we focused on a subset of children aged 13–14 months (N = 40) to explore the relationship between the initiator role in parent–child interactions and children's language outcomes. Language outcomes were measured by using the MacArthur-Bates Communicative Development Inventories – Korean adaptation (K-CDI; Pae & Kwak, 2011), with percentile scores derived from the Korean data repository available in WordBank (Frank et al., 2017).

Apparatus and materials

Adult–child naturalistic interactions were recorded using the LENA system. The LENA system facilitates home-based naturalistic observation of children's environments and interactions using a small digital recorder that fits into a pocket (Zimmerman et al., 2009). The device is capable of storing up to 16 hours of running speech, thus capturing the child's and their conversational-partner's vocalizations and interactions throughout the day. LENA preprocesses the recording, categorising it into ***segments***, as depicted in Figure 1, and classifies them based on the speaker (e.g., child, adult female, adult male, other child, and electronic/media sounds). It also identifies conversational blocks, as

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Table 1. Descriptive statistics of parental age, education and monthly income

	Mother		Father	
Variable	N	%	N	%
Age				
Under 25 years	1	0.71	0	0.00
25–30 years	16	11.42	8	5.71
30–35 years	68	48.57	38	27.14
35–40 years	46	32.86	63	45.00
40 years and above	9	6.43	31	22.14
Education				
High school	18	12.86	12	8.57
Associate's degree	30	21.43	34	24.29
Bachelor's degree	81	57.86	71	50.71
Master's degree	11	7.86	17	12.14
Doctoral degree	0	0.00	6	4.29
Income (monthly)				
Less than 1.5 million won	79	56.43	1	0.71
1.5–2.5 million won	28	20.00	24	17.14
2.5–3.5 million won	26	18.57	58	41.43
3.5–4.5 million won	3	2.14	37	26.43
4.5–6 million won	4	2.86	11	7.86
6 million won or more	0	0	9	6.43

illustrated in Figure 1, and categorises them according to the initiator (i.e., adult vs. child-initiated block).

Analysis framework for interaction metric

To examine the relationship between adult–child interactions and their response patterns, we analyse the interaction metrics at the level of *segment* and *block* (see Figure 1). At the ***segment*** level, we examined whether the role of being an initiator of a conversational block has any effects on how long (mean segment duration) and how much (number of segments) each person speaks. At the conversational ***block*** level, we investigated whether the initiator status of a speaker influences the speed of response and number of turns (responses). It is noteworthy that Figure 1 is a simplified example of adult-child interactions because naturalistic language environments can involve sound segments from sources other than the dyads, e.g., second adult speakers, other children, far sounds and sounds from electronics (TV, radio etc.). Responses are counted when a child segment occurs within five seconds before or after an adult segment and without any sound segment from a third speaker (different sex adult or another child), but either silence or far sounds and sounds from electronics are allowed in the initiation-response interim (Gilkerson & Richards, 2020).

At both levels of analyses, differences between being initiator or not would provide directional evidence of the initiator effect (e.g., Figures 4–5). In addition, we examine the association between interaction patterns and children's concurrent language outcomes as measured by the K-CDI percentile.

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Validation of temporal patterns based on LENA-automated annotations

A number of studies have validated LENA's speaker identification across diverse languages (Dutch: Bruyneel et. al., 2021, English: Xu, Yapanel & Gray, 2009, French: Canault et al., 2016, Italian: Bastianello et al., 2023, Korean: McDonald et al., 2021, Vietnamese: Ganek & Eriks-Brophy, 2018), with promising predictability for child language (Wang et al., 2020). Previous research (McDonald et al., 2021) has validated LENA's performance with Korean, demonstrating a comparable rate of accuracy with findings in other languages regarding speaker identification and word count. However, our understanding of the degree of correspondence between LENA-defined segment durations or response times and those determined through human coding remains limited. This is primarily attributed to the scarcity of research on the timing of caregiver responses to infants or vice versa (Yoo, et al., 2018). To validate our findings, we conducted a comparative analysis using manual annotations on 60 five-min audio clips from McDonald et al. (2021). Our analysis of the manually annotated dataset revealed patterns consistent with those found in the LENA data: adults generated more segments, with longer durations, and responded more promptly to infants compared to their child counterparts. This alignment underscores the utility of LENA automated annotations for studying adult–child dyadic interactions[2].

Procedure

Parents were given a 4-page instruction sheet to review, a log sheet, and a custom-made vest that had a pocket to hold the recorder in the upper front part of the garment. For parents who visited the laboratory in person with their child to participate in another study, we demonstrated the device to the mothers, provided instructions on the recording process, and addressed any questions they had. We requested that parents keep an hourly log of the activities on the day of the recording and informed them of the option to request the deletion of all or a portion of the recording that they might feel uncomfortable sharing. They were instructed to make the recording within three days after receiving the device and return it via prepaid package delivery service. In cases where parents failed to return the device within the designated time frame, we sent them with another device that had a fully charged battery to ensure uninterrupted recording of up to 16 hours. Children's vocabulary size was measured using the Korean adaptation of the K-CDI. We administered the K-CDI before their visit via an online form. Full recording instructions and a sample of the activity log sheet are available in the project's OSF repository: https://osf.io/fqj43/, along with the data in this study and scripts for analysing them.

[2]The comparative analysis involved 60 five-minute audio clips manually annotated by human coders. We observed that LENA's mechanistic application of acoustic thresholds often results in more frequent and shorter speech segments compared to human coding. Given the complexity of these differences, we focused our comparison on patterns of adult-child dyadic interactions, which directly align with our primary research interests. The manually-annotated data showed similar patterns to the LENA data in terms of adult-child interaction dynamics. Detailed results of this analysis can be found in the supplementary materials on our OSF repository (https://osf.io/fqj43/). While this comparison supports the utility of LENA for our research questions, a broader discussion on LENA's validity is provided in the discussion section.

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Results

To provide context for interpreting the outcomes of our investigation, we first analyse the frequency of initiated blocks across speakers and age groups. While this analysis is not directly tied to our primary research questions, it establishes a baseline understanding of conversational initiation patterns. Subsequently, we present the findings related to our main research questions in three parts. For the first research question, we report findings on interaction patterns of Korean adults and children as a function of initiator roles (Speaker/Turn × Block Type). To address the second research question, we extend this analysis to explore interactions with children's age (Speaker/Turn × Block Type x Child Age). The initiator effect, our primary focus is captured by the interaction between Speaker/Turn × Block Type. If no interaction with Child Age is found, this suggests that the initiator effect is consistent regardless of the child's age. However, if an interaction with Child Age is observed, the initiator effect may still persist but varies depending on the interaction pattern. For the third research question, we present results indicating the important role of an adult's initiative effort in children's language outcomes.

Using the `Anova()` function in the *car* package (Fox, 2009), we evaluate whether adding a particular fixed effect or interaction significantly improves the model's fit. We report chi-squares ($\chi 2$), degree of freedoms (*df*) and *p*-values to summarise the significance of main and interaction effects for each model. Regression statistics are provided in tables (Tables 2 & 3), including standardised beta estimates (β), confidence intervals (*CI*), and *p*-values using the `tab_model()` function in the *sjPlot* package (Lüdecke, 2021). This dual approach offers a comprehensive assessment: ANOVA evaluates the overall contribution and significance of variables and their interactions, justifying post-hoc analyses, whereas regression coefficients indicate effect direction and strength for specific nested variable levels. For pairwise comparisons involving variables with multiple levels contrasts, we report the estimated marginal means (*EMMs*) for each factor level, along with the differences between levels, standard errors (*SE*), and *p*-values using the `estimate_contrasts()` function from the *modelbased* package (Makowski et al., 2020), with accompanying graphical illustrations (Figures 3–5).

Frequency of initiation across children's age

We first examined whether the number of initiated blocks differs between speakers (adult and child) and across age. We constructed a generalised linear mixed model (negative binomial GLMM for overdispersed count data) on the number of initiated blocks with the model formula: block numbers ~ Block_Type * Child_Age + (1 + adult's gender | dyad). This model included Block Type (adult-initiated or child-initiated), Child Age, and their interactions as fixed factors. Additionally, we included dyads as random intercepts to account for individual differences among participants. The model, analysed with the `Anova()` function in the *car* package (Fox, 2009), showed no significant main effect of Block Type, $\chi 2(1) = .21$, $p = .648$, and no significant main effect of Child Age, $\chi 2(1) = 1.22$, $p = .267$. However, there was a significant interaction between Block Type and Child Age, $\chi 2(1) = 4.22$, $p = .040$. The interaction between Block Type and Child Age, as illustrated in Figure 2, shows that children between 7 and 10 months old show no significant differences ($p > .05$) in the number of initiated blocks. However, from 11 months onwards, children initiate a greater number of blocks than adults ($p < .05$).

Table 2. Model outputs on initiator effect, its interaction with age and other covariates

	Segment duration			Number of segments		
Predictors	*β (SE)*	*CI*	*p*	*β (SE)*	*CI*	*p*
(Intercept)	0.36 (0.01)	0.34 – 0.39	< .001	1.32 (0.04)	1.24 – 1.40	< .001
Speaker [CHN]	−0.33 (0.00)	−0.34 – −0.32	< .001	−0.38 (0.01)	−0.40 – −0.35	< .001
Block [CIC]	−0.06 (0.00)	−0.07 – −0.06	< .001	−0.49 (0.01)	−0.52 – −0.46	< .001
Child Age	0.05 (0.01)	0.03 – 0.07	< .001	−0.05 (0.02)	−0.09 – −0.01	.022
SES Composite	0.02 (0.01)	0.00 – 0.03	.009	0.04 (0.02)	0.00 – 0.07	.046
Sex [M]	0.02 (0.02)	−0.01 – 0.05	.284	−0.01 (0.04)	−0.09 – 0.07	.792
Speaker [CHN] × Block [CIC]	0.14 (0.01)	0.13 – 0.15	< .001	0.77 (0.02)	0.73 – 0.81	< .001
Speaker [CHN] × Child Age	0.02 (0.00)	0.01 – 0.03	< .001	0.14 (0.01)	0.11 – 0.17	< .001
Block [CIC] × Child Age	−0.01 (0.00)	−0.02 – 0.00	.087	0.05 (0.01)	0.02 – 0.08	.001
Speaker [CHN] × Block [CIC] × Child Age	−0.01 (0.01)	−0.02 – 0.01	.304	0.02 (0.02)	−0.02 – 0.06	.313

	Response interval			Number of turns		
Predictors	*β (SE)*	*CI*	*p*	*β (SE)*	*CI*	*p*
(Intercept)	−1.76 (0.05)	-1.85 – −1.67	< .001	0.40 (0.02)	0.37 – 0.43	< .001
Turn [C-to-A]	−0.24 (0.02)	−0.27 – −0.21	< .001	0.05 (0.01)	0.03 – 0.07	< .001
Block [CIC]	−0.05 (0.02)	−0.09 – −0.01	.007	0.01 (0.01)	−0.01 – 0.03	.190
Child Age	−0.13 (0.03)	−0.19 – −0.07	< .001	0.01 (0.01)	−0.00 – 0.03	.129
Sound type [with-sound-between]	2.75 (0.01)	2.72 – 2.77	< .001	−0.22 (0.01)	−0.23 – −0.20	< .001
SES Composite	−0.07 (0.03)	−0.12 – −0.02	.004	**model did not converge with the SES and sex factors*		
Sex [M]	−0.08 (0.06)	−0.20 – 0.03	.153			
Turn [C-to-A] × Block [CIC]	0.11 (0.03)	0.06 – 0.16	< .001	−0.14 (0.01)	−0.17 – −0.11	< .001
Turn [C-to-A] × Child Age	−0.00 (0.02)	−0.04 – 0.03	.814	−0.00 (0.01)	−0.03 – 0.02	.663
Block [CIC] × Child Age	−0.01 (0.02)	−0.04 – 0.03	.732	0.01 (0.01)	−0.01 – 0.03	.322
Turn [C-to-A] × Block [CIC] × Child Age	−0.05 (0.03)	−0.10 – −0.00	.043	0.01 (0.01)	−0.02 – 0.04	.384

Table 3. Modelled with CDI percentile and its interaction with adult–child interactions and concurrent language skills.

	Segment duration			Number of segments		
Predictors	*β (SE)*	*CI*	*p*	*β (SE)*	*CI*	*p*
(Intercept)	0.36 (0.01)	0.33 – 0.38	< .001	1.93 (0.10)	1.74 – 2.13	< .001
Speaker [CHN]	−0.37 (0.01)	−0.39 – −0.36	< .001	−0.30 (0.01)	−0.32 – −0.28	< .001
Block [CIC]	−0.06 (0.01)	−0.07 – −0.04	< .001	−0.43 (0.01)	−0.45 – −0.40	< .001
K-CDI Percentile	0.00 (0.01)	−0.01 – 0.02	.688	0.05 (0.04)	−0.04 – 0.13	.269
SES composite	0.01 (0.01)	−0.00 – 0.03	.109	0.07 (0.04)	−0.02 – 0.15	.127
Sex [M]	0.02 (0.02)	−0.01 – 0.05	.236	0.04 (0.09)	−0.13 – 0.22	.640
Speaker [CHN] × Block [CIC]	0.09 (0.01)	0.07 – 0.11	< .001	0.51 (0.02)	0.47 – 0.54	< .001
Speaker [CHN] × K-CDI Percentile	−0.00 (0.01)	−0.01 – 0.01	.885	−0.02 (0.01)	−0.04 – 0.00	.051
Block [CIC] × K-CDI Percentile	0.01 (0.01)	0.00 – 0.03	.040	−0.07 (0.01)	−0.10 – −0.05	< .001
Speaker [CHN] × Block [CIC] × K-CDI Percentile	−0.02 (0.01)	−0.04 – −0.00	.023	−0.05 (0.02)	−0.08 – −0.01	.007

	Response interval			Number of turns		
Predictors	*β (SE)*	*CI*	*p*	*β (SE)*	*CI*	*p*
(Intercept)	−2.00 (0.09)	−2.19 – −1.82	< .001	0.80 (0.05)	0.70 – 0.91	< .001
Turn [C-to-A]	−0.29 (0.03)	−0.34 – −0.23	< .001	0.05 (0.02)	0.02 – 0.08	.003
Block [CIC]	0.08 (0.03)	0.02 – 0.15	.015	−0.11 (0.02)	−0.14 – −0.07	< .001
K-CDI Percentile	−0.04 (0.06)	−0.16 – 0.08	.495	−0.05 (0.03)	−0.11 – 0.01	.114
Sound type [with-sound-between]	2.91 (0.02)	2.86 – 2.95	< .001	−0.36 (0.01)	−0.38 – −0.33	< .001
SES composite	−0.06 (0.06)	−0.18 – 0.05	.261	0.04 (0.03)	−0.01 – 0.10	.121
Sex [M]	0.02 (0.12)	−0.21 – 0.25	.874	−0.01 (0.06)	−0.14 – 0.11	.820
Turn [C-to-A] × Block [CIC]	0.07 (0.05)	−0.02 – 0.16	.112	−0.13 (0.03)	−0.18 – −0.07	< .001[3]
Turn [C-to-A] × K-CDI Percentile	−0.05 (0.03)	−0.11 – 0.00	.068	0.00 (0.02)	−0.03 – 0.03	.925
Block [CIC] × K-CDI Percentile	0.01 (0.03)	−0.06 – 0.08	.774	0.00 (0.02)	−0.04 – 0.04	.997
Turn [C-to-A] × Block [CIC] × K-CDI Percentile	0.07 (0.05)	−0.02 – 0.16	.128	−0.00 (0.03)	−0.05 – 0.05	.933

[3]The significant results in Table 3 compare a specific set of contrast, that is, between the adults' turn numbers in CIC with the intercept (children's turn numbers in AIC), but are not relevant to the initiator effect tested. We have included this table to provide traditional statistics in line with the reviewers' suggestion, while the chi-square approach, provided in-text, effectively reports the key effects under investigation.

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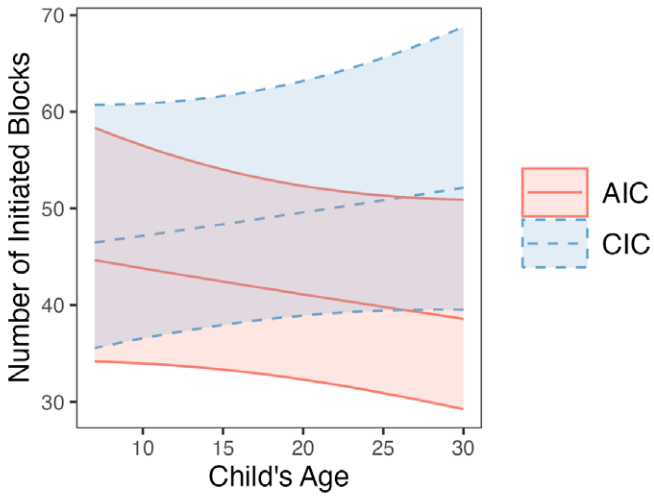

Figure 2. Model's predicted number of initiated blocks in AIC (adult-initiated conversational block) and CIC (child-initiated conversational block) across children's ages.

The main model

We examine the effect of interlocutory order by measuring four aspects of adult–child interactions: segment duration, number of segments, response interval, and the number of turns, in a series of GLMMs. The models' ANOVA outputs are summarily reported in Table 2. Each measure in the first column of Table 2 represents a dependent variable (i.e., segment duration, number of segments, response interval, and number of turns) which is separately fitted in a GLMM model and thus four GLMM models are fitted in total.

The models for segment duration and number of segments included fixed factors such as *Speaker* (adult or child), *Block Type* (adult-initiated or child-initiated), and *Child Age* (children's age). We also included SES composite[4] and sex as covariates due to their potential influence on children's language development, with the model formula: measure (segment duration/number of segments) ~ Speaker * Block_Type * Child_Age + SES_composite + sex + (1 + adult's sex | dyad).

In contrast, the models for response interval and number of turns included fixed factors such as *Block Type, Turn Type* (adult-to-child turn, i.e., child's response to the adult, A-to-C, or child-to-adult turn, i.e., adult's response to the child, C-to-A), *Intermittent Sound Type* (with-intermittent-sound, i.e., far sounds and sounds from electronics in the initiation-response interim, or no-intermittent-sound, i.e., only SIL (silence) segments allowed in the interim), and *Child Age.* The intermittent sound variable in the response metrics is included to account for the potential impact of background sounds on response latency and possible interruptions[5], with the model formula: measure (response

[4]The SES composite score is calculated as the sum of four equally weighted, standardized scores (z-scores) of parental education rank and income rank and the formula is as follows:

SES Composite Score = 0.25[Z(Income_father) + Z(Income_mother) + Z(Education_father) + Z(Education_mother)]

[5]Our analyses focus solely on segments attributed to either a child or an adult, excluding segments classified by LENA as overlapping speech (OLN). In response to the reviewer's feedback, we conducted supplementary analyses to explore the impact of overlapping speech classification by LENA, which assigns audio segments to a

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interval/number of turns) ~ Turn * Block_Type * Child_Age + sound_type + SES_composite + sex + (1 + adult's sex | dyad). SES effects were found consistently across all variables, while sex effects were not observed. The next section focuses on the effects directly related to our main research questions.

Q1: Does the initiator effect (Ko et al., 2016) replicate in Korean caregiver-child dyads?

To investigate whether the initiator effect observed in previous research extends to a different population, we examined its presence in Korean caregiver–child dyads. We found a consistent initiator effect across multiple conversational metrics (Figure 3), with partial effect for turn number. Specifically, for segment duration, there was a significant interaction between Speaker and Block Type ($\chi^2(1) = 158.243$, $p < .001$). Initiators spoke longer (ADT in AIC: *EMM* = 1.45, *SE* = .01; CHN in CIC: *EMM* = 1.12, *SE* = .01) than respondents (ADT in CIC: *EMM* = 1.36, *SE* = .01; CHN in AIC: *EMM* = 1.04, *SE* = .01; *p*'s < .001). For the number of segments, there was also a significant interaction between Speaker and Block Type ($\chi^2(1) = 288.818$, $p < .001$). Initiators produced more segments (ADT in AIC: *EMM* = 3.73, *SE* = .13; CHN in CIC: *EMM* = 3.38, *SE* = .12) than respondents (ADT in CIC: *EMM* = 2.28, *SE* = .09; CHN in AIC: *EMM* = 2.56, *SE* = .09; *p*'s < .001).

For response intervals, there was a significant interaction between Turn and Block Type ($\chi^2(1) = 14.496$, $p < .001$). Initiators responded quicker (C-to-A in AIC: *EMM* = 0.51, *SE* = .02; A-to-C in CIC: *EMM* = 0.62, *SE* = .02) than respondents (C-to-A in CIC: *EMM* = 0.54, *SE* = .02; A-to-C in AIC: *EMM* = 0.65, *SE* = .02; *p*'s < .001). For the number of conversational turns, there was a significant interaction between Turn and Block Type ($\chi^2(1) = 23.177$, $p < .001$). The number of conversational turns showed a partial initiator effect, with adults responded more frequently when they were the initiator (in AIC, *EMM* = 1.41, *SE* = .02) than when they were not (in CIC, *EMM* = 1.25, *SE* = .02, $p < .001$), but no differences were found for children ($p = .556$).

Q2: Is the initiator effect robust across child age?

Children's age was included as an interaction term in the main model to examine developmental changes in initiator effect, i.e., Speaker × Block Type × Child Age for segment duration and number of segments; Turn × Block Type × Child Age for response interval and number of turns). There were no significant three-way interactions involving Child Age for segment duration, number of segments, or turn number (*p*'s > .05), indicating that the initiator effect is held consistent regardless of childrens' age. However, a significant three-way interaction was found between Turn × Block Type × Child Age ($\chi^2(1) = 4.107$, $p < .001$) for response interval. Pairwise comparisons as depicted in Figure 4-C shows that the initiator effect in adult's response interval was significant between 7 and 17 months but diminished with children's age, with no evidence of the

single source-type category at a time. Our additional investigation, detailed at https://osf.io/fqj43/ (under supplementary analyses/overlapping_sound_and_noise_segments), indicates that the inclusion of overlapping speech segments does not alter the fundamental findings or interpretations of our study. Despite OLN segments being associated with shorter durations, increased segment and turn counts, and longer response latencies compared to segments produced by a single speaker, these observations did not influence the initiator effect. This reaffirms the robustness of our results against such classifications.

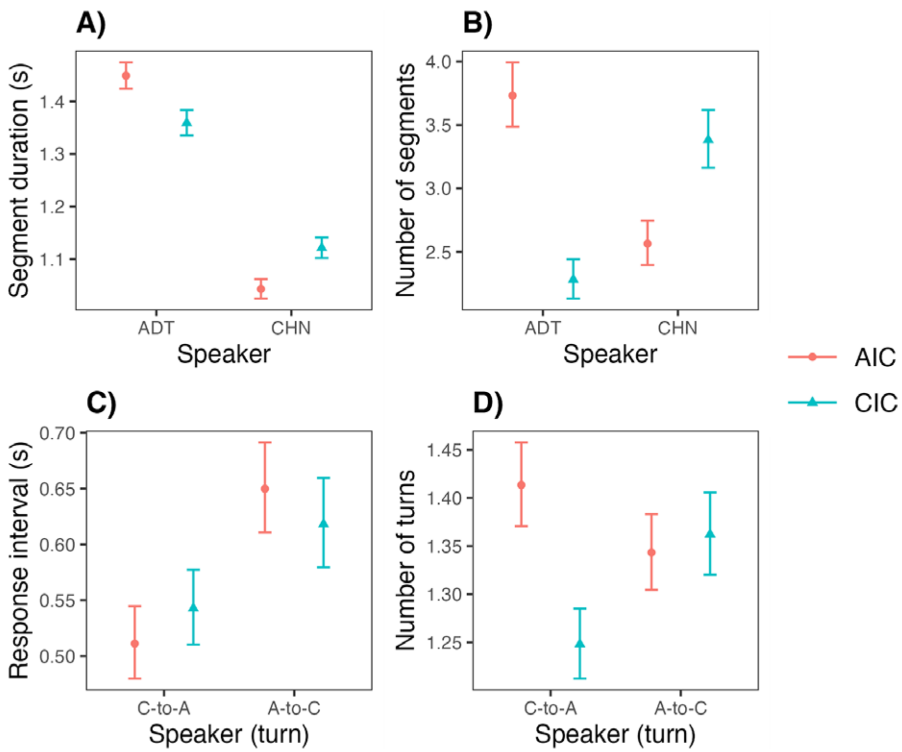

Figure 3. Errorbar plots of four metrics: at the segment level, A) segment duration and B) the number of segments; and at the conversational turn level, C) response interval, and D) the number of turns. ADT represents the adult, C-to-A represents child-to-adult turn, CHN represents the child and A-to-C represents adult-to-child turn in adult-initiated (AIC) and child-initiated (CIC) blocks.

effect from 18 months onwards, whereas initiator effect in children's response interval was significant between 9 and 24 months old.

Q3: Is the initiator effect robust across varying language abilities?

Building on the question of whether the initiator effect is robust across cultures and ages, we now explore whether it remains consistent across varying levels of children's language abilities. Specifically, we investigated how patterns of adult–child dyadic interactions relate to children's concurrent language abilities, measured using K-CDI, with a focus on children between 13 and 14 months of age ($N = 40$). We employed a simplified model to compare interaction patterns with children's receptive vocabulary scores, with the model formula: segment measure (segment duration/number of segments) ~ Speaker * Block_Type * CDI_Percentile + SES_composite + sex + (1 + adult's sex | dyad); turn measure (response interval/number of turns) ~ Turn * Block_Type * K-CDI_Percentile + sound_type + SES_composite + sex + (1 + adult's sex | dyad).

We found significant interactions between block type and speaker in segment duration ($\chi^2(1) = 54.763$, $p < .001$) and numbers ($\chi^2(1) = 369.738$, $p < .001$), in turn number ($\chi^2(1) = 7.722$, $p = .005$), but not in response intervals ($\chi^2(1) = 0.095$, $p = .758$).

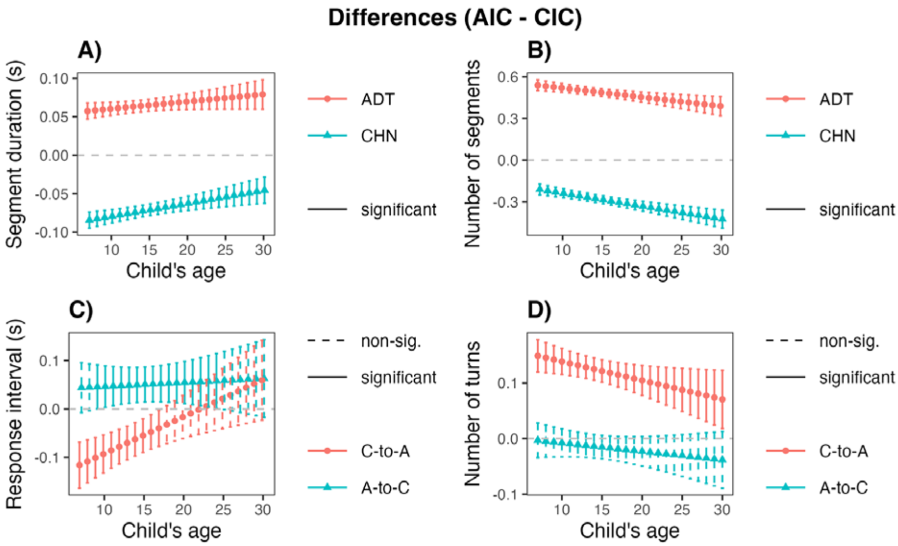

Figure 4. Initiator effect (defined as differences in EMMs between AIC and CIC) across age for adults (ADT/C-to-A) and children (CHN/A-to-C) across four metrics. Positive values for adults and negative values for children indicate the presence of the initiator effect in (A), (B), (D), the opposite direction is expected for (C). Note that only initiator effects in response intervals show significant interaction with the child's age.

Pairwise comparisons revealed initiator effect, in which speakers producing longer segments (ADT: *EMM* = 1.45, SE = .01; CHN: *EMM* = 1.03, SE = .01), more segments (ADT: *EMM* = 7.10, SE = .56; CHN: *EMM* = 5.70, SE = .45) when initiating compared to responding (p's < .001), and partially in turn number, in which both adults and children produce more responses in AIC (ADT: *EMM* = 1.95, SE = .07; CHN: *EMM* = 1.86, SE = .07) than in CIC (ADT: *EMM* = 1.55, SE = .05; CHN: *EMM* = 1.67, SE = .06, p's < .001).

However, the analysis also revealed significant interactions between children's K-CDI Percentile Scores, Speaker, and Block Type for segment duration ($\chi^2(1)$ = 5.200, p = .02) and numbers ($\chi^2(1)$ = 7.292, p = .007), thus further pairwise comparisons are conducted. For segment duration, the initiator effect in both adult and children segment duration remains significant throughout K-CDI (p's < 0.05), with exceptions at higher K-CDI percentile score bands for children (77th percentile and above, see Figure 5). The segment duration results show an attenuation of the initiator effect with higher K-CDI percentiles, with differences approaching zero for both speakers. In contrast, for segment numbers, pairwise comparisons reveal that the initiator effect in children attenuates across K-CDI percentiles (between 52th and 65th) and even reverses with higher K-CDI children (66th percentile and above), whereas the effect continues to increase in adults.

Discussion

Caregivers' speech input plays a pivotal role in children's language development, where both the quantity and the quality of speech hold significant importance (Bornstein et al.,

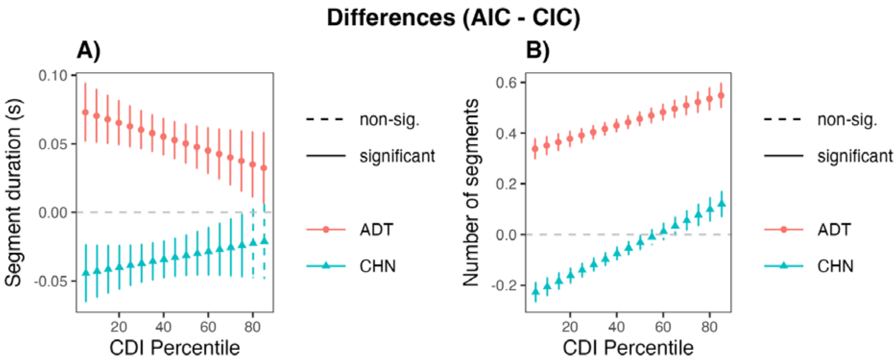

Figure 5. Initiator effect (defined as differences in EMMs between AIC and CIC) across K-CDI percentiles for adults (ADT/C-to-A) and children (CHN/A-to-C) in segment duration and number. Positive values for adults and negative values for children indicate the presence of initiator effect. Each error bar represents the model-estimated pairwise comparisons of EMMs at 5-percentile intervals of K-CDI scores.

2020; Hart & Risley, 1995; Hoff, 2003; Huttenlocher, 1998; Rowe, 2012). Yet, the initiative role in these exchanges and its impact on language development has remained relatively unexplored. With the aim of identifying adult–child interaction patterns that might be associated with children's language abilities, we examined naturalistic Korean adult-child interactions with children aged between 7 and 30 months.

The initiator effect and its robustness

Our study on Korean caregiver–child dyads confirms and extends the initiator effect observed by Ko et al. (2016). In addressing Q1, we found consistent evidence of this effect across multiple conversational metrics, including segment duration, number of segments, and response intervals, aligning with Goffman's (1974) frame theory, which we will discuss later. We observed the effect of interlocutory order (initiator effect), in which both adults and children produced longer and more segments and responded more quickly in their own-initiated blocks, whereas both speakers responded more frequently in their own-initiated blocks than the other speakers.

In Q2, we investigated the robustness of the effect and found that the initiator effect in segment duration and number remained independent from children's age, sex, and SES. This outcome is in line with our hypothesis that the mechanism behind the initiative role in conversational exchanges is rooted in the more general properties of conversational dynamics (Tomasello, 1988) rather than tied to a specific group or an age. The identification of initiator effects in both adult and child challenges conventional assumptions that conversations are mainly steered by adults. Our results highlight that infant-adult interactions are mutual, dynamic exchanges, underscoring the active participation of both interlocutors.

Furthermore, the study revealed clear evidence of cross-sectional developmental changes, i.e., greater ability to engage in conversational interactions among older children. Specifically, it was observed that older children initiated more conversations, produced more segments, and lasted for a longer duration than younger children. The developmental trajectory corresponded with a shift in adult–child interaction dynamics, in which adults tend to initiate fewer conversations, producing shorter and fewer segments when

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interacting with older children. These findings align with a previous study conducted by VanDam et al. (2022), which also reported a higher rate of initiation among 25–37-month-old children compared to their parents. This suggests that older children possess greater sense of control within conversations as a result of enhanced spoken language abilities. Moreover, the adjustments observed in adult–child interaction dynamics provide additional opportunities for the children to practice their speaking skills.

While SES was not the primary focus of our study, we included it as a covariate to assess its impact on conversational dynamics, particularly regarding the initiator effect. Our results indicated that higher SES composite scores were associated with longer segment durations, more segments, and shorter response intervals. This aligns with the well-established link between SES and infants' language development. A more detailed modelling of the SES effect is beyond the scope of this paper and remains a topic for future research. Crucially, all significant initiator effects observed in both models remained robust even after accounting for SES, suggesting that these effects are independent of SES. The findings of our study, alongside our previous investigations involving Canadian and American infants (Ko et al., 2016; Ko, 2021), suggest that this phenomenon embodies fundamental interactional mechanisms inherent in verbal exchanges across various socio-economic and cultural contexts.

Relation between adult's initiative roles and children's language abilities

Our aim in Q3 was to investigate the robustness of the initiator effect across a range of children's vocabulary abilities. To accomplish this, we narrowed our focus to a specific subsample of children who were 13 and 14 months old and compared their receptive vocabulary scores measured by K-CDI percentile. The relationship between the initiator effect and children's vocabulary abilities was more nuanced than we expected. Our analysis showed that the initiator effect generally persists in adults across a wide range of CDI percentiles; we found a significant initiator effect in segment numbers, segment duration, and adult turn numbers. In contrast, children showed a significant initiator effect in segment numbers, attenuated effect in segment duration, but no effect in response interval and response turn numbers.

When considering children's receptive vocabulary abilities alongside initiator effects in the number and duration of segments, adults consistently showed a significant effect across all percentile scores. Our findings suggest that caregivers tended to increase the relative amount of input in adult-initiated conversation and adjust their speech duration when their children understood more vocabulary, while maintaining the initiator effect. In contrast, children only showed a limited effect when incorporating their vocabulary abilities; Children with higher receptive vocabulary abilities produced more segments in AIC than in CIC and showed an attenuated initiator effect for segment duration. Three possible explanations may account for the observed patterns of interaction in segment duration: (1) adults speak more in their initiated interactions with children of greater scores in K-CDI because of children's more advanced linguistic capabilities and propensity to engage in contingent interaction (i.e., adults' contributions to conversation as a reaction of child's capabilities); (2) adults' propensity to speak more in their initiated interactions promote children's outcome (i.e., adults' active effort in conversation leading to a greater K-CDI scores); (3) on the other hand, it is also possible that, through parents' active participation in their conversations, they had more information about their children's word knowledge thus being able to report more words in the K-CDI. It is not easy to tease apart these possibilities with the results in the current study, and it might not be even possible to do that since the hypotheses are not mutually exclusive. Interpreting the patterns observed in segment duration is challenging given the minimal differences in the raw signal, making it difficult to draw meaningful conclusions. Further research is needed to explore the relationship between interaction patterns and language abilities, particularly given the contrasting trends observed in segment duration. Future studies that examine both receptive and expressive language skills could provide a more comprehensive understanding of these dynamics, as children's active participation may be more closely tied to expressive rather than receptive language development.

Mechanism of the initiator effect related to learning

Our primary focus centres on the implications of the initiator effect for child language acquisition. Nonetheless, we recognise that our findings may extend to broader theoretical discussions regarding human communication and interaction. With limited research directly targeting this phenomenon, Goffman (1974)'s framework provides insight into how the initiator effect manifests in social interactions. By initiating the conversation and establishing the initial frame, the initiator shapes the interaction's dynamics, leading to observable differences in speaking patterns between initiators and respondents. However, Goffman also emphasises the active involvement of all participants in the interpretive process. While the initiator sets the interaction's initial direction, others actively engage in interpretation and response based on their perspectives, motivations, and goals. This dynamic interplay allows for a complex negotiation of meanings and agendas within the interaction. To further illuminate our understanding, we suggest that future research investigate the speech acts (Searle, 1969) accompanying the onset of conversational blocks. Such an investigation should encompass non-verbal cues preceding verbal interactions, considering the multifaceted nature of communication cues. As Tomasello (2008) discusses, a pointing could be a request for help (imperative), a sharing of attitudes (expressive), or an offer to help (informative). Therefore, a comprehensive evaluation of the context will be essential for this endeavour. Exploring the initiator effect within the context of these theoretical frameworks will further enrich the significance and implications of our research for understanding the dynamics of human communication.

This discussion naturally leads us to the broader consideration of how the initiator effect might exert universal impacts across different cultures and facilitate early language development, especially given our finding that adult-initiated speech correlated with infants' comprehension development in 13–14-month olds. Infants initially lack the ability to actively participate in social interactions, thereby necessitating adults to take the lead in initiating and sustaining engagement (Tomasello, 1988). Consequently, adults typically assume the role of initiators in these interactions, often by aligning themselves with the infant's existing focus of attention or by guiding the infant's attention towards a shared external stimulus. This process, as observed in studies such as Collis and Schaffer (1975) and Murphy and Messer (1977), underscores the critical role of adults in facilitating early social interactions. Adults who initiate interactions with children typically hold more conversational control, selecting topics, posing questions, and steering the flow of communication. This notion resonates with Goffman's idea that initiators often have some influence on the frame and content of the exchange. Such interactions provide invaluable opportunities for children to enrich their vocabulary, hone turn-taking skills, and develop conversational proficiency, thus laying essential foundations for their linguistic and social growth.

Validity of LENA-defined conversational blocks

While we value the efficiency of LENA's automated analysis in categorising conversational dynamics, it is important to recognise certain limitations due to its mechanistic approach. In particular, we recognise uncertainties regarding what LENA identifies as conversational blocks and how they relate to the participants' experiences of verbal interaction. The concept of conversational blocks originates from Hart & Risley (1992), who isolated child-participating interactional episodes ending when there was no response within 5 seconds of a speaker's utterance for transcription. They documented the activities for that episode and whether the parent was in the same room as the child. In comparison, LENA identifies a conversational block regardless of the child's participation, resulting in some methodological differences. It remains unclear whether a LENA-defined conversational block necessarily contains topic-coherent bursts of interactions, making it uncertain if the same annotations applied in the original Hart and Risley's scheme would be appropriate. For example, LENA will mechanically define a conversation even when the interaction constitutes episodes of behavioural turn-taking, or proto-conversations (Bateson, 1979), in which the conventional topic-comment structure of an utterance is lacking and the baby simply behaves and adults simply fills in the gaps (Tomasello, 1988). At present, there is a scarcity of research addressing these intricacies, calling for a deeper investigation into the nature of units in conversational interactions. Nevertheless, studies utilising extensive human-annotated datasets, such as the Providence corpus in CHILDES, as demonstrated by Ko (2021), have similarly identified initiator effects in both utterance duration and response time using manually coded data. This consistency observed across LENA and human-coded data highlights the robustness and reliability of the initiator effect, as well as the validity of automated analysis tools like LENA in accurately capturing and interpreting these interactions.

Avenues for future research

As a cross-sectional study utilising concurrent speech data collected via LENA, it poses certain constraints concerning the adult-initiated interactions as a predictive measure of child language outcome. Nevertheless, our results are consistent with the findings in earlier research. For example, as mentioned earlier, infants who engage in a higher number of adult-initiated conversations at 6 months of age exhibited more advanced expressive language when they were 18 months old (Salo et al., 2022). Moreover, intervention studies have demonstrated that encouraging parents to actively engage in conversations with their children, though not specifically in the context of the initiator effect, leads to improved language outcomes up to 30 months (Ferjan Ramírez et al., 2020; Huber et al., 2023). These consistent results suggest that our study's findings may hold true with predictive measures. To confirm this prediction, future research could explore child language outcomes across development using age-appropriate assessment tools, with eye-tracking methodology providing direct measurements of early word recognition for infants (Zettersten et al., 2023; for Korean infants, Chai et al., 2023) and tablet-based assessments for toddlers' word comprehension from 18 months onward (Frank et al., 2016; Lo et al., 2021).

Additionally, the current work examined the quantitative aspects of adult–child interactions based on the audio-only data. Parent's interactions with their infants are multimodal – they point, direct their gaze, touch the infants and/or the objects while they speak, and infants can benefit from nonspeech contextual information when learning words (Yu, Ballard, & Aslin, 2005). However, our LENA-generated data may have overlooked initiative behaviours that were triggered by non-audio signals. For example, a conversational block could have been initiated by child's pointing to an object and an adult responding to it, but such an interaction would have been labelled as an adult-initiated block based on the audio. It is thus important to extend the current research with consideration of the multimodal aspects and its effect on adult–child interaction and language learning.

We acknowledge that the current work does not explore the nuanced differences in parenting styles between mothers and fathers. Research suggests that parents interact differently with their children, for example, mothers often being more soothing and responsive (e.g., Berman, 1980; Dayton et al., 2015), potentially fostering emotional development, whereas fathers posing more wh-questions (e.g., Rowe, Leech & Cabrera, 2017) that might stimulate cognitive development. Differences in interaction styles such as these mentioned could potentially influence children's language development in unique ways. While our study does not specifically address these role-based distinctions, we recognise their potential importance and suggest this as an area for future research.

Conclusion

Our study of Korean adult–child interactions corroborates and extends the initiator effect observed in Western populations (Ko et al., 2016), revealing its persistence across cultural contexts and ages. We found that both adults and children exhibit more active engagement when initiating conversations, suggesting this effect represents a fundamental aspect of human interaction. Our investigation reveals a nuanced relationship between adult-initiated interactions and children's language abilities as their first words begin to emerge. For segment numbers, stronger initiator effects were observed in adults interacting with children of higher receptive language abilities, with reversed effect in children. Conversely, for segment duration, the effect attenuated at higher CDI percentiles, possibly indicating adults' adjustment to children's receptive vocabulary abilities. This study underscores the complexity of early language development and the importance of considering both quantitative and qualitative aspects of adult–child interactions. Future research should explore multimodal aspects, potential differences in parenting styles, and long-term language outcomes to further elucidate the role of the initiator effect in language acquisition.

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Competing interest. The author(s) declare none.

Data availability statement. The data that support the findings of this study are openly available at https://osf.io/fqj43/.

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