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ARTICLE

Navajo Verbs in Child Speech

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Abstract

This study investigates Navajo verbs produced by four children, ages 4;07 to 11;02, during conversations with their caretakers. Analyses of 1600 verbs demonstrate that the bisyllabic verb form, consisting of a verb stem and a portion of the prefix string, is the most common pattern produced by the children. This indicates that Navajo-speaking children use meaningful units of verbal morphology that do not necessarily adhere to the linguistic boundaries normally ascribed to the Navajo verb complex. Further, the verbs are primarily intransitive and third-person singular constructions, which are minimally inflected. It is argued that these minimally-inflected verb forms are frequent not just because they are simpler, but also because they are highly productive as main verbs and are used to create phrasal verbs and nouns. These findings contribute to our general understanding of language development and to the growing body of research investigating children's acquisition of endangered Indigenous languages.

Introduction

This study investigates Navajo verbs produced by four children between the ages of 4;07 and 11;02 during their daily conversations with their caretakers. Navajo is an endangered Indigenous language spoken in the southwestern region of North America. It is a polysynthetic language; its verbs capture in a single unit the information that a full English predicate contains. To date, there is very little research on Navajo child language, and the few studies that exist have focused on the initial stage of language production and have found that Navajo child language development begins with the un-prefixed verb stem (Saville-Troike, 1996; Courtney & Saville-Troike, 2002), which is both phonologically prominent and semantically salient. Beyond this initial step in Navajo child language, little is known.

The current study investigates what types of verbs Navajo-speaking children produce in the next step in development – that is, once they begin to produce more complex forms beyond the un-prefixed verb stem. To do so, four Navajo-speaking children and their caregivers were audio-recorded during their daily conversations in the eastern part of the Navajo Nation. The recordings were transcribed, and 1600 verbs (400 per child) were extracted and coded for the number of syllables in the verb form as well as for four relevant

phenomena: 1) neuter or active, 2) intransitive, transitive, or ditransitive, 3) person and number, and 4) mode and aspect.

The results indicate that beyond the initial stage of verb production, Navajo-speaking children generally produce bisyllabic, meaningful verb forms that do not adhere to the linguistic boundaries normally ascribed to the Navajo verb. While the youngest child continued to produce some un-prefixed verb stems, the others always produced syllables or chunks of material in the prefix string preceding the stem. The most frequently produced forms are those that are least marked in the agreement paradigms. More specifically, children use neuter (stative) verbs and active verbs with equal frequency, but the set of neuter verbs used is smaller than the set of active verbs. Intransitive verbs are used more frequently than transitive verbs. The subject is most frequently third-person singular. Children also produce imperfective and perfective verbs more frequently than other modes and aspects. Since these verb forms are the least marked, the analyses demonstrate that minimally inflected verb words predominate in Navajo child speech. I offer multiple explanations for these findings. First, producing simpler forms perhaps helps children break into the complex Navajo verb construction. It is also likely that these forms are highly frequent in the input. In addition, some of these forms are highly productive and used for multiple purposes. Finally, it is important to remember that even though the children relied heavily on simpler verb forms, they nonetheless all produced complex verb constructions. Thus, even in the face of language shift, with Navajo being heavily threatened and with very few child language learners, these four children demonstrated that they had learned complex features of the Navajo verb.

The Navajo language

Status of the Navajo language

According to the Navajo Office of Vital Records and Identification, the Navajo Nation's official enrollment was 399,494 in 2021 (Romero, 2021). Nevertheless, less than half the population speaks the Navajo language; according to data from the American Community Survey, there were 171,299 speakers of Navajo in 2019 (Dietrich & Hernandez, 2022). Moreover, less than 5% are monolingual in Navajo; a 2017 article reported that there were only 7,600 Navajo-only speakers (Denetclaw, 2017). The number of monolingual Navajo speakers today is even lower given that the COVID-19 pandemic decimated the Navajo community, resulting in fewer elderly monolingual speakers of Navajo. At this time, the Navajo language is considered endangered (Eberhard et al., 2023) and thus research on this language is urgent.

The Navajo verb construction

The Navajo verb structure is described as morphologically rich, highly fusional, and complex (e.g., Franciscan Fathers, 1912; Haile, 1926; Reichard, 1951; Kari, 1976; Young & Morgan, 1987; McDonough, 1990; Faltz, 1998; Young, 2000; and Williams, 2009). The descriptions of the verb structure are shared across the Dene language family. The descriptions of Apachean (Hoijer, 1945a, 1945b, 1946a, 1946b, 1948, 1949); Carrier (Morice, 1932); Hupa (Golla, 1970); Ahtna (Kari, 1979); Slave (Rice, 1989); Sarcee (Cook, 1984); and Koyukon (Axelrod, 1993) also describe characteristics of the Dene verbs that are similar to Navajo. Sapir (1921, p. 128) described Dene languages as "…more

than ordinarily synthetic. The elaboration of the word is extreme. Concepts which we should never dream of treating in a subordinate fashion are symbolized by derivational affixes or 'symbolic' changes in the radical element, while the more abstract notions, including the syntactic relations, may also be conveyed by the word." Sapir's description captures the essence of the complexity of Dene verbs. The languages in the Dene family are closely related, with a time depth of at least two thousand years (Krauss, 1973; Krauss and Golla, 1981). The Navajo verb is comparable to an entire English proposition/ predicate. It expresses verbal semantics plus agreement, argument structure, and adverbial information. An example of the amount of information contained in a Navajo verb is demonstrated in (1), in which the verb expresses a completed event (see Table 2 further breakdown of the verb construction). As demonstrated in (1), the Navajo verb construction comprises a concatenation of lexical and inflectional morphemes, all of which are bound. Their individual meanings are dependent on the verb construction as a whole. While the verb structure is notoriously complex in all polysynthetic languages, identifying the specific morphemes in the Navajo verb is particularly difficult due to morphophonological interactions that blur morpheme boundaries (e.g., Sapir, 1921; Mithun, 1989; Mattissen, 2004). For example, the bolded syllable *-neez-* in (1) represents the three distinct morphemes *-ni-yi-si-ø*, as demonstrated in the gloss. Glossing in all examples in this article follows the Leipzig Glossing Rules. Glosses not included in those rules are explained in footnotes as relevant.

(1) *nínáánidanihi**neez**ts'ǫ́ǫ́z*
     *ní-nááni-da-nihi-**ni-yi-si-Ø**-Ø-ts'ǫ́ǫ́z*
     REP[1]-SMLIT[2]-DIST.PL–1SG.DU.OBJ-**TERM**[3]-**SMFAC**[4]-SI[5].**PFV–3SG.SBJ**-CFL-STEM.kiss[PFV]
     'They[3+] repeatedly kissed us[2].'

The Navajo verb is traditionally divided into three primary domains: the verb theme, the conjunct prefixes, and the disjunct prefixes (see Young & Morgan, 1987; Young, Morgan & Midgette, 1992; and Young, 2000). There are three models used to describe the Navajo verb. First, there is the slot and template model (Young & Morgan, 1987), where every single morpheme preceding the verb stem is identified as belonging to one of nine position classes, as in Table 1.

There are two other verb models. The Faltz (1998) model simplifies the slot and template model for teachers and second language learners of Navajo by grouping the verbal prefixes into categories: outer prefixes, distributive plural, object prefix, inner prefix, subject prefix, and classifier. Departing from the slot and template approach, McDonough's (2000) bipartite model divides the Navajo verb into two constituents: an

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[1]Repetitive = REP; describes a verbal action that involves a continuum of repetitive acts or a connected series of acts (Young et al., 1992; Young, 2000:73)

[2]Semeliterative = SMLIT (Young & Morgan 1987:x); defined as one more time, repeat once again (Young, 2000:22).

[3]Terminative = TERM; describes verbal actions of a type that is inherently terminal (Young et al., 1992; Young, 2000:25).

[4]Semelfactive = SMFAC; describes the isolation of a single act from a repetitive series (Young et al., 1992; Young, 2000:25).

[5]SI is one of four conjugational patterns present in the perfective verb construction (Young & Morgan; 1987 Young, 2000).

Table 1. Navajo verb template (Young & Morgan, 1987)

DISJUNCT PREFIXES				CONJUNCT PREFIXES					VERB THEME	
0	Ia-e	II	III	IV	V	VI	VII	VIII	IX	X
postposition object	a. null postposition" b. adverbial-thematic c. reflexive d. reversionary e. semeliterative	iterative	Distributive plural	direct object	deictic	adverbial-thematic	mode-aspect	subject	classifier	stem

auxiliary or 'infl' constituent labeled 'A$_{STEM}$' and the verb labeled V$_{STEM}$. This model aligns with syllable structures that naturally form the Navajo verb. The current article presents examples using McDonough's bipartite model.

In the traditional slot and template approach, there are sixteen different grammatical and semantic categories marked by prefixes in the Navajo verb. The prefixes of the verb construction are not entirely transparent because of morphophonological alternations – that is, fusion of neighboring prefixes due to sound changes at their boundaries. Consider the verb in example (1), *nináánidanihineezts'ǫ́ǫ́z*, 'They[3+] repeatedly kissed us[2] again'. The syllables in the word *ni.náá.ni.da.ni.hi.**neez**.ts'ǫ́ǫ́z* do not map onto the morpheme-by-morpheme translation (cf. to example 1 above) suggested by the template in Table 2. The "underlying representation" suggested by the template and the pronunciation of the verb do not match. In particular, slots VIb, VIc, VII, and VIII combine into, -***neez***-, one syllable in the actual pronunciation of the word, as shown in (2).

The most basic verb construction in Navajo typically requires a minimum of two syllables (Reichard 1951, p. 119; Landar, 1989; McDonough, 2000, 2003), which can take one of two shapes: CV or CVC (Young & Morgan, 1987). For example, *yáshti'* 'I speak' includes only two syllables. The minimal bisyllabic verb, which is also referred to as the verb base (Young & Morgan, 1987; Young, 2000), is composed of the verb stem and the prefix string (composed of one or more morphemes). While most verbs are minimally bisyllabic, the verb stem can stand alone in the verb *ní* 's/he/it says.' The verb stem encodes tense, aspect, and mood. It may also include information about the shape and quality of a subject or object, and the number of people involved in an event. The prefixes express temporal and spatial adverbial concepts in addition to person and number of the subject, object, and oblique object. The verb construction also encodes manner of action (e.g., continuative, transitional, terminative, repetitive) and type of action (e.g., state, cognition, motion, event, activity). Prefixes marking mode, subject, and valency are highly fusional inflectional morphemes, and they are required to compose a minimal verb construction. The inflectional morphemes that are located to the left of the core verb word become less fusional the farther away they are positioned.

Table 2. Morpheme-by-morpheme breakdown of the verb nináánidanihi**neez**ts'ǫ́ǫ́z

Ib	Ie	III	IV	VIb	VIc	VII	VIII	IX	X
ni	náání	da	nihi	**ni**	yi	si	Ø	Ø	ts'ǫ́ǫ́z
REV	SMLIT	DIST.PL	1SG.DU.OBJ	TERM	SMLAF	SI.PFV	3SG.SBJ	CLF	STEM
They[3+] repeatedly kissed us[2] again.									

Due to the complex structure of the Navajo verb, it can be used alone throughout a conversation, without needing to express the arguments as separate words (Williams, 2009). The basic word order of Navajo is Subject-Object-Verb (example 2) when the arguments are expressed. However, the order of morphemes within a Navajo verb is Object-Subject-Verb (example 3), with the verb stem in the final position, containing the core semantic content.

(2) *Łį̃į̃'   tł'oh   yiłchozh.*
     Subject   Object   Verb
     horse   hay   [3SG.**OBJ**-Ø[6].IPFV–3SG.**SBJ**]$_{A_{STEM}}$ [CLF-**STEM**.CHEW$_{IPFV}$]$_{V_{STEM}}$
     'The horse chews hay.'

(3) *yiłchozh*
     [*yił*] [*chozh*]
     [3SG.**OBJ**-Ø.IPFV–3SG.**SBJ**]$_{A_{STEM}}$ [CLF-**STEM**.CHEW$_{IPFV}$]$_{V_{STEM}}$
     'It chews it.'

In the next section, I describe verb stem alternation and demonstrate how the verb stem is a semantically and phonologically identifiable, salient unit. In addition to the factors that influence the form of the verb stem, note that the verb stem, which typically fuses with the adjacent classifier and subject prefixes, is also shaped by morphophonological changes to the initial segment of the stem. The stem maintains its robustness and remains a recognizable unit even after such changes. Further, there is a large amount of homophony among the prefixes of the verb. Homophonous morphemes are disambiguated by their co-occurrence with other morphemes in sequences of syllables.

For example, the verb construction *niníníłł* 'you set them (plural objects) down' in (4) contains three morphemes that have the same form *ni* and compose the A$_{STEM}$. Two of the *ni* forms manifest in the A$_{STEM}$ while the third *ni* does not. The third *ni* manifests as a high tone on the *ni* in the penultimate syllable. The use of the high tone indicates second person singular. Finally, the verb stem should not be mistaken for one of the *ni* in the A$_{STEM}$.

(4) *niníníłł*
     [*ni-Ø-ni-ni*] [*Ø-níłł*]
     [TERM–3SG.**OBJ**-NI.IPFV–2SG.**SBJ**]$_{A_{STEM}}$ [CLF-**STEM**.HANDLE.PLURAL. OBJECTS$_{IPFV}$]$_{V_{STEM}}$
     'You set them (plural objects) down.'

However, this homophony contrasts with the distinctive phonological forms of the verb stem which also contributes to the prominence of the stem within the full verb form. For example, compare *yishdlį̃į̃h* 'I usually drink it (ritual)' to *yishdlą́* 'I am drinking it' to *yishdlą́ą́'* 'I drank it'. In these examples, the A$_{STEM}$ 'yish-' looks the same and sounds the same, and the V$_{STEMS}$ '-dlį̃į̃h,' '-dlą́,' and '-dlą́ą́,' are different. In *yishdlą́*, the *yi*- is inserted to maintain the bisyllabic form of the verb construction while in *yishdlą́ą́'*, the *yi*- marks perfective. Compare *yishdlą́ą́'* 'I drank it' to *wóshdlą́ą́'* 'I wish to drink it.' In this case, the V$_{STEM}$ are similar '-dlą́ą́' while the A$_{STEM}$ are different 'yish-' and 'wosh-'. In these examples the A$_{STEM}$ expresses the difference in meaning.

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[6]Ø is one of four conjugational patterns in the imperfective verb construction.

The Navajo verb stem

The verb stem carries the core lexical meaning (Sapir & Hoijer, 1967; Cook & Rice, 1989; Axelrod, 1993, 2000; Holton, 2000; Rice, 2000; Smith, 2000) and it has semantic prominence (McDonough, 2003). It is monosyllabic and consists of two parts, a root and a suffix (Hoijer, 1945a, 1945b, 1946a, 1946b, 1948, 1949; Leer, 1979; Young et al., 1992; Holton, 2000). The inflectional verb root suffix marking mode causes the verb stem to have alternate forms. For example, the verb stem set for 'think' is as follow -*kees* 'think', -*kééz* 'thought', and -*kos* 'will think.' The difference in stem forms is due to a historic process that fused the mode suffix to the root. In addition, the onset consonant may change form when prefixes fuse to it. Reichard (1951) writes that "the stem can always be identified, even though its form may be slightly disguised" (pp. 119). Examples (5), (6), and (7) demonstrate changes that affect the verb stem due to preceding prefixes.

(5) *ádísis'nil*
     [ádí-Ø-si-sh] [**d-n**il]
     [REFL–3SG.OBJ-SI.PFV–1SG.SUBJ]$_{A_{STEM}}$ [CLF-STEM.HANDLE.PLURAL.
     OBJECTS$_{PFV}$]$_{V_{STEM}}$
     'I touched them (plural objects) to myself.'

Example (5) shows the interaction that occurs within the V$_{STEM}$ where the classifier and the stem meet, and a glottal stop emerges. The *d* in the V$_{STEM}$ interacts with the initial consonant of the stem -*n*- *(nil)* causing the *d* to morph into a glottal stop /'/.

(6) *naashshood*
     [na-Ø-Ø-sh] [ł-**zh**ood]
     [CONT[7]–3SG.OBJ-Ø.IPFV–1SG.SBJ]$_{A_{STEM}}$ [CLF-STEM.DRAG$_{IPFV}$]$_{V_{STEM}}$
     'I drag it along'.

In example (6), the initial consonant -*zh*- *(zhood)* in the V$_{STEM}$ syllable is devoiced which is caused by the preceding -*ł*- also in the V$_{STEM}$.

(7) *neiilzhood*
     [na-Ø-Ø-iid] [ł-**zh**ood]
     [CONT[8]–3SG.OBJ-Ø.IPFV–1DU.PL.SBJ]$_{A_{STEM}}$ [CLF-STEM.DRAG$_{IPFV}$]$_{V_{STEM}}$
     'We^2 drag it along'.

The first person dual plural verb *neiilzhood* 'we^2 drag it' in example (7) shows the stem remains in the -*zhood* form (cf. to (6) above). However, the -*ł*- becomes voiced (-*l*-), and this is due to the preceding subject marker (-*iid*-). Examples 5 and 6 demonstrate how verb words vary within a single verbal paradigm. In examples 5, 6, and 7, the various types of the degree of fusion in Navajo verb constructions present challenges in identifying individual morphemes. Several morphemes may compose a single syllable (Kelly et al., 2014). Even with these changes the verb stem syllable is noticeable as recognized by Reichard in 1951.

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[7]CONT = Continuative describes verbal action that occupies an indefinite span of time and that moves "around/about" without specified direction (Young et al, 1992; Young, 2000:72).

[8]CONT = Continuative describes verbal action that occupies an indefinite span of time and that moves "around/about" without specified direction (Young et al, 1992; Young, 2000:72).

The verb stem unit has the greatest amount of phonemic contrast (Holton, 2000; McDonough, 2003) within the verb construction. For example, the word *yishdlą́ą́'* 'I drank it' is a bisyllabic verb, *yish.dlą́ą́'*. Using the bipartite model (McDonough, 2000), *-dlą́ą́'* can be referred to as the V_{STEM}. The prefix string *yish-* is the A_{STEM} (the Auxiliary component of the verb word). The V_{STEM} syllable is much more robust and has greater phonetic prominence than the A_{STEM} (the prefix string *yish-*). The V_{STEM} unit is composed of an onset, coda, and nucleus where a long vowel with high tones and vowel nasality occurs. Comparing *yishdlą́ą́'* to *deeshdlį́į́ł* 'I will drink it,' the second syllable in *deeshdlį́į́ł* is robust. Like *-dlą́ą́'*, *-dlį́į́ł* includes an onset, coda, and the nucleus where the long, nasalized vowels with high tone occur. This phonetic prominence is due in part to the V_{STEM} containing the core meaning of a verb construction. The stems have been shown to have phonetic properties that make them very salient in speech. The full set of consonant and vowel contrasts are only found in verb stems. Also, in their study of Navajo verbs, McDonough and Willie (2000) found that a very small but measurable pause occurs at the boundary between the verb stem and prefixes, which heightens the phonetic prominence of the verb stem.

Navajo mode (tense, aspect, mood)

In this section, we take a closer look at the complex Navajo Mode (Tense, Aspect, Mood) of verbs. The Navajo Modes express the temporal character of the verbal activity – whether incomplete, complete, ongoing, future, potential, customary, or recurrent. Mode is marked by the shape of the V_{STEM}. If the stem shape is the same for different mode types, then the distinction is marked by a special prefix shape. With respect to the marking of mode on the verb stem itself, there are seven modes: imperfective, perfective, usitative,[9] iterative, progressive, future, and optative. Imperfective, perfective, usitative, iterative, and progressive are aspects. Future is the only tense, and the optative expresses mood. In the verb stem, mode and aspect are a unitary lexical item, and stem alternations reflect this union.

In addition to the five aspects that can be marked in the verb stem, there are twelve aspects that can be marked in prefixes, e.g., *ni* as in *łinishchíí'* 'I am red' (stative) vs. *yii* as in **yii**shchíí*h* 'I am turning red' (transitional); *tá* as in *tá́dishyeed* 'I am walking here and there' (diversative) vs. *na* as in **na**ashá 'I am walking around' (continuative) vs. *ni* as in *niníyá* 'I walked up to' (momentaneous) vs. *yi* as in *yisháál* 'I walked along' (cursive). In the prefix string, mode and aspect may compose a single unit; however, additional aspects can be added to the word formation.

Navajo agreement

Navajo agreement in the verb stem expresses the number of the grammatical subject and/or the grammatical object. For example, a stem can mark whether the grammatical subject is an individual person, or two individuals, or three or more individuals. Agreement is usually present in verbs of motion, verbs describing position, and handling of objects. For example, in the motion verb for walk, the following verb forms mark the

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[9]The usitative mode employs a verb stem that is similar to the one that is used in iterative verb words. The Astem distinguishes these two verb constructions. Usitative verb constructions refer to actions that are ritualistic-like actions that occur only at a very specific time or during a specific situation.

number of the grammatical subject: *yináád* 'you walk' vs. *woh'ash* 'you[2] walk' vs. *wohjah* 'you[3+] walk'. In the positional verb for 'sit', the following verbs mark the number of the grammatical subject: *sédá* 'I sit' vs. *siiké* 'we[2] sit' vs. *náhisiitą́* 'we[3+] sit'. Verbs expressing the handling of objects mark the number of the object: *nidiish'aah* 'I pick it (one item) up' vs. *nidiish'nííł* 'I pick them (at least two objects) up' vs. *nidiishjááh* 'I pick them (more than two objects) up'. In these examples, notice that the verb stems vary, although all verb stems describe the same action. Thus, verb stems expressing agreement lexicalize mode, aspect, and agreement as a single unit.

Agreement in Navajo codes person and number as a single unit in the verb construction. First and second person singular, dual plural, and distributive plural are represented with an identifiable agreement marker in the verb form. Third person singular and dual plural are not marked. Third person distributive plural is not marked in Slot VIII, the typical position for subject agreement markers; instead, it is marked in Slot III.

To summarize, the verb stem is semantically prominent as it carries the core lexical meaning. It is also phonetically prominent, as it is in utterance-final position, is mono-syllabic, and has other phonetic qualities that increase its prominence (e.g., syllable shape, vowel quality, preceding pause). At the same time, the stem itself, even without its prefixes, is highly complex, as it alternates depending on mode, the number of persons involved in an event, and may also include information about the shape and quality of a subject or object.

Previous research

The few studies on the acquisition of polysynthetic verbs indicate that the position of affixes is particularly important for predicting children's earliest verb forms. Among languages like Navajo, in which the verb stem generally appears at the right edge of the word, children begin to use verbs by producing an un-prefixed verb stem (Navajo: Courtney & Saville-Troike, 2002; Murrinhpatha: Forshaw et al, 2017; West Green-landic: Fortescue, 1984-1985; Mohawk: Mithun, 1989). By contrast, children demon-strate very early production of affixes in languages where the affixes appear after the verb stem (Inuktitut: Allen, 2017; Crago & Allen, 1998; Lee et al., 2023; Chintang: Stoll et al., 2017). In a comparative analysis of children acquiring four Mayan languages, Brown et al. (2013, p. 299) find "an impressive effect of affix position on the children's language development" across and within languages, with suffixes emerging before prefixes (see also Mateo Pedro, 2015; Pye, 1983). In addition, there is some evidence from research on Inuktitut that caregivers may use increasingly complex verb forms with more verbal inflection as children age, which may also impact the order in which inflections emerge in children's language production (Lee et al., 2023). Only one previous study specifically addresses children's acquisition of Navajo verbs. Saville-Troike (1996) studied five Navajo-speaking children who were recorded speaking in Navajo during natural conversations with family members. The children were recorded at three different time points. The youngest child, who was recorded at ages 1;01, 1;03, and 1;05 consistently produced unprefixed verb stems. Given the semantic and phonetic prominence of the Navajo verb stem (discussed above), it is not surprising that this is the first unit children produce. Recall that the verb stem contains the primary meaning, rendering it semantically salient and the main component necessary for building the full verb (Chee, 2017). Its readily identifiable meaning increases its prominence and makes

it salient to children (Slobin, 1973; Peters, 1985). In addition, the Navajo verb stem occurs in utterance-final position. Items in word-final or word-initial position tend to be the most salient and acquired earliest in child language development (Brown et al., 2013; Peters, 1985; Slobin, 1973). In addition to its position in the utterance, the Navajo verb stem's phonetic qualities increase its prominence. Slobin (1973) and Peters (1985) hypothesized that heavily fusional languages tend to segment along syllabic boundaries rather than morphemic boundaries. Further, they propose that features such as intonation, rhythm, and stress increase the saliency of speech, prompting children's extraction and segmentation of these salient features. In fact, Mithun (1989) found that Mohawk-speaking children first extracted stressed syllables. Similarly, final syllables emerge first among children learning K'iché and Yucatec Mayan (Brown et al., 2013; Pye, 1983). The Navajo verb stem carries the primary stress (Hoijer, 1945b) of the verb construction; its syllables have the greatest number of phonemic contrasts, and they are comprised of a full syllable structure consisting of an onset, nucleus, and coda; and its nucleus uses both high tones, nasalization, and vowel lengthening (Holton, 2000; McDonough, 2003). In summary, the position of the verb stem as well as its semantic and phonetic properties all conspire to make the Navajo verb stem particularly salient (Chee, 2017).

In comparison to the verb stem, Navajo verbal prefixes are more homophonous, with fewer phonological contrasts. In her study of five Navajo-speaking children, Saville-Troike (1996) documented the production of classifiers, thematic prefixes, as well as prefixes expressing mode/aspect and person/number. For this part of Saville-Troike's study, each child's first 50 non-duplicative utterances were assessed to determine whether they produced the prefixes in an adult-like manner. As mentioned above, the youngest child did not produce prefixes; however, the other four children did produce some. Two of the children were being raised in a Navajo-dominant setting. Their ages ranged from 2;10 to 3;0 and 3;5 to 3;7. For the most part, these children's prefixes were analyzed as being adult-like, with the older child reaching higher rates of adult-like forms. The other two children were being raised in an English-dominant setting. Their ages ranged from 2;11 to 4;0 and 3;6 to 4;7. These children's prefixes were less adult-like. For example, they omitted classifiers as well as prefixes expressing mode and aspect in contexts where these prefixes would be expected to occur in the adult grammar. With respect to person/number subject markers, the two children hailing from the Navajo-dominant homes produced first-person singular *sh-*, second-person singular *ni-*, duo-plural *ii(d)-*, and fourth person *ji*. By contrast, the other two children's subject markers were mostly restricted to first-person singular *sh-*; one also produced fourth person *ji-*. Saville-Troike did not study third-person singular due to this form being unmarked. In sum, Saville-Troike's study demonstrates that the first verb forms to emerge among Navajo-speaking children are comprised of the verb stem alone. By age three, children that are exposed to abundant input in Navajo produce a variety of prefixes, whereas those with less input in Navajo still omit many prefixes where they would be expected to occur in the adult grammar. While Saville-Troike's study provides an initial glimpse into the emergence of prefixes, the analyses of prefixes are based on only 50 utterances per child. By contrast, the current study includes 400 Navajo verb forms per child, and also includes data from older children, and thus advances our insight into the frequency of occurrence of various verb forms. More specifically, the study focuses on neuter versus active verbs; intransitive, transitive, and ditransitive verbs; as well as person and number forms, and mode and aspect forms.

Research questions

While previous research indicates that Navajo-speaking children's earliest productions of verb forms are comprised of the un-prefixed verb stem, our understanding of the stages that follow is limited. Given the complexity of the Navajo verb construction, it is essential to document children's use of multisyllabic verb forms to understand how children are acquiring the entire Navajo verb construction. Thus, the research questions that guide the current study aim to discover the landscape of Navajo verbs produced by Navajo-speaking children beyond their initial production of un-prefixed verb stems. More specifically, the research questions are as follows:

1) What is the length of Navajo verbs measured in syllables produced by children between the ages of 4;07 and 11;02? This measure was selected because it is correlated with morphological complexity in polysynthetic languages, while being considerably easier to measure (Allen & Dench, 2015). Since Saville-Troike (1996) documented the production of prefixes among children ages 2;10 to 4;7, we anticipate that the older children in the current study will produce multisyllabic verbs that include some prefixes.

2) What types of Navajo verbs are commonly used by Navajo-speaking children between the ages of 4;07 and 11;02? More specifically, do children express neuter or active verbs more often, and do they express intransitive, transitive, or ditransitive more often? Which person and number verb forms and which mode and aspect forms are the most frequent in child language?

Methods

This is a cross-sectional study focusing on child-caretaker dyads who were audio-recorded in the eastern part of the Navajo Nation over a period of several months. Permission was obtained from the Navajo Nation.

Participants

Each child participant had to be a first language speaker of Navajo who learned Navajo in the home. Through the recruitment process, it was discovered that there are very few first-language child speakers of Navajo under the age of 12 years. There are even fewer children under the age of four years acquiring Navajo as their first language, if any. Only four children who met the criteria were able to complete the study. All four were male. During the study, the four children's age spans were 4;07-4;11 (Child 1), 5;10-6;03 (Child 2), 9;08-9;11 (Child 3), and 10;10-11;02 (Child 4). The four-year-old's caregivers were his parents, who were approximately 45 years old at the time of the study. These caregivers were bilingual, but they reported only speaking Navajo to their child. In addition, they made a conscious effort to isolate their child from English by keeping him at home and surrounding him with Navajo speakers. This child had no siblings living at home. Child 2, who was 5;10-6;03, was being raised by his grandparents, who were over 65 years of age and were monolingual speakers of Navajo. A Navajo–English bilingual 9-year-old relative also lived in the home. Child 3 was being raised by his grandparents who were approximately 75 years old and were monolingual speakers of Navajo. This child also had one younger sibling living at home. Child 4, the oldest child (10;10-11;02), was being raised by

his mother who was bilingual; however, his Navajo-monolingual grandmother was his primary caregiver when he was younger. This child's siblings did not live at home.

All four families were heavily involved in traditional Navajo cultural practices, such as the Blessingway ceremony and rug weaving. These families' overall commitment to Navajo culture and tradition may help explain the importance they placed on maintaining the Navajo language in the home. The three older children all attended school where English was the primary language, while the youngest child did not yet attend school. Even so, there is some evidence in the youngest child's language production that he had experienced some exposure to English since he used some English words. As such, we can consider all four children Navajo–English bilinguals.

Data collection and data processing

The four Navajo-speaking children were audio-recorded while engaged in everyday activities with at least one caregiver. Each child plus one of their caregivers were taught how to use an audio recorder and given one to use at their discretion. It was emphasized that the goal of the project was to document spontaneous, daily conversations that took place in a non-supervised setting. Most participants recorded themselves at home, although some also recorded themselves in the car and some recorded themselves while sheepherding or riding bicycles. In most of the conversations, the children talked about their day. For example, in one recording Child 1 interacted with his mother and father and talked about spending his compensation at Walmart, teased his father, and with his mother he had conversations about what was happening or going to happen. Child 3, who was recorded while sheep herding, talked to his dog and talked about his friends. In other recordings, he was walking around on the land with his paternal grandfather who told him about plants and the area, and the child asked his grandfather questions and made comments. Child 4 talked about where he was going while riding a bicycle.

All participants were compensated. The recordings were orthographically transcribed by three native speakers of Navajo, who were told to write down exactly what the child said. In cases where the child's pronunciation of the verb deviated from the adult norms, the transcribers were asked not to make any corrections to the child utterances. The author analyzed the utterances and provided the target forms. All the transcriptions were checked by the author, who is a first-language native-speaker of Navajo and who was raised on the Navajo Nation and schooled at Rock Point Community School, where she learned to read and write in Navajo in elementary school.

Recordings took place between August 2014 and April 2015. Each caretaker-child dyad recorded themselves over about five months. The frequency and duration of recordings differed for each child because caregivers were in charge of deciding when and how often to record conversations. Table 3 shows what this corpus of Navajo child speech contains.

The first 400 verb tokens were extracted from each child's transcription, resulting in a total of 1600 verbs analyzed in the current study. Transcription began with the oldest child from whom approximately 400 verb tokens were extracted from about an hour and half of recordings. However, when verb tokens were extracted from about the same amount of audio recordings for the other children, there were fewer tokens. In order to obtain 400 verb tokens from the youngest child, about 5 hours of audio recording had to be transcribed. Each child had a different density of verb tokens per hour of recording. Thus, a different volume of transcription was needed for each child. Transcribing Navajo

Table 3. Corpus of Navajo child speech

	Child 1	Child 2	Child 3	Child 4
Age range	4;07–4;11	5;10–6;03	9;08–9;11	10;10–11;02
Duration of recordings in months	Dec 2014 – Apr 2015	Aug 2014 – Jan 2015	Jan - Apr 2015	Aug - Dec 2014
Length of transcriptions per child	5 hours 3 minutes 48 seconds	3 hours 36 minutes 24 seconds	2 hours 15 minutes 26 seconds	1 hour 20 minutes 58 seconds
# of Utterances per child	378	361	372	303

takes about two to three hours of work per minute of recording for the average transcriber. Due to constraints of time and funding, it was possible to include 1600 total tokens in the current study.

Interrater agreement was 89% as assessed for 10% of the verbs (n = 160) selected from across the four children. The author compared the transcripts to the original audio recordings to view all disagreements in the entire dataset. All disagreements were resolved prior to analysis.

Each of these child-produced verbs was coded for number of syllables, and analyzed for whether it was neuter (i.e., stative) or active (i.e., motion) whether it was intransitive, transitive, or ditransitive; its person and number; and the verb mode. For examples of neuter and active verbs, see Tables 5 and 6. An example of a transitive verb construction is *yizgoh* - 'He rammed it', which includes a subject and object, and an example of an intransitive verb construction is *yáshti'* - 'I am speaking', which only includes a subject. An example that includes the subject, direct object, and indirect object is *shilák'énítįįh* - 'You place the long, slender object in my hand'. For examples of person and number marking, see examples (8) and (9). The following are examples of verb modes: Imperfective Mode – *ayą́* 'S/he eats'; Perfective Mode – *ííyą́ą́'* 'S/he ate'; Usitative Mode - *ayį́įh* 'S/he habitually eats'; Future Mode - *adooyį́į́ł* 'S/he will eat'; Optative Mode - *óyą́ą́'* 'S/he wishes to eat'; Iterative Mode – *ná'ádį́įh* 'S/he usually eats'; Progressive Mode – *ooyį́į́ł* 'S/he is eating'.

All coding was completed by the author, a native speaker of Navajo. The coding process was guided by the categories laid out in Young and Morgan (1987) and Young et al. (1992). These sources include specific examples of verbs that were used to determine category assignment. Three tokens were discounted because the child only attempted a prefix string without a verb stem. These three tokens were replaced with three other tokens in order to maintain an equal number of tokens for each child in the dataset (400 tokens per child).

Results

Number of syllables per verb in Navajo child speech

Figure 1 presents, for each child, the proportion of verbs according to the number of syllables in the verb. This figure only includes verbs with up to five syllables. The oldest child also produced two verbs with six syllables and one with seven syllables. The majority
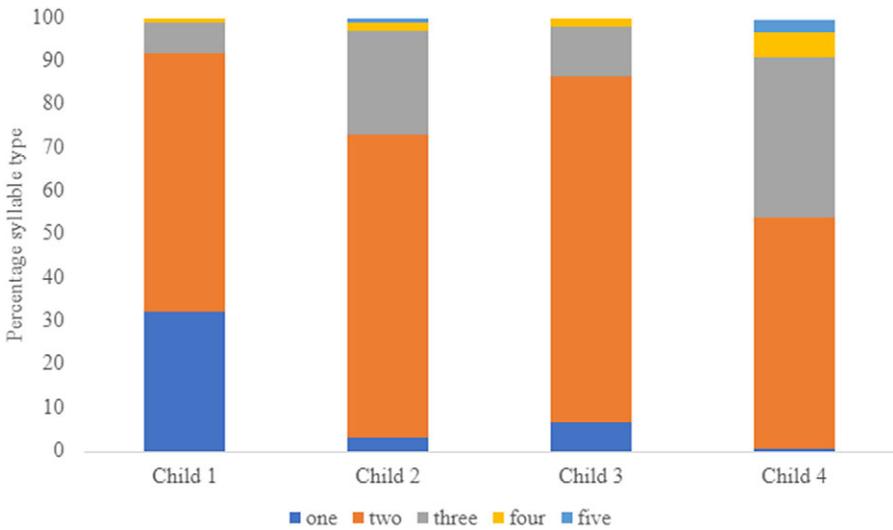
Figure 1. Percentage of verbs with each syllable-length used by each child (Child 1-3: n = 400 verbs per child; Child 4: 397)
Note: Child 4 also produced two verbs with six syllables and one verb with seven syllables.

of the verbs (66%) were bisyllabic. Further, bisyllabic verbs were the most frequent type for each individual child. Bisyllabic verbs are formed by producing a verb stem plus a verbal prefix. The verbal prefix can have the CVC or the CV shape. In some cases, a default verbal prefix, *yi* -, must be added to the verb stem to maintain a bisyllabic verb construction. When using the default *yi*- prefix, this is usually due to the lack of prefixes, especially in third-person verbs. Three-syllable verb constructions were the second most frequent syllable shape in the dataset overall, and also for the three children whose ages ranged from 5;10 to 11;02. The oldest child also produced 22 four-syllable verbs. Although Navajo verbs can have multiple syllables, such as five, six, or seven syllables, they were not common in the data set; there were 43 five-syllable verbs, half of which were produced by the oldest child.

Examples of Navajo verbs with different syllable lengths are as follows: a one syllable word is *ní* 'S/he says'; a two syllable word is *ół.hosh* 'You² sleep'; a three syllable word is *ni.sé.yá* 'I went about'; a four syllable word is *bí.da.hooł.aah* 'You³⁺ learn it'; a five syllable word is *ał.ch'é.ná.hoosh.' įįh* 'I usually keep this area tidy'; a six syllable word is *bi.ká.'á.náá.násh.yeed* 'I help him again'; and a seven syllable word is *shi.lá.k'é.ni.da.dil. nih* 'They³⁺ usually shake my hand'. Monosyllabic verbs were frequent in the youngest child's data (n=128), but not among the older children. Note that the rates in Figure 1 include the monosyllabic verb form *ní* 's/he/it says.' However, adults also produce *ní* as an un-prefixed verb stem. Thus, each production of *ní* was analyzed for whether an adult would also produce this form without prefixes in the given context. Table 4 zeroes in on the 167 monosyllabic verb forms in the children's data and separates the tokens where an adult would also have produced un-prefixed *ní* from all other tokens. Note that no other verb stem in the data set would be produced by an adult without prefixes. The results bolster the conclusion that un-prefixed verb stems are a characteristic of younger Navajo-speaking children, as only the youngest child produces a substantial

Table 4. Types of monosyllabic verbs in Navajo child speech

Adult Target	Child 1 4;07–4;11	Child 2 5;10–6;03	Child 3 9;08–9;11	Child 4 10;10–11;02	All four children
Does not match adult target (not *ní*)	109	8	4	0	121
Matches adult target (*ní*)	19	3	22	2	46

amount of these. Further, there are more non-adult-like than adult-like monosyllabic forms among the two youngest children, but the reverse is true for the two older children. Unsurprisingly, the two younger children produce significantly more non-adult-like monosyllabic forms as compared to the older children [X^2 (1) = 57.04, $p < .0001$].[10] Thus, once adult-like ní forms are separated out, it is clear that un-prefixed verb stems decrease with age and in fact are not found in the oldest child's data. In sum, the results indicate that there is a period of time where Navajo-speaking children continue to produce un-prefixed verb stems alongside more complex forms (Child 1), and that somewhere between five and six years of age, children stop producing non-adult-like un-prefixed verb stems.

In the next four sections the distribution of child-produced verbs is reported for the following four properties: (1) neuter (i.e., stative) or active (i.e., motion) verbs, (2) transitivity, (3) person and number, and (4) verb mode. The results demonstrate that although Navajo-speaking children produce a variety of verb constructions, the most frequently used verb types are those that take the fewest inflections.

Neuter and active verb forms in Navajo child speech

The primary difference between neuter and active verbs is that neuter verbs describe states while active verbs express activities and events. Neuter verbs tend to be minimally inflected; they only require a single prefix. Active verbs typically take several prefixes because they involve expressing an action or event where information such as who, how, and when are typically expressed. The analysis of 1600 verb constructions shows that 51% (815 tokens) are neuter verbs and 49% (785 tokens) are active verbs. Thus, Navajo-speaking children use neuter verbs and active verbs at similar rates.

Figure 2 displays each child's use of neuter and active verb tokens. Notice that Child 1 uses more neuter verb tokens than active verb tokens while the remaining children use almost equal numbers of each verb type. In fact, Child 1 produces significantly more neuter verb tokens as compared to the three older children [X^2 (1) = 6.02, $p = .01$]. Neuter verb constructions are minimally inflected, typically bisyllabic, and are usually in third-person singular constructions used to describe conditions, positions, states, and dimensions. This could be one reason why Child 1 produces more neuter than active verbs. This child is the youngest one, and thus may not yet have the ability to explain more complex propositions involving multiple verb arguments.

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[10]This result holds when using Yates' Chi Square test, which is appropriate given that the older children only produced four non-adult-like monosyllabic forms [X^2 (1) = 53.59, $p < .0001$].
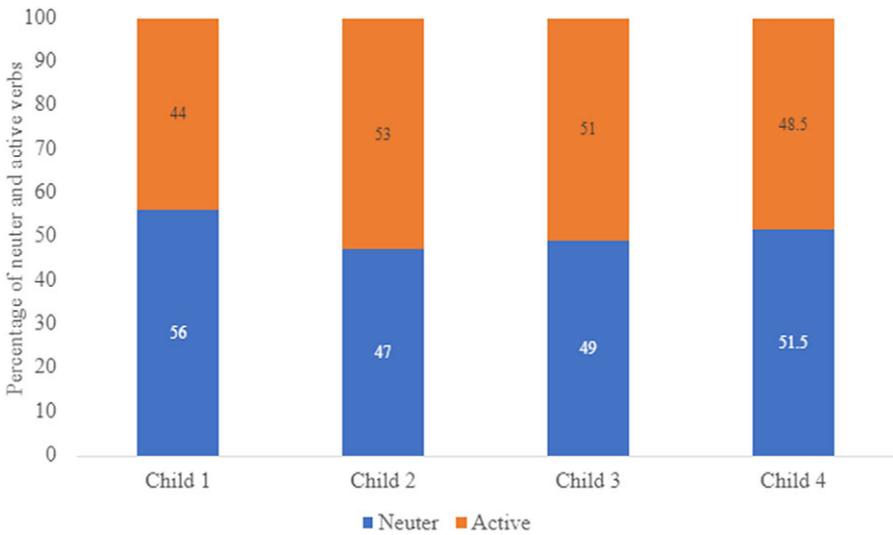
Figure 2. Percentage of neuter and active verbs by child (n = 400 verbs per child)

Although the percentages of neuter and active verb tokens are nearly equal for all children, in fact ten verbs represent nearly half (360/815) the total number of neuter verb tokens. There are at least 23 tokens for each of these ten verbs. By contrast, only two active verb types occurred at least 21 times (Table 5). These two verbs comprise 10% (77/785) of the total active verb tokens. The ten most frequent neuter verbs and active verbs, as well as their token counts are presented in Table 5. Turning to infrequent verbs, 10% (81/815) of the neuter verb types were produced only once. In contrast, 35% (276/785) of the active verb types were produced only once. Ten examples of infrequent verbs for each of the neuter and active verbs appear in Table 6.

Why do children repeat the same neuter verbs so often? Given that neuter verbs describe states, they are an excellent tool for description, 'it is beautiful/good, it is sitting there', etc. As such, they have less semantic content than active verbs. Active verbs are more specific in their semantic content and thus are less versatile in terms of the events they can describe.

Transitivity in Navajo child speech

Navajo verbs can also be categorized according to transitivity. Transitive verb constructions, such as *yizgoh* - 'He rammed it' - take a subject and direct object; intransitive verb constructions, such as *yáshti'* - 'I speak' - take only a subject. Navajo verbs can be marked for subject, direct object, and indirect object in a single verb construction, such as *shilák'éni'aah* - 'You place it in my hand'. This means that the more arguments a verb has, the more inflections a verb construction will take. If a verb expresses only the subject, then it is indicated by using a single agreement marker. If a verb needs to express two arguments, then a verb word indicates this by using two prefixes. And three prefixes are used in ditransitive verb constructions, or the verb may require an oblique marker such as a postposition. An example of a ditransitive verb construction is *shaa néi'ááh* – 'S/he

Table 5. The most frequent verbs in Navajo child speech

Token count	Verb	Translation
Neuter		
63	*nizhóní*	'It is pretty/beautiful.'
55	*sidá*	'S/he sits.'
53	*át'é*	'It (something) is.'
35	*nisin*	'I want it.'
33	*ní*	'S/he says.'
27	*hozhǫ́*	'There (an area) is happiness.'
24	*kót'é*	'It is like this.'
24	*jiní*	'One says.'
23	*hólǫ́*	'It exists.'
23	*si'ą́*	'It is in place.'
Active		
56	*níníł'į̃*	'You look at it.'
21	*naashné*	'I play.'
19	*ashłééh*	'I make it (something).'
18	*naané*	'S/he is playing.'
17	*ííníshta'*	'I attend school.'
15	*déyá*	'I begin to go.'
14	*naaghá*	'S/he walks about.'
13	*yáłti'*	'S/he is talking.'
13	*íílééh*	'S/he makes it (something).'
12	*naalnish*	'S/he works.'

usually gives it to me'. Navajo-speaking children are tasked with learning this marking system in addition to other verbal inflectional systems such as mode marking when producing verbs.

The children in this study produced a total of 1,236 intransitive verb constructions, 344 transitive verb constructions, and 20 ditransitive verb constructions. Thus, Navajo-speaking children produce verb constructions that require the least amount of inflection (intransitive verbs) much more frequently than those that require more than one type of agreement marking (transitive or ditransitive verbs). In fact, 77% of the data is composed of intransitive verb constructions, demonstrating that children primarily produce these types of verbs in their daily conversations with their caretakers.

Figure 3 presents a breakdown of each child's production of intransitive, transitive, and ditransitive verb constructions, and demonstrates that reliance on intransitive verbs holds across all four children. At the same time, there appears to be a slight increase with age in the use of intransitive verbs as compared to transitive verbs; compared to the two

Table 6. Examples of verbs used only once in Navajo child speech

Token Count	Verb	translation
Neuter verbs		
1	*naaz'ą́*	'Several individual objects rest in place.'
1	*náánisdzin*	'I want more of it.'
1	*siłtsooz*	'A flat flexible object rests in place.'
1	*yinílyé*	'You are called.'
1	*yá'ánisht'ééh*	'I am good.'
1	*dinistsxiz*	'I am spazzy.'
1	*bénáshniih*	'I remember it.'
1	*digiz*	'It is crooked.'
1	*hádaastxih*	'They[3+] have become old.'
1	*jideez'į́į́'*	'One is looking.'
Active verbs		
1	*yiinishta'*	'I am reading it.'
1	*tánásgis*	'I am washing it.'
1	*nideeshwoł*	'I will return walking.'
1	*ahidi'deeshniił*	'I will chop it (wood).'
1	*ałnánáshwo'*	'I repeatedly go back and forth.'
1	*ch'í'dii'nił*	'We[2] will let plural objects (sheep) out.'
1	*da'oodlą́ą́'*	'They[3+] drank.'
1	*haalyeed*	'S/he is going upward and out.'
1	*héinídzíí'*	'You spoke up.'
1	*i'niiyą́ą́'*	'I am beginning to eat.'

younger children, the two older children produced higher rates of intransitives than transitives [X^2 (1) = 7.46, p = .006].

Person and number in Navajo child speech

Navajo verb constructions mark for person and number using a single morpheme. Navajo expresses first, second, and third persons paired with singular, dual-plural, and distributive plural numbers by using combinations of these markings as a single lexical unit. Person and number markings also help form the A_{STEM} of a verb construction. Example (8) illustrates how person and number are expressed in the verb construction. The second person, dual plural subject agreement morpheme constitutes the first syllable in *ół.hosh*. In this example, produced by Child 1 at age 4;09, person and number are expressed the same way an adult would express them.
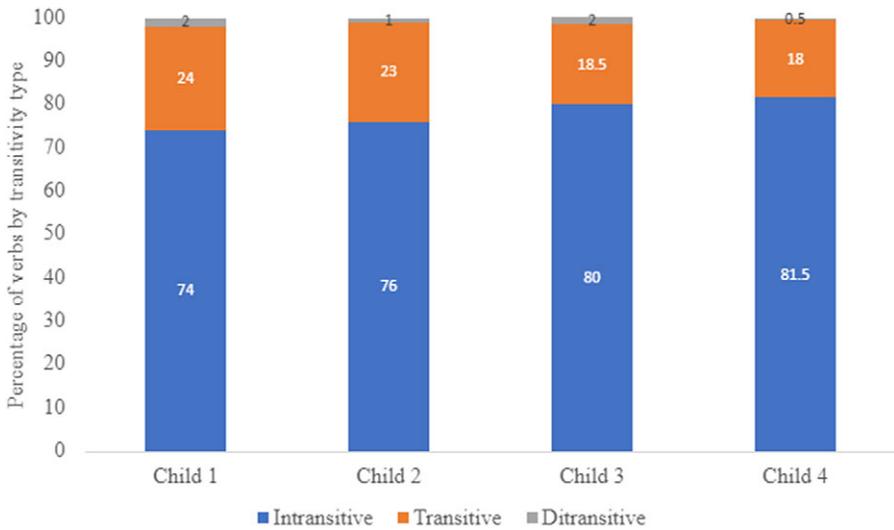
Figure 3. Percentage of intransitive, transitive, and ditransitive verbs produced by Navajo-speaking children (n = 400 per child)

(8) ółhosh   (Age 4;09)
     [ó] [łhosh]
     [Ø.IPFV–2DPL.SUBJ]$_{A_{STEM}}$ [CFL-STEM.SLEEP$_{IPVF}$]$_{V_{STEM}}$
     'You² sleep.'
     Target: ółhosh

Navajo verb constructions do not mark for third person singular or third person dual plural. This makes these third-person verb constructions the least marked in comparison to the first- and second-person verb constructions. Example (9) below shows the progressive verb in third person singular produced at age 6;02. This example shows three types of information synthesized into one syllable: the third-person singular object, the progressive marker, and the third-person singular subject comprise [*yoo-*]. Thus, the subject and the direct object are both captured in the A$_{STEM}$ syllable. The meaning 'drag' is captured in the second syllable [*-dzį*].

(9) *yoodzį*   (Age 6;02)
     [*yoo*] [*dzį*]
     [3SG.OBJ-PROG–3SG.SUBJ]$_{A_{STEM}}$ [CLF-STEM.DRAG$_{PROG}$]$_{V_{STEM}}$
     'S/he is dragging it along.'
     Target: *yoodzį́į́s*

Table 7 displays the distribution of verbs produced with different types of subject agreement markers. Navajo-speaking children produce verbs with third-person singular subject agreement marking most often. More specifically, 971/1600 (61%) verbs were produced with third-person singular subject agreement (Table 7). Verbs with first-person singular subject agreement are the second most frequent (387/1600; 24%), followed by verbs with second-person singular subject agreement (116/1600; 7%). Navajo-speaking

Table 7. Person/number of subject marking in Navajo child speech

	Child 1	Child 2	Child 3	Child 4	
	4;07-4;11	5;10-6;03	9;08-9;11	10;10-11;02	Total
Singular					
1st	43	118	94	132	387
2nd	80	16	14	6	116
3rd	265	211	273	222	971
Dual-Plural					
1st	1	7	3	5	16
2nd	3	0	0	0	3
3rd	1	3	3	0	7
Distributive plural					
1st	0	18	3	4	25
2nd	0	3	0	3	6
3rd	7	24	10	28	69
Total	400	400	400	400	1600

children produce far fewer verbs with dual plural subject agreement (2%) or distributive plural subject agreement (6%). Overall, the distribution of forms is similar across children in that over half of each child's verb forms are marked for third-person singular subject agreement. Comparing the two younger children to the two older children, the predominance of third-person singular forms persists across age [X^2 (1) = .95, p = .33]. Child 1 produces more second-person singular than first-person singular forms, whereas the reverse is true for the other three children. At the same time, Child 1 also produces a substantial amount of first-person singular forms (n = 43). In sum, the results indicate a similar distribution across children and an overall preference for singular forms, especially third-person singular. As will be discussed later, the high frequency of third-person singular forms may be due to the lack of agreement marking and may also be related to the use of third-person forms to create phrasal verbs. In sum, this analysis lends further support to the conclusion that overall Navajo-speaking children produce more unmarked verbs than other types.

Mode in Navajo child speech

Table 8 shows a comparison of how often the different Navajo verb modes were produced by each child. Imperfective verbs, such as *áshłeeh* - 'I am making it' - comprise 62% of the data. Perfective verb constructions, such as *iishłaa* - 'I made it' - comprise 27% of verbs used by children in their daily speech, making perfective verbs one of the two most frequently used verb types in Navajo child speech. The usitative (*yiyį́į́h* - 'S/he usually eats it'), future (*néidį́į́h* - 'S/he will eat it'), and optative (*wóshą́ą́'* - 'I wish to eat it'), together, make up only 3% of the verb forms found in the dataset while the iterative (*náshdį́į́h* - 'I repeatedly eat it') and the progressive (*yidloh* - 'S/he is smiling') make up the remaining 8%.

Table 8. Mode types in Navajo child speech

NAME	Child 1 4;07 – 4;11	Child 2 5;10 - 6;03	Child 3 9;08 – 9;11	Child 4 10;10 - 11;02	TOTAL
Imp.	290	213	252	241	996
Perf.	87	132	119	95	433
Yi-Prog.	11	21	24	16	72
Iter.	4	9	5	38	56
Fut.	5	22	0	8	35
Opt.	3	2	0	0	5
Usit.	0	1	0	2	3
Total	400	400	400	400	1600

The reliance on imperfective verbs holds across all four children; this category makes up at least half of each child's verbs. At the same time, it is worth noting that the youngest child's rate of imperfective forms (72.5%) was significantly higher than that of the three older children (53.3%, 63%, 60.3%; average across the three children = 59%) [X^2 (1) = 23.85, $p < .0001$]. Thus, it appears that with age, children decrease their reliance on imperfective forms.

Turning to the optative, progressive, and future, the two youngest children both produce these verbs at least once, which suggests that by age 4;07, these verb modes are produced by Navajo-speaking children. With respect to the optative verbs the two youngest children, Child 1 and Child 2, are the only ones who produced these verbs, whereas Child 3 and Child 4 did not. Given that the optative verb is present in the youngest child's speech (Child 1), we can surmise that Navajo-speaking children learn this verb form relatively early, but it is scarce, which may explain why the oldest children did not produce any tokens of it.

Usitative verbs are interesting in that they share the same verb stem shape with the iterative verb construction. The only difference is that usitative verbs and iterative verbs have different prefixes to indicate this difference. Child 2 and Child 4 both produced at least one example of a usitative verb, whereas Child 1 and Child 3 did not produce any. Child 1 might still be too young to be able to produce these verbs, which express a habitual event. While Child 3 is already nine years old, he is the only child who does not produce any tokens of usitative, optative, or future verb forms. It is possible that this child's inventory of verb modes is smaller than that of Child 2 and Child 4, but it is also possible that the relative scarcity of usitative, optative, and future verb forms makes them less likely to appear in natural corpus data.

Discussion

This paper analyzed a dataset of 1600 verbs produced by four Navajo-speaking children, ages 4;07 to 11;02, in the home environment where they were recorded having conversations with their caretakers. Prior research indicated that children produce only the un-prefixed verb stem during the earliest stage of language production and that, given abundant input in Navajo, children produce prefixes with great accuracy (Saville-Troike,

1996). Unlike Saville-Troike's study, the current study focused on the rate at which different verb forms were produced rather than the accuracy of the production. Two research questions were posed. Given that children's earliest Navajo verb productions consist of monosyllabic un-prefixed verb stems, the first question was whether older children would continue to rely on such structures or produce more complex ones. The second question focused on what types of Navajo verbs children produce.

To answer the first research question, the children's 1600 verbs were coded for the number of syllables. Results showed that overall, the children most often produced at least two syllables, indicating a sensitivity to the fundamental structure of Navajo verbs as consisting of both an A_{STEM} and a V_{STEM}. The youngest child, whose age ranged from 4;07 to 4;11 during the study, was the only one who still produced a substantial amount of monosyllabic forms (Figure 1). This conclusion is bolstered by the finding that the monosyllabic forms found among the older children were primarily tokens of *ní* 'he/she/it says' in contexts where this form can also stand alone in adult Navajo. Thus, non-adult-like un-prefixed verb forms were primarily concentrated in the youngest child's data and also dissipated with age. At the same time, it is worth noting that even this youngest child primarily relied on bisyllabic forms (60%) and also produced some verbs with three syllables (7%) as well as two verb tokens with four syllables and one verb token with five syllables. This indicates that there is a stage of development during which the child transitions into producing more complex verb forms but still sometimes produces un-prefixed verb stems.

Given that the children in this study are past the initial stage during which children solely rely on un-prefixed verb forms, the data lend themselves to the exploration of more complex verb structures in Navajo child language. To answer the second research question, which focused on which types of verbs children produce, the study investigated the distribution of neuter and active verbs, transitivity, person and number, as well as mode and aspect forms. Overall, the results showed that there was a preference for minimally inflected verbs. More specifically, the children produced relatively high rates of intransitive, third-person singular and imperfective verb constructions, which comprise the least inflected verb types. This is interesting as Navajo is famous for its verbal morphology and the verbs are usually described as highly inflected with many morphemes that are also highly fusional.

Why do children produce minimally inflected verb constructions? One possibility is that children slowly add more complex forms with age and experience with more varied forms. The analyses of neuter versus active verbs (Figure 2) and verb modes (Table 8) support such a conclusion as the youngest child relies more heavily on neuter forms and the imperfective mode than the older children. By contrast, the analyses of transitivity and person and number (Figure 3, Table 7, respectively) suggest a similar distribution across the four children, with all four relying heavily on intransitives and third-person singular forms, even though there is a wide age range. With respect to transitivity, previous research has shown that across several languages, children rely on intransitive forms initially and tend to omit direct objects even with transitive verbs (e.g., Pérez-Leroux et al., 2018; Shin, 2022; Theakston et al., 2004). Further, several studies have found that bilingual children omit objects with transitive verbs at higher rates and for longer periods of time as compared to monolingual children (Pirvulescu et al., 2014; Shin et al., 2023). It is possible that the children in the current study experience a prolonged period of time during which they rely heavily on intransitive verbs. Allen (2013) also found that Inuktitut-speaking children produced more intransitive than transitive verbs, which she explains is related to the tendency in Inuktitut to use detransitivizing structures to express bivalent events. In

contrast, Navajo passive constructions are relatively rare. The high use of intransitive constructions by children in this study is more likely tied to a prolonged period during which they produce minimally inflected forms.

In sum, the results overall support the conclusion that the Navajo-speaking children in this study relied heavily on minimally inflected forms. There is also some evidence suggesting that they increase their use of more complex verb forms with age. Future research including longitudinal data would help clarify whether this is the case.

Another explanation for the reliance on minimally inflected verb constructions is that in fact the distribution of verb forms found among the children mirrors the distribution found among adults. Perhaps the verb constructions produced by children are a reflection of the high rate of certain verb types in the input. A companion study is planned to evaluate the caregivers' verb types to help answer this question. In addition, the environment in which the conversations took place may have influenced which verb types were used. For example, the caretaker-child conversations in the home may have focused primarily on third-person entities, which could help explain the predominance of third-person verb constructions. They may also be conversing about events that are happening during the conversation which accounts for the high rate of imperfective verb constructions. An analysis of discourse topics would further help explain the distribution of verbs found in the current study.

Finally, it is also worth noting that minimally inflected forms may at first glance suggest that children are avoiding complex structures. Henke (2019), for example, found that a two-year-old child acquiring Northern East Cree used a possessive construction with fewer inflections than the construction produced by her parent. However, in addition to minimally inflected forms, children in the current study produced some forms that are highly productive and are used for multiple purposes in Navajo. For example, third-person forms are used in combination with postpositions to create phrasal verbs. This leads to a shift in meaning or allows meaning to be extended from the main verb. For example, *nizhóní* 's/he/it is beautiful' to *shił nízhóní* 'I like it.' The verb *nizhóní* is in both examples, but they have a different meaning after a postposition is added to create a phrasal verb. Changing the third person form to a first-person form by adding the prefix *-sh-*, produces *nishzhóní* 'I am beautiful'; however, without the postposition *shił*, *nizhóní* is not used to mean something that is 'liked' as in *shił nízhóní*. Other examples include *shił bééhózin* 'I know it' versus *bééhózin* 'it is known', *baa hózhǫ́* 'being happy about it' versus *hózhǫ́* 'happiness,' and *hólǫ́* 'it exists' versus *shee hólǫ́* 'I have'.

In addition to being used to create phrasal verbs, minimally inflected third-person verbs are also used to create nouns. For example, a minimally inflected verb is *adą́* 'eating.' When the postposition *bikáá'* 'on top of it' is added to the verb construction *adą́'*, the phrasal verb *bikáá' ádą́* 'eating on top of it' is created. By adding the nominalizer *-í* to this phrasal verb *bikáá' ádą́*, an *-n-* must be inserted prior to adding the nominalizer to create the noun *bikáá' ádą́ní* 'table.' The *-n-* is inserted to maintain a CV syllable structure. The majority of Navajo nouns are formed in this way. Other examples are *dah naat'a'* 'flying up high' compared to *dah naat'a'í* 'flag', *na'oolkił* 'continuously moves in small increments' compared to *na'oolkiłí* 'clock,' and *bee ałhi'dilne'* 'used to chop' compared to *bee ałhi'dilne'í* 'axe'. The verb constructions in these examples are in third-person singular and the postpositions in these examples are also in third person singular. Since Navajo nouns are primarily created from the least inflected types of verb constructions, mastering these forms early on has many benefits for the Navajo speaker. In summary, this discussion of the multiple functions of minimally inflected third-person singular forms – both in terms of the creation of phrasal verbs and nouns – serves to help us understand

why minimally inflected forms may predominate in child language, and perhaps in adult Navajo, too. They are not only less complex; they are also highly frequent and productive and serve to create other constructions. As such, they are useful for children who are still acquiring the language.

While the high productivity of minimally inflected verb forms may explain the frequency of these forms among Navajo-speaking children, it is important to remember that many of the verb types that children produced are in fact highly inflected (e.g., active verbs), and are often comprised of more than two syllables (38% of verbs produced). Thus, the children are already well-versed at producing highly complex Navajo verb structures.

It is also interesting that, even though there was a progression with age with respect to number of syllables in the verb forms, the use of active verbs, and the decrease in the reliance on imperfective mode (Figures 1 and 2; Table 8), there was no clear progression with age with respect to transitivity or person/number forms. In some ways, Child 3 appears to be less advanced than the younger children. For example, the analysis of verb mode (Table 8) suggests that Child 3 may have a smaller inventory of verb modes than the other children. In a previous analysis, this child was also shown to be less accurate in his pronunciation of verbs as compared to the other three children (Chee, 2017). It is possible that Child 3, who was nine years old during data collection, had become an English-dominant bilingual. Saville-Troike (1996) found that the two children in her study who lived in an English-dominant setting were less advanced in their verb production than the two who lived in a Navajo-dominant setting. It would not be surprising if the children in this study become English dominant. In fact, two potential participants were lost from the study in a short span of time due to becoming English-only speakers. At the same time, Child 3 lives with two monolingual Navajo-speaking grandparents and must maintain his Navajo language to be able to communicate with them in the home environment. Further, the mode forms missing from Child 3's dataset (Table 8) were also very scarce across the children. Finally, he performed similarly to the other children in the analyses of neuter versus active, person and number, and transitivity. In terms of number of syllables, once adult-like forms of *ní* were separated, Child 3 mostly produced bisyllabic forms – but also some forms with three syllables; and some with four syllables. Thus, while Child 3 seems less advanced than the younger children in terms of his verb mode inventory, he is comparable or more advanced than the younger children in other ways. In summary, all four children relied heavily on minimally inflected forms, but also produced very highly complex Navajo verbs. In addition, the study provided some evidence that more complex forms emerge with age.

Conclusion

The four Navajo-speaking children in this study, whose ages ranged from 4;07 to 11;02, were past the initial stage during which Navajo-speaking children rely wholly on monosyllabic un-prefixed verb stems. While the youngest child produced a substantial number of such forms, more than half his forms had at least two syllables. Thus, the children's verbs allowed for an exploration of how Navajo-speaking children advance past the initial stages of language development.

The variety of verbs the four Navajo-speaking children used in their daily speech at home with their caretakers was rich. This paper organized the verb constructions into different groups for analysis. By categorizing the child-produced verbs into neuter versus active, by transitivity, by person and number, and by mode, we learned that minimally

inflected verbs are highly frequent in Navajo child speech. The high frequency of minimally inflected Navajo verb constructions may in part be due to their less complex form, but it is also likely due to how frequent and productive these forms are in the Navajo language. For example, if Navajo-speaking children have a good grasp on third-person verb forms, then they may use them to create phrasal verbs and nouns.

Future studies should analyze how caregiver speech and specific Navajo verb constructions found in the input shape children's learning. The adult input may frequently include minimally inflected verbs. Discourse topics should also be examined, as this may influence the distribution of forms found in natural conversation data.

In closing, it is important to remind the reader that it was difficult to find four first-language child learners of Navajo, and there are no monolingual child speakers of Navajo at this time. This underscores the urgency of studies like the current one, which is the very first to explore how Navajo-speaking children produce verbs beyond the earliest stage. The study found that the children no longer rely solely on the monosyllabic verb stem, and that they show a preference for minimally inflected verbs. I argued that learning to master minimally inflected, bisyllabic Navajo verb constructions at a young age serves the children well because they can then use these forms to create phrasal verbs and nouns. Finally, the study also found that the Navajo-speaking children produced complex verb forms, which underscores children's ability to learn highly complex and highly fusional verb constructions.

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