Language Documentation and Conservation Special Publication No. 30
Bridging Child Language Research to Practice for Indigenous Language Revitalization
ed. by Amalia Skilton, Ryan E. Henke, and Melvatha R. Chee
https://nflrc.hawaii.edu/ldc/sp30/
http://hdl.handle.net/10125/74822

DINÉ CHILD LANGUAGE REVITALIZATION AND RESEARCH AT SAAD K'IDILYÉ

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Saad K'idilyé is a Navajo language nest dedicated to creating first-language speakers of Diné Bizaad. Prenatal families and children under age three are immersed in Navajo language and culture, where the use of English is strongly discouraged. In 2022, Saad K'idilyé partnered with UNM's Indigenous Child Language Research Center to document how Diné Bizaad is spoken to and learned by children. In the nest, caregiver speech is rich, engaging, and almost entirely in Navajo, with less than 1% of English use. Descriptions of caregivers' attention-grabbing speech and their most frequently produced words are provided. A closer look at children's speech, including their babbling and vocalizations, shows that many early words mirror adult language, with particles appearing before nouns and verbs. The findings of this work are intended to support Saad K'idilyé's mission to foster a new generation of Navajo speakers and ensure Diné Bizaad will continue into the future.

1 Introduction

Diné Bizaad (Navajo, ISO 632-2: nav) is a member of the Southern Apachean branch of the Dene language family. Diné Bizaad is spoken primarily on the Navajo Nation, the largest area retained as a sovereign nation by Indigenous peoples in the southwestern United States, spanning across parts of New Mexico, Arizona, and Utah.

1.1 Diné Bizaad language shift

Although there are general reports of large populations of Diné speakers, most fluent speakers are older than 40 (Chee 2017). Furthermore, the COVID-19 pandemic particularly devastated speaker populations. One report from 2021 (Becenti 2021) estimated that two-thirds of deaths from COVID-19 in Navajo Nation were people 65 and older. It is increasingly rare for children to learn Diné Bizaad as a first language in the home (Chee 2017), and this trend was recognized as early as 1973 (Spolsky 1974). In the 1980s, 93% of Diné people were reported to speak Diné Bizaad across the United States. By 2010, this had decreased to an estimated 51%. Florian Johnson, a cultural specialist at Rock Point Community School, calculated these percentages using U.S. census data from those years. Although these numbers are frequently cited in news articles, reports, theses, and dissertations (Tome 2021; Valenski 2021), the methodology used by Johnson to calculate numbers of Diné Bizaad speakers has not been published. In a language survey by Johnson and Legatz (2006) conducted at Tséhootsooí Diné Bi'olta', a school on the Navajo Nation where instruction is provided primarily in Diné Bizaad, 63% of older students (grades 4–12) and 85% of parents agreed that Diné language loss is occurring. Further, just 51% of younger students (grades K–3), 8% of older students, and 42% of parents agree that they are proficient in the Diné language. These percentages are indicators of language loss within the Diné Nation. A recent study of Navajo language acquisition (Chee 2017) identifies very few children as first language speakers. AnCita Benally, the program manager for the Navajo Nation Office of Standards, Curriculum and Assessment Development, reported to the Navajo Times that Navajo children, especially the youngest ones, are less likely to speak Navajo (Denetclaw 2017). Outside of the Navajo Nation, Diné Bizaad may be even more threatened. Many Diné live in urban environments, with few programs available to address their language needs.

The opportunity to study the acquisition of Indigenous languages by children is quickly disappearing. When the only remaining speakers of a language are the elderly, the future of that language becomes uncertain (Chee et al. 2025). Child speakers are foundational to sustaining and maintaining languages. Yet very few Indigenous children across North America are learning the traditional languages of their communities (Krauss 1992: 4; Meek 2019: 95). To combat language loss, efforts are being implemented to develop child speakers of Indigenous languages. One such effort is language nests, where infants and toddlers are immersed in their traditional language. This environment creates an optimal opportunity to document their acquisition process. In general, there is a lack of language documentation focusing on children's use of linguistic and grammatical features in Indigenous languages (Pye 2021; Kidd & Garcia 2022), which is largely due to research focusing primarily on fluent adult speakers. Our language nest, Saad K'idilyé, finds value in the linguistic study of child language.

1.2 Indigenous child language

The first language acquisition of Indigenous North American languages is very much understudied (Kidd & Garcia 2022). Studies addressing the development of such languages are especially

few but still ongoing (e.g., Mithun 1989; Crago & Allen 1998; Mateo Pedro 2020; Lee, Johnson & Allen 2023; Skilton 2023a; Pierson 2024; Henke et al. 2024; Chee 2025; Henke 2025). There are a few studies that address the acquisition of the Navajo verb (Saville-Troike 1996; Courtney & Saville-Troike 2002; Chee 2007; Gentner & Boroditsky 2009; Chee 2017, 2025).

Studies of the acquisition of Native American languages are very rarely undertaken by speakers of the language, and Chee is the first Navajo person to conduct linguistic research on how children learn to speak Navajo (Chee & Henke 2024). Chee's (2007; 2017; 2025) analyses of Navajo speech by children aged four to 11 years highlight an area of child language acquisition which has not received enough scholarly attention, representing an important contribution to the small body of literature. The kind of detailed understanding of a language that a native speaker brings to their study is invaluable in interpreting the data produced by children. Navajo child language research work is crucial to understanding and expanding the linguistic knowledge base of Navajo. The knowledge gained through research at Saad K'idilyé provides a description of child-directed speech (CDS) and sheds light on the earliest stage of Diné Bizaad development.

In the sections below, we introduce Saad K'idilyé and lay out our methodology, research questions, results, future research questions, discussion, and conclusion. This work addresses five research questions. The first three questions are focused on CDS, which is also known as "motherese." The last two questions are focused on the children and their production of Diné Bizaad. The results shared are based on analyses done by the Indigenous Child Language Research Center at the University of New Mexico (ICLRC).

2 Saad K'idilyé

The language nest, Saad K'idilyé, was established in 2022 in Albuquerque, New Mexico. It was founded by five community members, all of whom are involved with Navajo language education in some capacity: Warlance Chee, Mary Whitehair-Frazier, Melvatha R. Chee, Tiffany Lee, and Cheryl Yazzie. After two years of planning, Saad K'idilyé came to life and opened its doors in August 2022.

Saad K'idilyé's primary goal is to produce child speakers of Diné Bizaad. There is a focus on prenatal families and children under the age of three. In the nest, infants and newborns are fully immersed in Navajo language and culture. The use of English is not permitted. The strength of Saad K'idilyé is its foundation, which follows a traditional Diné knowledge framework. Most recently, Saad K'idilyé expanded their language nest to include pre-kindergarten children, ages three to four, to extend their Navajo language education for as long as possible.

Saad K'idilyé's Navajo language and cultural education is also provided for the children's nuclear families. Families attend weekly language classes and participate in cultural activities (e.g., moccasin making) and cultural teachings (e.g., traditional child-rearing practices) provided each month. Cultural experts are invited to teach Navajo culture. Saad K'idilyé believes that the greatest impact can be made at these very early stages.

To document and gain insight about the acquisition process of Diné Bizaad, Saad K'idilyé

has partnered with the ICLRC to carry out research. Saad K'idilyé believes research is valuable, especially if it is used to advance their work at the language nest. In turn, they share their successes and challenges to contribute to other language nests in the U.S. and Canada. Saad K'idilyé is committed to five years of documenting caregiver-child interaction. Funding for this project was obtained from University of New Mexico's Center for Regional Studies and from the state of New Mexico's Research and Public Service Projects. Chee's expertise and the goals of the ICLRC provide the foundation for a successful collaboration.

3 Methods

This paper reports on a pilot study conducted by the ICLRC at the University of New Mexico (UNM) in partnership with Saad K'idilyé. The ICLRC is directed by Dr. Chee, a Diné-speaking linguist from the Navajo Nation. As the Primary Investigator (PI), she founded the ICLRC to support community-led first language acquisition research through consultations and software training. The ICLRC aims to assist Indigenous communities in New Mexico with this type of work and to support revitalization and sustainability efforts.

The goal of this pilot study was to document CDS in Navajo and to explore Navajo language development. From the start, the findings of this work were intended to feed back into Saad K'idilyé's effort, which focuses on creating new generations of Navajo speakers.

3.1 Data collection

ICLRC recorded data from September 2022 to February 2023. A video camera was placed in the room during normal operating hours to capture adult-child interactions in spaces where natural, spontaneous communication occurs. By doing so, we built a database for analysis to help us understand various aspects of CDS and speech by children immersed in Diné Bizaad.

3.2 Permissions

Any research involving human participants conducted by UNM faculty requires Institutional Review Board (IRB) approval prior to initiation. As part of the IRB application, a letter of support from Saad K'idilyé was included for this work. All personnel involved in this research were required to complete the Collaborative Institutional Training Initiative certification. This is to ensure the entire research team understands the ethical, regulatory, and professional standards that govern research.

At Saad K'idilyé, families and caregivers are informed during their initial interviews that research is conducted at the nest, and that video recordings are collected for research purposes. Prior to the start of this work, the PI obtained informed consent from all participating families and caregivers, with additional consent gathered as new families joined. The consent form specifies that the ICLRC will keep all data and personal information confidential. Presentations of findings do not include identifiable videos or photos, and ICLRC strives to involve caregivers in research presentations when possible. Further, the PI must obtain permission from Saad K'idilyé

before producing any publications based on this data. Permission was given to publish this paper.

3.3 Participants

During the period when these interactions were recorded, there were eight child-participants, ranging in age from three to 17 months. They attended the nest Monday through Thursday from 8:00 a.m. to 5:00 p.m., where they experienced full immersion in Navajo. Some children were present more consistently than others. While parents are encouraged to speak Navajo to their children at home, the amount of exposure to the language outside the nest cannot be confirmed. To maintain their children's exposure to Diné Bizaad, families are encouraged to speak the Navajo they have learned at language classes provided by Saad K'idilyé, use the Navajo language material they were provided (CDs, books, games, etc.), and to attend planned weekend activities which typically focus on Navajo language and culture (e.g., Navajo shoe game).

Thirteen adults also are represented in the dataset. Six caregivers were employed throughout the entire recording period and are present consistently in the data, while three additional individuals affiliated with the nest were present only occasionally. Four parents also volunteered at the nest and were recorded periodically. Of these 13 adults, six are first-language Navajo speakers who acquired Diné Bizaad at home during childhood; two are second-language speakers (their first language being English) who frequently interacted with fluent speakers at the nest; four are parents who are learning the language; and one was a video recorder for ICLRC with some knowledge of Navajo words.

3.4 Workflow at ICLRC

Figure 1 shows the workflow the team used to analyze six hours of video recordings for this pilot study. Videos were recorded weekly. To manage the large volume of recordings, one hour of footage per month was randomly selected. The team quickly realized it was unrealistic to process all videos recorded and implemented a process to prioritize videos with good audio and visual quality. This analysis covers six hours of data, which represents the total amount the team was able to process in a year. It is estimated that it takes 11 hours of work to completely process one minute of video recording. Data processing took place from September 2022 through June 2023. In June 2023, ICLRC presented preliminary results and methodologies to Saad K'idilyé. With support from Saad K'idilyé, both UNM ICLRC graduate and undergraduate students were also able to work on this data from July 2023 to August 2023.

All video recordings were reviewed prior to being processed for data. In these reviews, sacred cultural practices and content were edited out. For example, morning prayers or ceremonial events were not recorded. If these practices were recorded by mistake, they were edited out of the video.

Once videos were selected, they were prepared for transcription, transcribed, coded for parts of speech, and extracted into Excel for analysis. Students prepared files for transcription

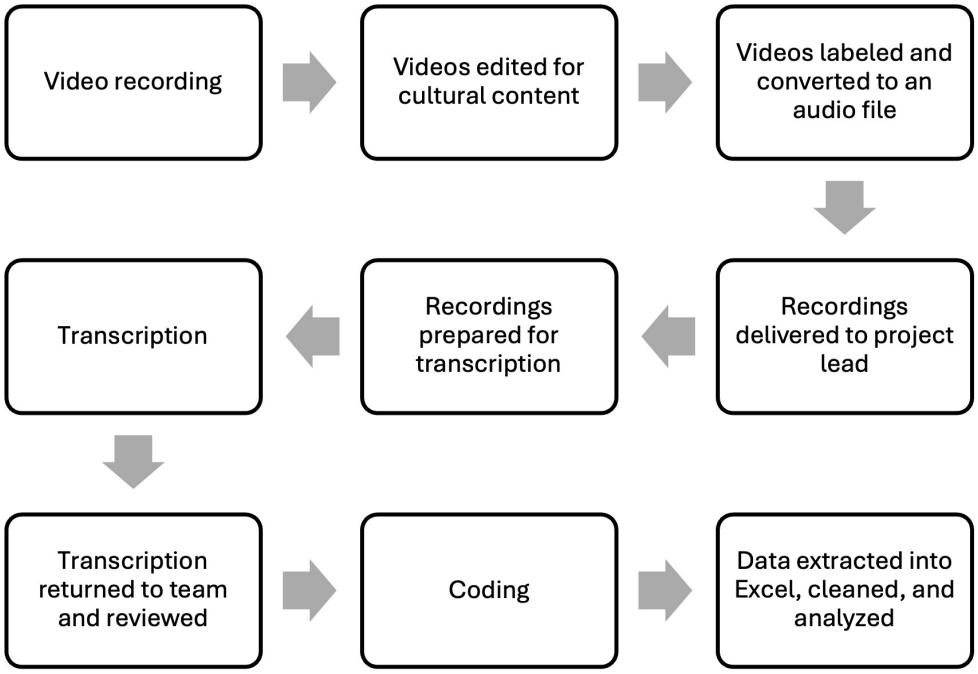

Figure 1. ICLRC research workflow

by marking each instance of speech by every participant in the video. Speakers were also identified during this step. Transcription work entails an individual listening to an audio file and writing down exactly what is being said in the recording. The transcribers ICLRC work with are fluent and literate in Navajo. Once a transcriber returns the completed file, students code each word by assigning the codes "N" for nouns, "V" for verbs, "P" for particles (words that are not nouns or verbs), "Nm" for names, and "E" for English. During this coding process, a fluent Diné Bizaad speaker verified child word forms in context. The team also confirmed these words with caregivers who were present during the interaction. For example, the child utterance *aahdáá-daah* was analyzed as an attempt to say *doo bikáá' jizíį da* 'don't stand on it' based on the context in which the child produced this word and the tone of the word. Interestingly, this pattern is consistent with findings from Ticuna, where adult listeners can often identify intended words based solely on tone, even when the child's production is non-adult-like (Skilton 2023b). In total, 28,024 words were analyzed to answer the research questions below.

During this same time period, Saad K'idilyé caregivers used paper lists kept on the walls to quickly document Diné Bizaad words that they heard the children produce in the nest. Each time they noted a word, they included the date it was spoken. Many of these words were not captured in the video data. Because of this, it is important to consider both the data from the video recordings and the first-hand data from the caregivers who work closely with the children. Figure 2 shows an example of caregiver notes.

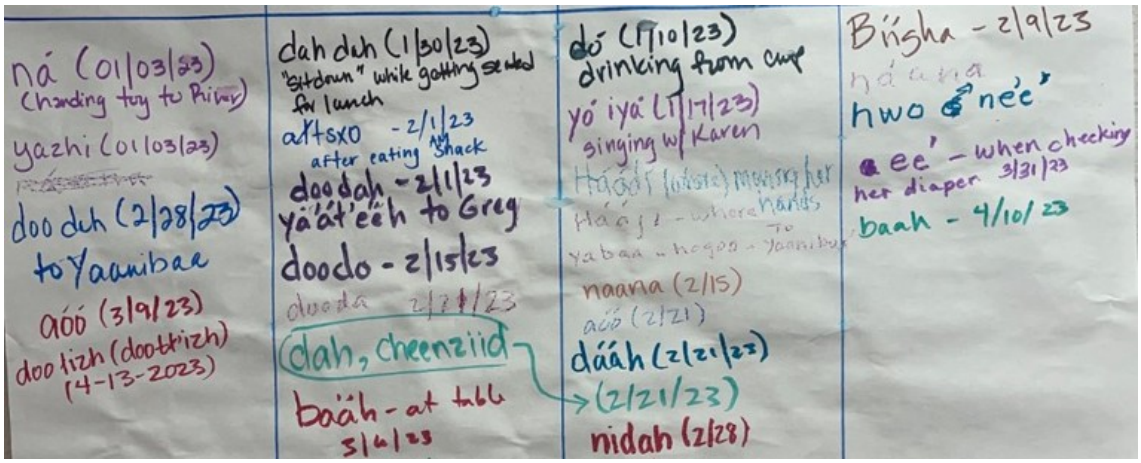

Figure 2. Dated caregiver notes at Saad K'idilyé

4 Research questions and results

During the development of research questions, the ICLRC PI and Saad K'idilyé explored collaborative approaches to study the acquisition of Navajo. A priority was to learn from Navajo children and apply that knowledge to strengthen Navajo language education. The PI suggested taking an in-depth look at Navajo CDS. She explained that, since there is currently no description of Navajo CDS, analyzing this type of speech would allow Saad K'idilyé to provide the first description and create a foundation for comparing child and adult speech. She also suggested examining verb forms and types spoken to children, the frequency of word types, and the first words produced by Navajo children. With her qualifications, Saad K'idilyé agreed to let her and her ICLRC team work on questions that address these topics. Below are the research questions, some of which focus on the caregivers and others on the children.

4.1 Do caregivers and parents use full verb words when talking to children?

Yes, for the most part. Caregivers primarily use verb stems in combination with various affixes when speaking Navajo to infants and toddlers. The data shows that there are only a few instances where adults use only the bare verb stem. While bare verb stems do appear in Navajo CDS, they are not prominent, as shown in Figure 3.

We documented 7,897 verb tokens spoken in the nest. Of these verb tokens, 66 were bare verb stems with no affixes attached to them. Table 1 shows a few examples of adult-produced bare verb stems.

In this work, we found that adult caregivers do occasionally produce the bare verb stem in Navajo CDS (n=66, 0.84%). This is significant because Courtney & Saville-Troike (2002: 624) argue that "adult speakers do not produce bare verb roots or stems" when speaking to children. Through research in a language nest, we can learn much more about Navajo CDS. These first-hand studies help inform research about polysynthetic language development, including when they are different from previous findings.

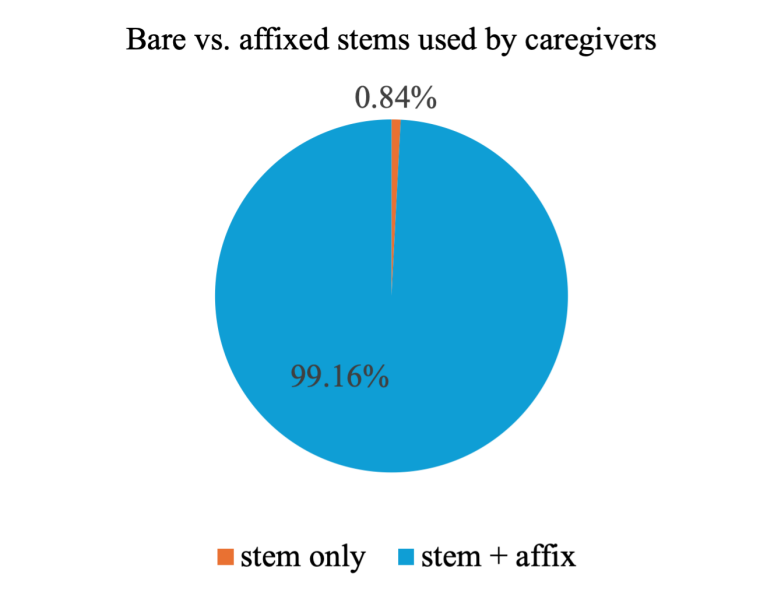

Figure 3. Bare verb stems used by caregivers: percentage

Table 1. Bare verb stems produced in Navajo CDS

Verb	Verb stem	Adult utterance	English translation
nídaah	-daah	Kwe'é dah -daah.	(You) sit up high right here.
nich'aa	-ch'aa/-ch'a	-ch'aa -ch'aa -ch'aa -ch'a -ch'a -ch'a.	(Don't) cry, (don't) cry, (don't) cry, (don't) cry, (don't) cry, (don't) cry.
yit'ood	-t'ood	-t'ood k'ad díí át'éego nit'ood.	(You) wipe, now wipe it like this.
łikan	-kan	-kan ya'.	(It's) delicious, right?
yiiziį̨h	-zį̨h	-zį̨h k'ad yiiziį̨h shoo.	(You) stand, you stand up now.

4.2 Do caregivers and parents modify their speech?

Yes. We identified several modification patterns in Navajo CDS. These characteristics are well established in first language acquisition literature (Clark 2024). One prominent pattern found in modified Navajo CDS to infants and toddlers is where caregivers change their voice to use a higher, exaggerated, up-and-down pitch contour. Other changes to their speech include vowel lengthening and consonant changes, as seen in (1), where /zh/ is changed to [z] and /ó/ is lengthened to [oooo]. (2) shows another example of consonant change where /sh/ is changed to [s]. In (3), vowel lengthening also occurs along with deletion of the consonant /g/. Deletion of the consonant /g/ in the suffix *-go* seems to be a common occurrence in naturally occurring Navajo speech, regardless of who is being addressed. Some of these modifications occur all at once.

(1) *nizhóní* 'it is pretty' → [nizoooní]

(2) *díí shą'* 'what about this?' → [díí są']

(3) *kojígo* 'over here' → [kojíóóó]

Two patterns we notice in Navajo CDS involve the repetition of words. The first type is a

quick spurt of repeated words which tend to indicate urgency and can be heard in the caregiver's voice. The quick repetition of words in CDS causes a word to shorten, as in (4), where the word *nidaga'* is shortened to [ga']. (5) shows another type of repetition. Slower speech and fully enunciating words one at a time tends to co-occur with a calm voice while communicating with and trying to teach a child. This seems to indicate something of importance.

(4) *nidaga', ndaga', daga', ga' ga'* 'no'

(5) *hazhó'ó, hazhó'ó, hazhó'ó* 'slowly'

Although child-directed verbs are modified in some ways, they are still meaningful forms. (6) and (7) below show more sound modifications to verb stems in CDS.

(6) *nicha* 'you cry' → [nstsa]

(7) *bánáhachɬ́íh* 's/he gets mad' → [bánáhasɬ́íh]

4.3 What words are most frequent in CDS?

The words analyzed in this study were categorized into four main groups based on their grammatical function in Navajo: verbs, nouns, particles, and English words. The particle group is composed of all other words that are not nouns or verbs. In Navajo CDS, we observed that the adult speech consists of approximately 56% particles, 31% verbs, and 12% nouns, as shown in Figure 4. English made up about 1% of the data. The English terms used were mostly proper names and contemporary terms that have not been coined into Navajo (e.g., *Target*, *Smith's*, *Cowboys* [NFL team], *vegan*, *avocado*, *tofu*).

Table 2 shows information about Navajo particles, verbs, and nouns in caregivers' speech. The words listed below are the top ten most frequently produced particles, verbs, and nouns in CDS video data.

Table 2. Most frequent words produced by caregivers in videos

Particles			Verbs			Nouns		
Word	Translation	Tokens	Word	Translation	Tokens	Word	Translation	Tokens
éí	that	867	át'é	it is	325	ni	you	170
díí	this	796	níníl'į	you look at it	240	shiyázhí	my little one	151
aoo'	yes	743	nizhóní	it is beautiful	222	níla'	your hand	106
na'	take this!	545	nídaah	you sit	188	shí	I, me	96
kojí	over here	493	łikan	it tastes good	180	awéé'	baby	70
t'áá	just, only	380	ałtso	it is finished	153	tó	water	68
dah	up high	340	ní	he/she says	145	dibé	sheep	61
níléí	that/there	325	diní	you say	131	łį́į'	horse	54
shį́į	maybe	307	yá'át'ééh	hello, it is good	127	bí	him/her	51
hágo	come here	305	kót'é	it is like this	93	béégashii	cow	49

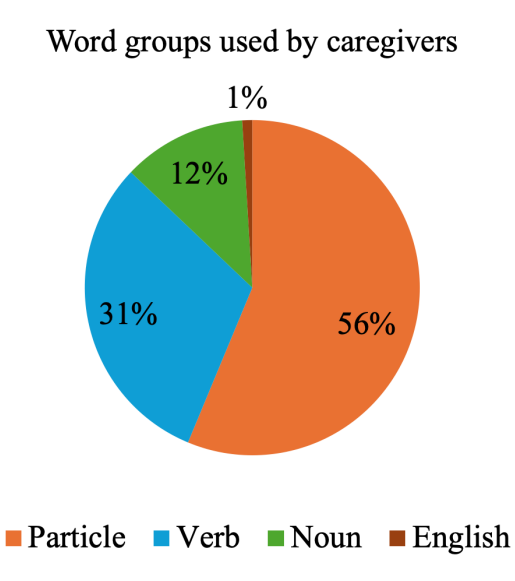

Figure 4. Word groups used by caregivers: percentage

4.4 What are children's first Navajo words?

Capturing children's first Navajo words was challenging because the ICLRC team did not have the workforce to video-record eight hours a day in the nest, nor to review every video recorded. A combination of caregiver documentation and video recordings were used to answer this question. Both the caregiver documentation and video data captured the children using Navajo particles, verbs, and nouns, in addition to the babbling and vocalizations that are characteristic of all children acquiring spoken language.

The vocalization and babbling stages of linguistic development occur before children produce their first words (Clark 2024). The stages of vocal development in infants and toddlers learning to speak Navajo appear to parallel those observed in English. Early vocalizations in Navajo are made up primarily of vowel sounds (e.g., *áá́á* or *waaah*), while babbling typically consists of consonant and vowel (CV) combinations (e.g., *dédeedéé'*, *deedí*) that quickly begin to resemble adult words. Soon after children start babbling, it becomes challenging to distinguish true Navajo words from babbled syllables. For example, a child produced the syllable *da'*, which is a question marker in Navajo. It had to be determined whether this was a meaningful word or a babble.

The video data showed the babies and toddlers produced 821 vocalizations and 528 babbles. The relative distribution shown in Figure 5, which compares these counts across ages, indicates that the children in the nest are following typical speech development milestones reported for more-studied languages such as English (e.g., Clark 2024). Between three and five months, Navajo infants produced a range of vocalizations. These include sounds such as cries, coos, and noises expressing happiness or sadness.

Figure 5 also shows that babbling increases around 6 months, which is consistent with the

typical developmental timeline described by Clark (2024). Children around six to eight months begin to produce canonical babbling, repeating simple CV syllables such as *bababa*, and soon afterward start varying their intonation to mirror the speech patterns of the language they hear (Clark 2024). In our data, babbling increases significantly with 52 instances at the 6-month mark, following a similar pattern.

Studies from other languages also confirm that these milestones are broadly typical. For instance, Tseltal Mayan children have been observed to follow a similar progression as Western children, producing canonical babble and combining their first words within comparable age ranges (Casillas, Brown & Levinson 2019). As babbling develops, children begin to vary the syllables within sequences, producing strings like *bababa-mamama* (Clark 2024). By 10 to 12 months, their babbling increasingly reflects the sound sequences, rhythms, and intonation contours of the language spoken around them, laying the foundation for early word production (Clark 2024). At 14 months, we documented one noticeable instance where the intonation of a child's babble mirrored that of a caregiver. The child produced *aahdáádaah* which reflected the adult utterance *doo bikáá' jizdáa da* 'one is not supposed to sit on that.'

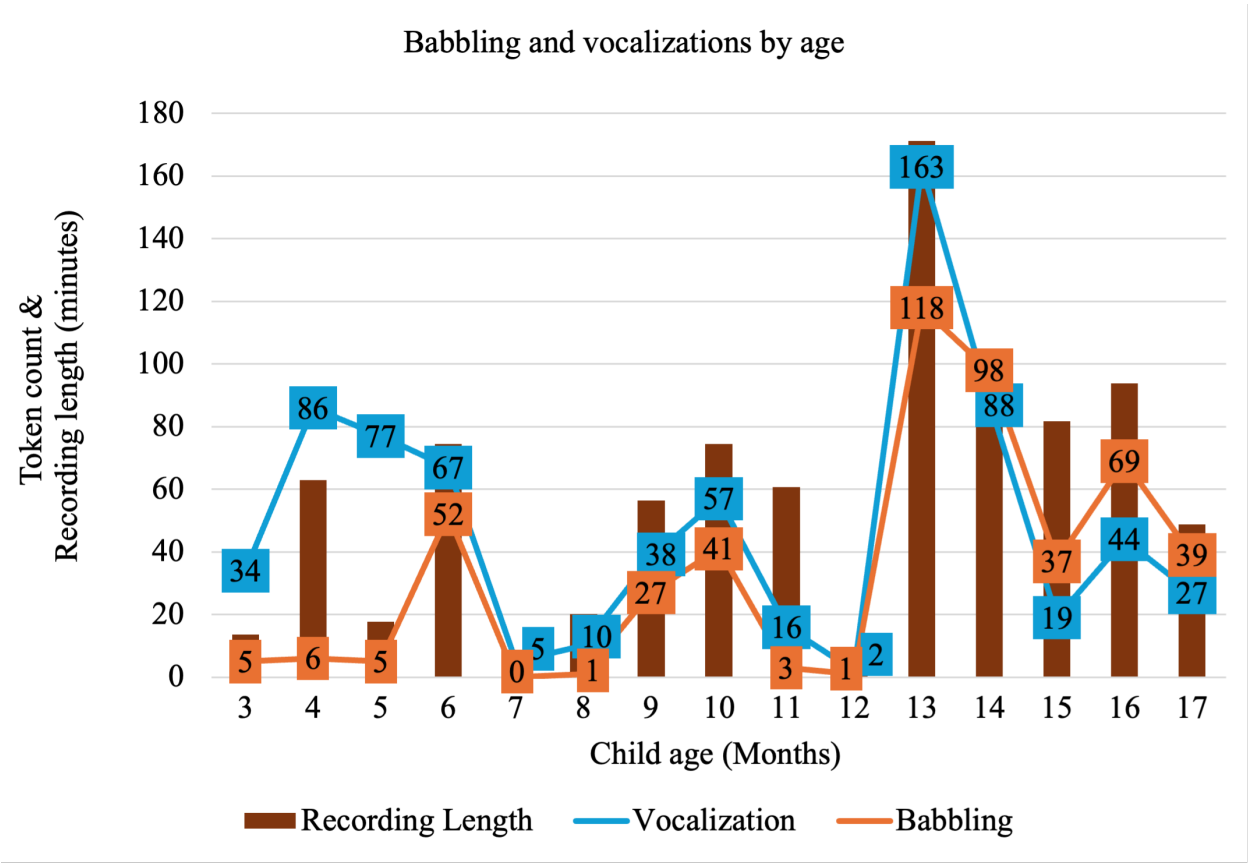

Figure 5. Child babbling and vocalization counts by age
Note. Counts for certain ages (e.g., 7, 8, and 12 months) are notably lower due to significantly shorter recording lengths for those age groups.

In the video data, we saw that children produced a variety of particles, nouns, and verbs. Particles are among the earliest units of speech to be produced by Navajo infants and toddlers younger than 11 months, while the data suggest that nouns and verbs start being spoken several months later. We were able to pull 65 identifiable words from the video data, which consist of approximately 74% particles, 6% verbs, 5% nouns, and 15% English words, as seen in Figure 6. All Navajo words produced by children captured in the video data are listed below in Table 3.

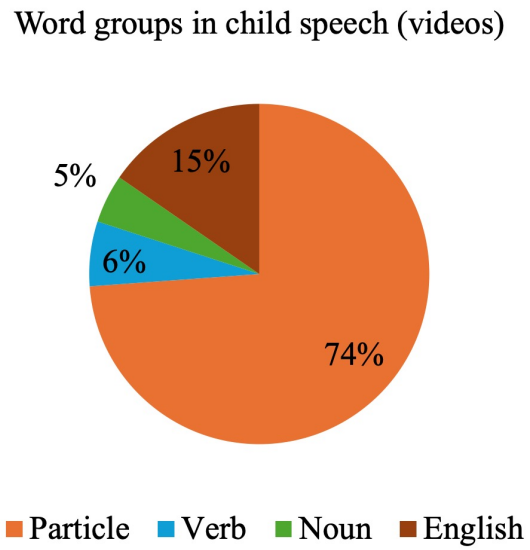

Figure 6. Word groups in child speech in videos: percentage

Caregiver documentation shows that children who joined the nest soon after birth produced their first word at eight months, after six months of being immersed in Diné Bizaad in the nest. The earliest-produced words are from the two youngest children, who entered the nest one to two months after birth. One infant at eight months and 25 days said *há'íí'ǫǫǫh* 'what' (adult-like/target form: *ha'át'íí*) and another at eight months three days said *naaná* 'again' (target form: *náánáá*). Children who joined the nest at several months old or later produced their first Navajo words a few weeks to a few months after enrollment.

Some particles that were recorded by caregivers but not observed in the video recordings included *háájí* 'where,' *bíighah* 'beside it, enough, sufficient,' and *txį'* 'let's go.' Some verbs that were recorded by the caregivers included *ch'éénídzíid* 'you wake up,' *ałtso* 'it is done, finished, completed,' and *át'é* 'it is.' Some nouns that were recorded by the caregivers but not observed in the video recordings included *łeezh* 'dirt,' *jooł* 'ball,' and *tsé* 'rock.' The word types of the child speech on the caregiver lists are shown in Figure 7 below. These percentages follow the trend found in the video data, with more than half of the production being particles. Notice that in Figure 7, there is no category for English as there is in Figure 6. This is because caregivers did not record English words they heard children say in the nest.

Table 3. Words which children attempted in the videos

Particles		
Word	Translation	Tokens
hágo	come here!	12
díí	this	9
dooda	no	5
na’	here	4
aoo’	yes	4
áádęę’	from there	3
hái	who	3
yíiyá	scary	1
níwé	leave it alone!	1
kojí	over here	1
yáadí	geez!	1
ałtsé	wait!	1
áájí	over there	1
nidaga’	no	1
Verbs		
yiiłtsóód	you get ahold of it	1
yá’át’ééh	hello, it is good	1
doo bikáá’ jizíį da	don’t stand on it	1
e’e’aah	west	1
Nouns		
dibé	sheep	1
tó	water	1
Sis Naajiní	Mount Blanca	1

Note. All words are given in the target (adult-like) form.

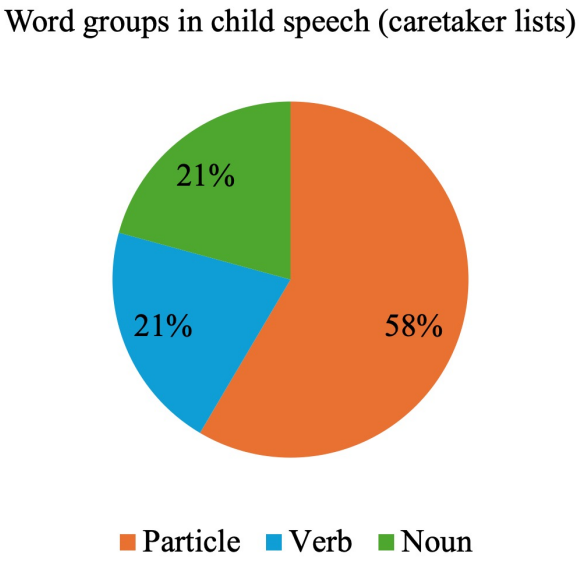

Figure 7. Word groups in child speech in caregiver lists: percentage

4.5 Are highly frequent adult words among those that are initially produced by children?

Indeed! Some of the most frequent caregiver words were produced in early Navajo child speech. For example, words used by caregivers such as *díí* 'this,' *nídaah* 'you sit,' and *dibé* 'sheep' are highly frequent in Navajo CDS. The same words are also some of the first words produced by children learning to speak Navajo at the nest. Table 4 shows the top ten words in each category for adult speech. Highlighted words are words that were also produced by children in video data and caregiver notes.

Table 4. Most frequent adult words found in child speech

Particles			Verbs			Nouns		
Word	Translation	Tokens	Word	Translation	Tokens	Word	Translation	Tokens
éí	that	867	át'é	it is	325	ni	you	170
díí	this	796	níníl'į	you look at it	240	shiyázhí	my little one	151
aoo'	yes	743	nizhóní	it is beautiful	222	níla'	your hand	106
na'	take this!	545	nídaah	you sit	188	shí	I, me	96
kojí	over here	493	łikan	it tastes good	180	awéé'	baby	70
t'áá	just, only	380	ałtso	it is finished	153	tó	water	68
dah	up high	340	ní	he/she says	145	dibé	sheep	61
níléí	that/there	325	diní	you say	131	łį́į'	horse	54
shį́į	maybe	307	yá'át'ééh	hello, it is good	127	bí	him/her	51
hágo	come here	305	kót'é	it is like this	93	béégashii	cow	49

Frequency is an important factor in first language acquisition. The most frequently produced adult words are more likely to be acquired earlier and used more accurately by children (Ambridge et al. 2015). Looking at frequency effects in this data helps explore the shape Navajo CDS and child speech. In the data provided in Table 4, the highly frequent adult words that children produced are those that tend to have a clear, straightforward meaning. For example, particles such as *díí*, *na'*, and *hágo* capture entire concepts and do not require any more language to make them clearer. On the other hand, the meaning of particles such as *t'áá* and *shį́į* only become clear when used as part of an entire sentence. In children's use of highly frequent verbs and nouns, it appears that they are producing the most useful type of words for the environment they are in. They tend to use words with clear meanings, facilitating communication with their caregivers. At the same time, they may have produced other words that were not captured during the video recording sessions at Saad K'idilyé.

4.6 Future research questions

This research has provided valuable insights for all participants. As a result of the collaboration between Saad K'idilyé and the ICLRC, all stakeholders have learned so much from this six-hour analysis of documented caregiver-child interaction. We believe that we can learn more, especially if we continue to document the speech of children beyond 17 months of age. Continued research on Navajo child language acquisition can help answer the questions below.

1. What types of child utterances emerge at the two- and three-word stage for Navajo?

2. How might modifications in CDS change as children grow older?
3. How can we effectively support children in maintaining their Navajo language into adulthood?
4. How can we speed up language data processing for Navajo?

These, and the research questions above, can be adapted for other communities conducting similar work. This knowledge, obtained through a longitudinal study, can be used to help the future of Diné Bizaad, related languages, and other Indigenous languages.

5 Discussion

Saad K'idilyé plans to use the information learned through this research to enhance their nest. One goal they have is to develop learning materials for second language learners, especially for parents of the children in the nest. Currently, very few of the parents understand Diné Bizaad and even fewer speak the language. Parents at the nest are provided with language learning materials such as books, games, and a subscription to Rosetta Stone. They are also required to attend language classes. The nest puts a heavy emphasis on parents' language learning. For the transmission of Diné Bizaad to be successful, the nest cannot be the only place where the children hear and interact using the language. It must also be spoken at home to increase each child's chance of becoming a speaker.

Saad K'idilyé has several ideas for creating learning materials that target parents. For example, Saad K'idilyé could provide evidence-based teaching materials to support families taking Navajo language classes. Using the inventory from the nest, the most frequently used adult words can be incorporated into language lessons and teaching materials. This will give parents the opportunity to use these words at home with their family. As a result, the children's exposure to these words may increase. This may speed up their acquisition of these words.

Research in the nest also aids in Saad K'idilyé's applications for grant funding. Saad K'idilyé is sustained by grants. By collaborating in this research, Saad K'idilyé can provide research results to their funders. By doing so, they are able to demonstrate that they are actively working to identify ways to improve Navajo language learning and track their progress. For example, one representative of a grant funder was excited to share a research report with his employer, stating that this was a unique feature of Saad K'idilyé.

This research is also an indicator of the success Saad K'idilyé is experiencing. For example, we learned that caregivers used approximately 1% English in the nest and those were primarily proper nouns (e.g., *Dallas Cowboys*) and objects foreign to Navajo culture (e.g., *chia seed*). Through research, Saad K'idilyé staff learned how English made its way into the nest and identified ways to move towards a 100% Navajo-only environment. To assist with this effort, Saad K'idilyé started a list of English words that lacked a Navajo equivalent (e.g., *vacuum cleaner*, *avocado*) and coined a potential Navajo term. All caregivers contributed and could consult the list (Figure 8) when they needed a Navajo word.

Communities are beginning to recognize Saad K'idilyé's work and are learning that research

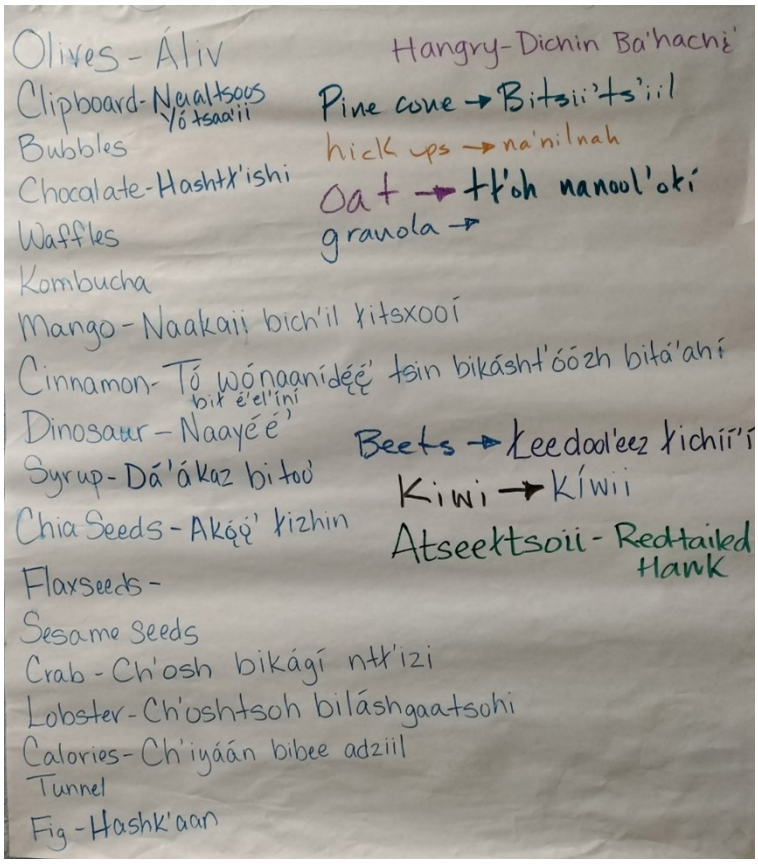

Figure 8. A list of Navajo terms coined by Saad K'idilyé caregivers

is incorporated at the nest to identify a systematic path for language learning, especially for second language learners. They are also able to shed light on this understudied area, identifying trends and gaps in the very limited existing research. Including this information can strengthen grant proposals. It may increase the chance of obtaining funding from donors and organizations that recognize the potential for meaningful outcomes.

6 Conclusion

This preliminary look at Navajo CDS and child speech provided us with a wealth of knowledge. We learned that caregivers primarily use verb stems combined with various affixes when addressing children. We also observed various changes in their speech directed to children. Interestingly, adults mostly produce particles, followed by nouns and verbs. The first six hours of this research produced three significant findings. First, adults speaking Navajo to children do use bare verb stems, although rarely (see Table 1). Secondly, children primarily produced Navajo particles rather than nouns or verbs. In fact, their earliest documented words are particles. Children learning to speak Navajo appear to reach the established milestones for vocalization and babbling reported for languages such as English. Notably, we documented a child producing

their first word – a particle – at eight months. Finally, many of the frequently spoken words by caregivers were among the children's earliest words. It is rare to be able to make these kinds of observations when very few infants and toddlers get the opportunity to experience immersion in Diné Bizaad. The collaborative work presented in this paper is one of the first of its kind. The information learned from research like this is very important, as it can make a difference in our communities, families, and state.

Acknowledgments

We express our deepest gratitude to the Saad K'idilyé children, families, and caregivers for generously participating in this study. Research like this is only possible with the support of community members. We hope they witness how their participation, language learning, and words make a difference in this world. They offer future generations valuable insights into Navajo child language and CDS. We also thank the reviewers (Amalia Skilton and Melissa Lewis) and the editors of this volume (Amalia Skilton and Ryan Henke) for their insightful feedback and recommendations. This work would not have been possible without the support of all involved.

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