The Adaptation of MAIN to Luganda

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The present paper reports on how the MAIN instrument was adapted to Luganda, a Bantu language spoken in Uganda, for assessing the narrative skills of Luganda-speaking children. The adaptation involved recommendations for cultural adaptations of the picture sets and translation of the manual into Luganda. The paper also describes the first (pilot) study using the Luganda MAIN, and how the bureaucratic, linguistic, and technical challenges along the way were dealt with. In addition, preliminary results are reported and discussed, followed by some conclusions and suggestions for future research.

1 Introduction

The present paper reports on the process of cultural and linguistic adaptation of the Multilingual Assessment Instrument for Narratives (LITMUS MAIN,[1] hereafter MAIN) to Luganda, a Bantu language widely spoken in Uganda. We describe the adaptation of the materials to the African setting (picture sets, instruction sheet, manual), and the administration of MAIN to Luganda-speaking children in Kampala, Uganda, pointing out the challenges involved in carrying out this endeavor. Finally, some preliminary results are reported and discussed.

The Multilingual Assessment for Narratives (MAIN) is a picture-based instrument developed by a group of international researchers to assess the production and comprehension of narratives by children of diverse linguistic and cultural backgrounds, i.e., multilingual, bilingual, and monolingual children (Gagarina et al., 2015). It has standardized procedures for narrative elicitation and scoring. MAIN has mainly been used to elicit oral narratives, but it

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[1] LITMUS stands for Language Impairment Testing in Multilingual Settings. It is a battery of tests developed as a result of *COST Action IS0804 Language Impairment in a Multilingual Society: Linguistic Patterns and the Road to Assessment* (see https://main.leibniz-zas.de/).

could also be used to test written production and comprehension of narratives (e.g., Pesco & Bird, 2016; Lindgren, 2019; Amora et al., 2020; Mieszkowska et al., 2020; Kapalková et al., 2020; Klop & Visser, 2020; Kan et al., 2020; Otwinowska et al., 2022). The materials consist of four picture-based stories (Baby Goats, Baby Birds, Cat, and Dog), each in the form of a sequence of six pictures intended to elicit narratives and to assess both their production and comprehension. The four stories were controlled for parallelism in their macrostructure and microstructure (story level and sentence level, respectively). At the macrostructural level, the stories were controlled for story components (A), episodic structure (B), number of tokens of internal state terms (C), and comprehension of goals and internal states of protagonists (D). At the microstructural level, the stories were controlled for aspects like the number of coordinating and subordinating constructions, overall internal state terms, and the number of direct speech sentences. The stories can be used with children aged 3 years and up. Each MAIN picture set can be used in one of three modes: Model story, Telling and Retelling. In all three modes, the story selection process is identical, i.e., the researcher asks the child to select one of three presented envelopes containing a set of six pictures. In addition, in all three modes the telling of the story is followed by asking the child comprehension questions about the story. However, in the Model story, the child gets to see the whole sequence of the picture set, and then the researcher tells him/her the story unfolding two pictures at a time. In the Retelling mode, the researcher tells the story to the child, and then the child tells the story to the researcher, and in the Telling mode, the child is asked to look at two pictures at a time and tell the story himself/herself.

A major advantage of the instrument is that it is theoretically based and designed to be culturally and socio-linguistically neutral and appropriate for speakers of different languages, social, and cultural backgrounds. It is designed to be sensitive to different speaker populations, and to enable testing multilingual speakers on each of their languages in a comparable way. To date, the MAIN manual has been adapted to more than 90 different languages, e.g., Afrikaans, Arabic, Greek, Hindi, Mandarin, Russian, Turkish, and Urdu (Gagarina & Lindgren (eds.), 2020), and the scoring procedure was revised to include more examples (Gagarina, Klop et al., 2019). In addition, MAIN has been used with numerous typologically different languages (e.g., Arabic, Danish, Bulgarian, Estonian, Greek, Catalan, Gondi, and Hindi; see references in Gagarina & Lindgren (eds.), 2020). This increases its cross-linguistic reliability and makes its scoring results available for comparison. Given the few assessment tools adapted to Ugandan languages to date, the endeavor of adapting MAIN to Luganda fulfills a true need for language and culture appropriate tools for clinical assessment as well as for research on narrative production by different groups of child and adult Luganda speakers.

2 Typological characteristics of Luganda

Luganda (or Ganda, as recorded in some documentation of the language), is a member of the Niger-Congo group of languages belonging to the narrow Bantu language cluster.[2] Luganda is

[2] Based on alphanumerical classification of Bantu languages, whereby letter-word combinations are used to represent the geographical zone in which each language is spoken, Luganda has been classified as E15 (Guthrie,

widely spoken in the central part of Uganda by many people, most of whom are native speakers of a language called Baganda. In the last housing and population census of Uganda, the population of Baganda was 5.56 million people (UBOS, 2016). Luganda is the major language in Kampala city, the Capital of Uganda, and in neighboring areas. Most urban dwellers in Kampala acquire Luganda as it is used in trade and business. The dialects of Luganda include Lusese, Lukooki, Lunabuddu, Luvuma, and the standard variety spoken in central Buganda. It is the standard variety that is used in formal communication, trade, business, and school. According to Lewis (2009) and Nakayiza (2013) some of the dialects of Luganda like Lukooki and Lusese are almost dying out. Luganda is closely related to several other Ugandan languages, including Runyoro and Runyankore (Kamoga & Stevick, 1968, p. iii) in its linguistic structure. For example, these languages have a similar noun class system whereby nouns fall in different classes and each class has an agreement marker inflected on the verb, adjective, and pronoun in a sentence. Luganda has a writing system, which like other languages in Uganda, is based on the Roman alphabet (Nsimbi & Chesswas, 1958). However, in some respects, its spelling system differs from that of other languages related to it, such as Runyankore-Rukiga and Runyoro-Rutooro. This is due to differences in speech sounds that occur in one language and not the other. For example, in Luganda we find both /l/ and /r/. These two sounds occur between specific vowels, so that /l/ occurs between the vowels [o…o] and [a…a] as in *ensolo* 'animals', *omuwala* 'girl', while /r/ manifests itself between [e…e] in words like *ekikere* 'frog', *emmere* 'food'. Likewise, as shown in Ndoleriire (2020), Runyoro-Rutooro /l/ and /r/ occur in specific environments: /l/ occurs between [u…i], [i…i], and [o…u], e.g., in the words *ihuli* 'egg', *omusiri* 'garden', *olubabi* 'leaf', whereas /r/ is conditioned by the environment [e...a], e.g., *okusera* 'to night-dance'. In contrast, in Runyankore-Rukiga we find only /r/ in all the environments, except in loan words such as *lita* 'litre' and among some speakers of Rukiga.

Luganda is well-documented. It has grammar books, dictionaries, and other reference texts, (e.g., Crabtree, 1923; Matovu, 1990). Most of its basic vocabulary has been recorded down in dictionaries (Kiingi, 2007; Murphy, 1972). It is taught in school from lower primary level to university level and used in the media. In the past, the Baganda had a tradition of storytelling. Nowadays, some of these stories are included in the school curriculum, for instance, in teaching religious studies. For example, many Ugandans who were in primary school in Uganda in the early 80s would still remember the story of *Nkyalira Walumbe e Ttanda* 'I Visit the Spirit of Death in Ttanda' (this is a myth about death). The story was included in the school teaching materials alongside other common traditional stories in Uganda and was used in lessons of religious studies to teach about the origin of death.

Luganda is a Subject-Verb-Object (SVO) language, as illustrated in examples (1) and (2) below.[3] Its lexical categories include nouns, verbs, adjectives, and adverbs which form the

1969, 1971), J15 (Bastin et al., 1999), and J10 (Ethnologue, 1996). Luganda is also classified as ISO 639-3 lug under the ISO code classification (Eberhard et al., 2022). For more detailed information, see references cited here.

[3] The following abbreviations are used in the examples: APPL - Applicative; AUG - Augment; HAB - Habitual aspect; IND - Indicative; INF - Infinitive (default, non-inflected, unmarked base form); NCL - Noun class (the number following NCL is the noun class number); Person - 1, 2, 3; PASS - Passive voice; PL - Plural; PST - Past tense; PFV - Perfective aspect; OBJ - Object pronoun; SG - Singular; SBJ - Subject pronoun.

content words, as well as pronouns, prepositions, conjunctions, among others, which form the function words. Pronouns may be free or bound. Examples of the latter case can be seen in (3) and (4) below. Chesswas (2002) describes the words that mark place, locative, and prepositions in Luganda. Some of the prepositions are: *e* 'in, from', for example in *e Mmengo* 'Mmengo' (name of a place); *Nva e Kampala* 'I come from Kampala'. Others are: *ku* 'in, at, to, on, about' and *mu* 'in, inside'. For conjunctions, Sternefeld (2015) lists the following conjunctions in Luganda: *ne* 'and', *ate* 'and, in addition', *era* 'and, in addition, also, too', *naye* 'but', *kyokka* 'just', *kubanga* 'because', and *n'olwekyo* 'therefore'. Others are: *nga* 'when, meanwhile, as though, like', *buli lwe* 'whenever', and *wabula* 'while, but'.

(1) *Omwana* *alidde* *omuyembe.*
o-mu-ana a-li-il-e o-mu-yembe
AUG-NCL1-child SBJ.3SG- eat-PFV-IND AUG-NCL3-mango
'The child has eaten a mango'

(2) *Abakyala* *bafumba* *emmere.*
a-ba-kyala ba-Ø-fumb-a e-m-mere
AUG-NCL2-woman SBJ.3PL-HAB-cook-IND AUG-NCL9-food
'The women cook food'

(3) *Omulimi* *yaleeta* *amazzi.*
o-mu-limi y-a-leet-a a-ma-zzi
AUG-NCL1-farmer SBJ.3SG-PST-bring-IND AUG-NCL5-water
'The farmer brought water'

Morphologically, Luganda is an agglutinative language with a noun class system of 23 classes denoting semantic notions like Human/non-human, Object, Plant, Property, etc. The noun class is denoted by a class marker which is a prefix attached to the root.[4] In example (3), *omulimi* 'farmer' is the subject of the sentence. The subject is marked on the verb by the 3rd person singular subject pronoun as a prefix. The subject and the subject pronoun prefix on the verb agree in number and noun class. Both must be in the same noun class, in this case class 1, whereby the noun class marker (*-mu-*) for the noun and the subject pronoun (*a-*) correspond grammatically. Due to assimilation, the sound /a/ changes to /y/ in speech form.

In Luganda, the marking of inflectional categories on the verb includes tense, aspect, number, voice, modality, and agreement (in number and person). Modality is marked by modal verbs. This is illustrated in (4), where there are two verbs: an auxiliary *ayinza* 'may' which is a modal verb and the main verb *okuleeta* 'to bring'. Aspect marking (imperfective, perfective) is illustrated in examples (5)–(6), respectively, and voice marking (active, passive) is illustrated in examples (7)–(8), respectively:

[4] A noun in Bantu languages is made up of three components: an [augment] + [class prefix] + [root], e.g., the noun *o-mu-ntu* (person) consists of *o-* [augment], *mu-* [class prefix,3SG], and *-ntu* ['person', root]. Katamba (2003) notes that nouns in Bantu languages are categorized into 'classes' based on the prefixes they take.

(4) *Omulimi* *ayinza* *okuleeta*
o-mu-limi a-yinz-a o-ku-leet-a
AUG-NCL1-farmer SBJ.3SG-may-IND AUG-INF-bring-IND
amazzi.
a-ma-zzi
AUG-NCL5-water
'The farmer may bring water'

(5) *Omulimi* *atuleetera* *amazzi.*
o-mu-limi a-tu-leet-er-a a-ma-zzi
AUG-NCL1-farmer SBJ.3SG-OBJ.1PL-bring-APPL-IND AUG-NCL5-water
'The farmer is bringing us water'

(6) *Omulimi* *yali*
o-mu-limi y-a-li
AUG-NCL1-farmer SBJ.3SG-PST-be
atuleetedde *amazzi.*
a-tu-leet-er-i-e a-ma-zzi
SBJ.3SG-OBJ.1PL-bring-APPL-PFV-IND AUG-NCL5-water
'The farmer had brought us water'

The verb in sentence (5) denotes the imperfective progressive aspect, which in Luganda is not overtly marked by affixation. In contrast, the verb in (6) has a modified ending to denote the perfective aspect. Voice is illustrated in examples (7)–(8). In (7) the applicative suffix is used, and (8) both the applicative and the passive suffixes co-occur.

(7) *Omulimi* *yatuleetera*
o-mu-limi y-a-tu-leet-er-a
AUG-NCL1-farmer SBJ.3SG-PST-OBJ.1PL-bring-APPL-IND
ensujju.
e-n-sujju
AUG-NCL9-pumpkin
'The farmer brought for us a pumpkin'

(8) *Ensujju* *etuleeteddwa*
e-n-sujju e-tu-leet-er-w-a
AUG-NCL9-pumpkin SBJ.3SG-OBJ.1PL-bring-APPL-PASS-IND
omulimi.
o-mu-limi
AUG-NCL1-farmer
'The pumpkin has been brought for us by the farmer'

Luganda sentence types include: simple sentences (made up of one verb), e.g., *Abayizi balina ebitabo* 'The students have books', compound sentences (clauses joined by a coordinating conjunction), e.g., *Abayizi nabalaba era balina ebitabo* 'I saw the students and they had books', *Abayizi nabalaba naye tebalina ebitabo* 'I saw the students but they did not have books', and

complex sentences (consisting of one simple sentence and one or more subordinate clauses), e.g., *Omusomesa amanyi nti abayizi balina ebitabo* 'The teacher knows that the students have books'. Subordinate clauses are introduced by complementizers. The common form is the word *nti* 'that' as in *Awo Wango n'avaayo n'agamba nti yali taliiko kabi* 'Then, Mr. Leopard came out and said that he had no blame.'

3 The process of adapting MAIN to Luganda

Adaptation of any research instrument to diverse language populations is not an easy task. This is especially true when the languages involved are understudied. However, this process is essential before the instrument can be used to elicit data in new temporal, cultural or linguistic settings. A careful adaptation process can ensure that the results based on that instrument accurately reflect what they are supposed to measure, and at the same time reflect the unique characteristics of the language community studied. In this section, we describe the process and the steps required for the adaptation of MAIN to Luganda.

3.1 Adapting the MAIN picture sets to African culture and setting

The adaptation of MAIN to Luganda required both cultural and linguistic modifications. We first describe the cultural modifications proposed for the picture sequences, and then proceed to the linguistic adaptations of the manual and instruction sheet.

The modifications that were proposed for the picture sequence relate to animal and human figures as well as to objects and food and are intended to reflect more closely the African setting and to appeal to an African audience. Some of these were implemented by designing picture sets that were more appropriate to the African context. These include replacing the fox with a wolf (in the Baby Goats story) and using a dark-skinned boy with black curly hair (in the Cat story). In several African traditional narratives, a wolf is portrayed as a dangerous animal. Foxes are rarer than wolves in African tradition, so replacing the fox with a wolf in the picture set would make it more familiar to the children. In the telling task, some of the children actually used the words 'wolf' or 'leopard' to name the fox. Goats are reared in most African communities. Like any other domestic animal, they drink water in flooded areas or ponds when they are taken out for grazing. It is also common for the animals' kids or calves to drown in such water whereupon they are rescued by their mothers. They can be attacked by other animals, especially wolves. Thus, using goat figures in the pictures was suitable for the African audience.

Proposed changes which have not been implemented yet include the following: portraying the animals in the picture sets more like African domestic animals, e.g., most African dogs have straight-shaped jaws, V-shaped ears, and long tails, and often have a little bell around the neck. The domestic cat could be replaced by a wild cat which normally has black patches and likes hiding behind bushes to hoodwink unsuspecting people. In fact, children are fond of chasing it on sight, so they would recognize it easily in a picture. In the Cat story pictures, the boy goes fishing using a rod with a roller. However, a common fishing method in Africa is for people to sit by the riverbank or by the lake and lower the hook in the water, pulling it out as they feel that it is heavy due to the weight of a fish. Thus, adaptation of the fishing rod to the

African setting would require drawing a rod with a hook without a roller, instead of the boy's current fishing rod which has a roller for pulling the string. Also, the bucket may be replaced by a basket as the container where the fish is kept. In addition, children could be drawn holding a locally made ball. The balloons seen in the Dog story pictures can be found in some African modern homes as well as in nursery schools, but nursery school children, unlike children who do not attend school, do not always know their native language. They use mostly English or a mixture of English and a native language. A local object which could replace the balloon is a catapult that children use to shoot at birds in the trees. The houses in the background (of the pictures) could also be replaced by African shacks or traditional African houses. Regarding food, in the Dog story pictures, it is better to use meat (beef) instead of sausages. In some modern African homes, people eat sausages, but there is no local word for it.

Given that not all required changes to the picture sets were implemented by the time MAIN was administered in Uganda, and due to technical problems (e.g., electricity breakdown, lack of internet connection) which prevented downloading and printing new sets of pictures, the researchers had to use the standard pictures (see the picture set in Figure 1 below), which they already had available. That said, the standard pictures are generally understandable, and they do appeal to the children since they are in cartoon form. Thus, using them did not seem to affect the production of the narratives in any significant way, since all the participating children were school children, who were exposed to outside cultural environments through their school curriculum. The outcome of keeping the standard pictures would have been different with children that are not in school, because they would probably not quite recognize some objects (e.g., sausage) in the pictures.

Next, we describe the process of adapting the MAIN manual to Luganda. The main reason for translating the manual into Luganda is to ensure that the researchers using it comprehend the procedure and follow the administration and scoring instructions accurately and successfully. In line with that, the MAIN manual, including the story scripts, were translated from English into Luganda by two researchers over a period of several weeks. The translators produced three drafts before coming up with an acceptable version. Several features in the manual were familiar, which made it easy for the translators, e.g., terms used in formal education like *instructions, assessment, guide, materials, picture, story,* among others, and elements in the home environment of the children. Moreover, the narratives had the same structure as the ones that the children hear in their home as they are growing up, so that formulaic narrative markers like 'long ago, there was … or long ago, there lived …' were easy to understand and express in Luganda. However, despite the ease of adapting some aspects of the MAIN manual to Luganda, there were challenges to overcome.

3.2 Challenges in the adaptation process

Several challenges were encountered in the translation of the MAIN manual and its instruction sheet from English to Luganda, due to typological differences between the two languages and the lack of one-to-one lexical correspondence between them. For instance, some key concepts like *model story* and *retelling* as well as linguistic terms used in relation to internal states, e.g., *mental verbs*, do not have lexical equivalents in Luganda. The translators overcame the

challenge either by identifying a close equivalent or by using a whole sentence to convey the meaning. Thus, the terms above were translated as follows: model story to *okunyumya* 'conversation', retelling to *okuddamu ebyogeddwa* 'repeating what is said', internal state terms to *ebigambo by'embeera y'omunda* 'words expressing feelings', linguistic verbs to *ebikolwa by'ekinnannimi* 'saying verbs', *ebikolwa by'okugamba* 'action verbs', and *ebikolwa by'okutegeeza* 'verbs of thinking', and mental verbs to *ebikorwa by'okulowooza* 'verbs of thought'. A similar case was reported by Amora et al. (2020), who acknowledged the lack of one-to-one lexical equivalence between English and Tagalog. They also used the closest translations and descriptive forms. For example, they wrote about the translation of the word *boy* that "… in Tagalog, there is no direct one-word translation for the word 'boy'. ... [but the] closest translation is the gender-neutral *bata* 'child'. Adding the gender and connecting the words together with a linker (e.g., *batang lalaki* for 'boy') gives the same meaning as its English counterpart" (Amora et al., 2020, p. 225).

Understanding some of the instructions related to the preparation of the picture sets and translating them into Luganda was also challenging, since some of the instructions were ambiguous or opaque. For instance, the pictures in Figure 1 were supposed to be cut widthwise through the wider gap in-between. But the instruction was "Cut out the two rows of pictures" which was difficult to translate into Luganda. Also, the instruction "Paste the pictures together into a 6-picture strip as illustrated below and fold them twice (pic 1, pic 2, fold, pic 3, pic 4, fold, pic 5, pic 6)." was difficult to follow, since two separate instructions were put together (pasting and folding the picture strips), the folding direction was not clarified in the instructions, and figuring it out from the drawing was not straightforward. Yet, the pictures should have been folded in such a way that when the child opens them, s/he sees only two pictures at a time out of the six pictures on the strip. To resolve this, the Luganda instructions require separating the upper from the lower set of pictures by cutting along the wide gap between them. Then, placing the lower strip on the shaded part on the top-right of the upper strip and pasting them together at that point; finally, folding the picture set after the second and fourth picture margins to allow opening two pictures at a time for the child to see.

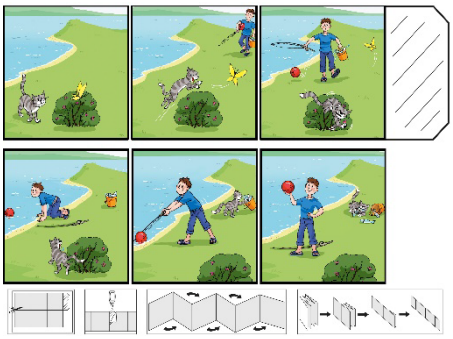

Figure 1: Preparation of the picture set (Gagarina, Klop et al., 2019, p. 3).

4 Administration of MAIN to Luganda-speaking children – a pilot study

Between 2018 and 2020, the authors of this article administered MAIN to 24 Luganda-speaking children aged 7 to 12. This piloting of MAIN focused only on narrative production. Therefore, we used only the Telling mode. In this section, we describe the research team (4.1), the participants (4.2), the procedure of data collection (4.3), the challenges encountered (4.4), data processing, i.e., transcription, translation, and scoring (4.5), and some preliminary results (4.6).

4.1 The research team

The research team included a PI and a co-PI. The PI who is the first author of this paper, is a lecturer at Makerere University in Kampala and a speaker of Luganda as an L2. The PI was responsible for coordinating the various aspects of the project, training two Luganda-speaking research assistants to collect narratives in three of the four schools and to transcribe them, and recruiting three contact persons in local schools, coordinating the transcription of the narratives, and translating the manual from English to Luganda. The PI also took care of the administrative requirements including getting the necessary documents to carry out the study, composing the parental consent form, coordinating the testing dates, and obtaining the participants lists from the schools. The co-PI, the second author, is a lecturer at a college in Israel, and does not speak the local languages, but has hands-on experience with the Ugandan education system and with coordinating MAIN administration in some other languages (e.g., Telugu, Palestinian Arabic). The co-PI was responsible for contact with the MAIN team at ZAS and for supervising the administration of MAIN in the largest school. Apart from the PI and co-PI, the research team included the two L1 Luganda-speaking research assistants mentioned above, two translators who were L1 speakers of Luganda, one of whom translated the MAIN manual from English into Luganda, and the other translated the narratives from Luganda into English, an L1 Luganda-speaking language editor who edited the transcriptions, and a second scorer, a faculty member at Makerere Linguistics department, who was an L2 speaker of Luganda.

4.2 Participants

The participants were recruited from four public schools located in different administrative areas (Divisions) of Kampala, the capital city of Uganda: Two schools in the Kawempe Division (Schools A and B), one in the Kampala Central Division (School C) and one school in the Nansana Division (School D).[5] The first two schools were in different parishes of the Kawempe Division, namely Ttula and Mulago, respectively. The school contact persons identified children suitable for the study. The children were Luganda-English bilinguals, as it is almost impossible to find monolingual Luganda speakers who attend school. Initially, 34 children of the appropriate age were identified and tested (School A, N=24; School B, N=2; School C, N=2; School D, N=6). However, only 24 were eventually included in the study. Most children came from one school (A, N=19) and a few others came from the three other schools

[5] The term *Division* is used by Ugandan authorities to refer to a small administrative unit in urban areas. In Uganda, several Divisions constitute a town or a city.

(B, N=1; C, N=1; D, N=3). The 24 participants were 13 males and 11 females, aged 7;4–12;10 (*M*=9;6). The children aged 7–9 years were in the 2nd–4th grades, respectively, except for one 9-year-old child who was in the 5th grade. The children aged 10–12 years were in the 5th–7th grade, except for one 10-year-old child who was in the 4th grade. These exceptions may be due to late start or to repeating a class, which is not uncommon in Ugandan schools. Several children (N=10) were excluded from the study for various reasons: Objection of the school administration, low proficiency in Luganda, absence from school during the testing day, COVID-19 limitations, incompatibility with the research requirements (e.g., wrong narration language – English, Runyankore, Acholi; failure of parents to complete and sign the consent form), or technical reasons like problems with the recording equipment, quality of the recording, wrong testing procedure, or missing personal details (see section 4.4). Information about the number of participants by age and gender is given in Table 1.

Table 1: Participants' information

Age group	Age range	N	Male	Female
7–9 years (M_{age}=8;9)	7;4	1	1	0
	8;0–8;9	7	5	2
	9;0–9;8	10	4	6
Total 7–9 years		18	10	8
10–12 years (M_{age}=10;5)	10;1–10;10	3	1	2
	11;7	1	0	1
	12;0–12;10	2	2	0
Total 10–12 years		6	3	3
Total (M_{age}=9;6)		**24**	**13**	**11**

4.3 Data collection

Data collection was carried out at the schools, in a relatively quiet place set for this purpose, either in the classroom or outside, in the compound of the school. Children were sent by their teacher in turn according to a pre-compiled list and were administered the test individually. Most children were assessed by the PI and co-PI, and a few by research assistants. The children were first asked their name and age (to be verified against the information filled in by their parents on the consent form). Then they were explained in English, what they were requested to do. The explanation was given in English since it is the language commonly used in Ugandan schools, and to ensure uniformity in the administration conditions, since not all the members of the research team who administered the test were native speakers of Luganda. Following the

instructions, the children were shown the first set of pictures and were asked to tell the story in Luganda. If they started telling the story in English, they were asked to start over in Luganda. There were few isolated instances of children who asked for clarifications in English, perhaps since they were tested in a school environment where everyone was intuitively using English. This may imply that in the future, similar interviews should be conducted in a natural setting of the target language.

Each child told two stories based on two different picture sequences. The four sets of pictures (Baby Birds, Baby Goats, Cat, and Dog) were used to elicit the narratives. Children were initially asked to pick one picture set at random. After telling the story based on the first set of pictures, each child was asked to pick a second set of pictures and tell the story based on it. The pairs of picture sets were not equally counterbalanced, so that 12 children told the Baby Birds/Dog stories, 10 children told the Cat/Baby Goats stories, 2 children told the Cat/Dog stories, and no child told the Baby Birds/Cat stories, the Baby Birds/Baby Goats stories, or Dog/Baby Goats. Most of the narratives were audio recorded on a Samsung smartphone using the phone recording app. The rest of the narratives were recorded using a Spark mobile phone. Once the task was completed, the child received a balloon as a small token of appreciation.

The distribution of narratives by story and age is displayed in Table 2. The Baby Birds story was narrated by 12 children, the Baby Goats story was narrated by 10, the Cat story was narrated by 12, and Dog was narrated by 14 children. In sum, 48 narratives were collected. Most of the narratives were produced by 8;0 and 9;0-year-old children (N=14 and N=20, respectively). As noted in section 4.2, a different number of narratives was collected in each school. The bulk of the narratives were gathered in one school in the Kawempe Division (A, N=19), and another small number of narratives was gathered in the three other schools – one in the Kawempe Division, one in Kampala Central and one in Nansana (B, N=1; C, N=1; D, N=3). In addition, the final number of narratives collected for each picture set was uneven. This was partly due to the number of children who participated in the study in each school, and partly to the number of children who showed interest in telling a particular story.

Table 2: Distribution of narratives by age group and story

Story	**7–9 years**	**10–12 years**	**Total by story**
Baby Birds	8	4	12
Baby Goats	9	1	10
Cat	10	2	12
Dog	9	5	14
Total by age group	**36**	**12**	**48**

4.4 Challenges during the data collection process

The administration of the MAIN instrument to Luganda-speaking children required dealing with numerous challenges like objections of school principals and parents, children's absence,

difficulties with contact persons in the schools, and an array of technical problems. These are described in more detail here: First, several principals objected to the administration of the test in their schools for fear of negative evaluation of the school based on the test results. In these cases, the research team had to look for other schools to perform the study. Other Principals expressed objection to administering the test in their school without a letter of permission from the Ministry of Education. The need to obtain such letters required dealing with bureaucracy and would have delayed the administration of the test in the schools. Secondly, some parents refused to sign the informed consent form, were late in returning it or failed to return it altogether. Consequently, this led the researchers to look for more children, which was also a time-consuming task. Thirdly, some of the children who were supposed to participate in the study were absent from school on the day the administration of the tests took place, due to sickness or holiday. In some other cases, the research assistants interviewed children who did not belong to the required age range. Fourthly, the researchers had difficulties to find a contact person in one of the schools, or in other cases, the contact person did not follow the time schedule, which resulted in delays in data collection. In a few other cases the researchers failed to find research assistants. Finally, there were some technical problems, such as limitations in storage and transfer of the audio recordings, unclear or incomplete recordings, or use of inappropriate testing procedures. Therefore, some of the data collected had to be discarded.

4.5 Data processing: Transcription, translation, and scoring

The narratives were transcribed by a trained research assistant who was a native speaker of Luganda. Next, the transcriptions were verified by another research assistant against the recordings and were then translated from Luganda into English.

As the Luganda-speaking children were tested only in the Telling mode of MAIN, only the story structure (SS) and structural complexity (SC) parts of the MAIN scoring sheet were used to score the narrative macrostructure in production. The SS measure reflects the quantitative aspect of narrative structure, comprising the participants' combined score on the four sections of the production test (Max 17 points): the setting (Range: 0_{Min}–2_{Max} points) and three episodes (Range: 0_{Min}–5_{Max} points each). The SC measure reflects the qualitative aspect of the narrative, comprising the participants' score on different elements within each episode, i.e., Goal (G) - the objective of the protagonist's action, Attempt (A) - the protagonist's action itself, Outcome (O) - the (non)accomplishment of the action, and various sequences thereof. The comprehension questions which form part of the Telling mode were not asked during the piloting phase of the study due to time limitations (a future study thus needs to investigate Luganda-speaking children's narrative comprehension). Two members of the research team scored the narratives, the PI and another lecturer from the Linguistics department at Makerere University, both L2 speakers of Luganda. The scorers read each narrative together. Then, each scorer scored the story independently, and the two sets of scores were compared. In case of disagreement, the scores were discussed until agreement was reached.

The scorers faced some challenges during the scoring procedure as, initially, they found it difficult to score some of the categories. For example, in the setting, the part that concerns the place where the story takes place (e.g., *by a lake/ at the riverbank/ in a meadow)* is not

commonly used in the setting of African narratives). African stories seldom begin with sentences like 'long ago, near a mountain'. Normally, you find a pattern like 'Long ago, there was Mr. Hare and Mr. Leopard. They lived together harmoniously …'. In contrast, the part of the setting that concerns the time of the story (*once upon a time/ one day/ long ago…*) was quite familiar to them, based on their background of African stories. They had heard such expressions both around the campfire and in the primary school. That said, the scoring of the setting worked well because the pictures portrayed the presence of the characters in a place, e.g., the goats were grazing near a lake. The rest of the categories became easy to score as the scorers got more experience following the scoring procedure in the MAIN guidelines.

4.6 Preliminary results

In this section, we report preliminary results based on the analysis of the narrative data elicited using the Luganda MAIN. We first focus on findings pertaining to story structure (SS). Our data comprises 48 narratives produced by 24 Luganda-speaking children between ages 7;4-12;10 (*M* = 9;6). The group's overall mean score on SS was *M*=8.04 (*SD*=2.64; Range: 1_{Min}–13_{Max}), which was lower than the middle score (8.5) of the total score (Max=17), suggesting that most children scored below 50% of the maximum number of points on SS as a whole.

Table 3 displays the mean, standard deviation, and score range by age group. The findings reveal that the mean scores of the 7–9-year-olds (*M*=7.56, *SD*=2.68) was lower than that of the 10–12-year-olds (*M*=9.50, *SD*=1.98), suggesting that the children's scores increased with age. An independent t-test showed a significant difference between the age groups on narrative scores, $t(46)=-2.31$, $p=.026$.

Table 3: Mean scores on SS (Max = 17) by age group for N = 48 participants.

Age group	N	Mean	SD	Median	Min	Max
7–9 years	36	7.56	2.68	8	1	12
10–12 years	12	9.50	1.98	9	7	13

Table 4 displays the children's mean, standard deviation, and score range by story. The findings suggest that the children scored highest on the Baby Goats story (*M*=8.9) and lowest on the Cat story (*M*<8), with the Baby Birds and the Dog stories in the middle, with a mean of around 8.1. Further analysis of a larger number of narratives elicited with each story is required to determine whether these differences are statistically significant, and whether the picture sequence used is indeed a factor that affects production scores. It should be noted, though, that similar findings have been reported in Gagarina, Bohnacker & Lindgren's (2019) study on adults and in Lindgren's longitudinal study from age 4 to 7 (2019), whereby participants showed higher scores on the Baby Goats story as compared with the Baby Birds story.

Table 4: Mean scores on SS (Max = 17) by story type for N = 48 participants

Story	N	Mean	SD	Min	Max
Baby Birds	12	8.00	2.45	2	12
Baby Goats	10	8.90	3.45	1	13
Cat	12	7.17	2.62	3	10
Dog	14	8.21	2.19	5	12

Moving on to a more refined examination of the SS scores, Tables 5 and 6 display the mean and standard deviation for each of the three different episodes by age group (Table 5) and story type (Table 6). The maximum score on the setting is 2, and the maximum score on each one of the episodes is 5. Table 5 shows that the group of 7–9-year-olds scored consistently below 50% of the maximum number of points, i.e., 2.5, on each episode but above 50% on the setting, whereas the group of 10–12-year-olds scored around 50% or slightly above on each episode and on the setting. Thus, the participants' overall score on each episode was relatively low, but appeared to improve slightly with age.

Table 5: Mean and standard deviation of SS by age group and episode

	Setting (Max = 2)		Episode 1 (Max = 5)		Episode 2 (Max = 5)		Episode 3 (Max = 5)	
Age group	*Mean*	*SD*	*Mean*	*SD*	*Mean*	*SD*	*Mean*	*SD*
7–9 years	1.28	0.944	2.19	1.091	2.00	1.219	2.08	1.052
10–12 years	1.75	0.622	2.58	1.311	2.42	1.084	2.75	1.055

Table 6: Mean and standard deviation of SS by story type and episode

	Setting (Max = 2)		Episode 1 (Max = 5)		Episode 2 (Max = 5)		Episode 3 (Max = 5)	
Story	*Mean*	*SD*	*Mean*	*SD*	*Mean*	*SD*	*Mean*	*SD*
Baby Birds	1.83	0.577	1.67	1.30	1.83	0.835	2.67	1.07
Baby Goats	1.60	0.843	2.60	0.966	2.40	1.43	2.30	1.25
Cat	1.00	0.953	2.50	1.31	2.25	1.22	1.42	0.996
Dog	1.21	0.975	2.43	0.852	2.50	0.855	2.07	1.21

The findings of Table 6 indicate that the children scored around 2.5 or below on each episode, but above 1 in the setting, regardless of story type (Setting: *M*=1, Range: 1_{Min}–2_{Max}; Episodes 1–3: *M*=2.5, Range 0_{Min}–5_{Max}).

Figure 2 displays findings relating to the structural complexity of the narratives by age group and sequence type, i.e., story complexity (SC). The categories included in the scoring of each episode were the Attempt (A), the Goal (G) and the Outcome (O) of each episode (see section 4.5), and combinations of these categories, presented here by level of complexity: no sequence (no-S), AO, GA/GO and GAO. We followed the procedure in Gagarina, Bohnacker et al. (2019) in calculating the proportion of each episode type out of the total number of episodes in the sample. Akin to Gagarina, Bohnacker et al.'s (2019) methodology, we combined "sequences with A/O only" "with "sequences with G only" into one category, the no sequence (no-S), as both do not represent sequences but rather single components. The total number of episodes for the 7–9-year-olds was 108 (36x3), and the total number of episodes of the 10–12-year-olds was 36 (12x3).

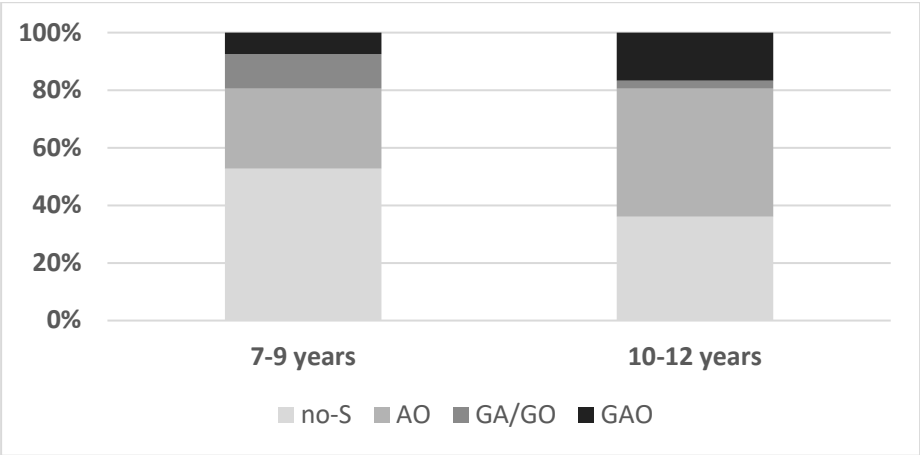

Figure 2: Structural complexity by age group and sequence type

The following findings emerge from the structural complexity analysis: The two groups of children used the no-S and the AO sequences considerably more than the GA/GO and GAO sequences. This finding, in and of itself points to a relatively basic and simplistic narrative structure. However, while the 7–9-year-olds used the no-S sequence most frequently (53.00%, 57/108) followed by the AO sequence (27.78%, 30/108), the 10–12-year-olds used the AO sequence most frequently (44.44%, 16/36) followed by the no-S sequence (36.11%, 13/36). Since AO is a sequence, whereas, by definition, no-S is not, the increased use of the former by the older children suggests that complexity may be increasing with age. This claim is further supported by the production of GA/GO versus GAO sequences by the two groups: While the younger group produced GA/GO sequences (12%, 13/108) around four times as often than the older group (2.78%, 1/36), the older group produced the most complex sequence, GAO, twice the percentage of the younger group ((16.67%, 6/36, vs. 7.41%, 8/108).[6] In sum, findings

[6] The makeup of the "no-S" category included the following components: G, A, O, and no component at all. The component most prominent in this category in both age groups was O (N=23, 40.3%, 7–9-year-olds; N=5, 38.4%,

suggest that although the narratives produced by children in both groups contain mainly simple episodes, the older group shows a somewhat higher complexity of narrative structure.

Finally, the quantitative findings described in Tables 5–6 and in Figure 2 are illustrated with an example. Consider the following *Cat* narrative produced by an 8-year-old child:

CHI17 [8;0, Cat]

Lwali lumu nga ppusi *eri awo, ngeraba akamuli ku muti.*
One day, when the cat was there it noticed a flower on a certain tree.

Ngeraba ekiwojjolo ku muti nebuuka ekikwate,
The cat saw a butterfly on a tree and jumped to catch it.

negwa mu maggwa negagifumita.
Unfortunately, it landed on thorns which pricked it.

Omu omulenzi ngabadde agenze okuggyayo ebyennyanja, na omupiira gwe negugwa,
One boy who had gone to get fish from water had his ball slide/fall

negugenda mu mazzi.
into this water.

Kaakati nalekawo ebyennyanja ppusi nebiraba.
He then abandoned his fish and the cat saw them.

Negenda wali eri nebirya nga omupiira ali muguggyayo,
It moved closer to the fish and ate them while the boy was rescuing/removing his ball from the water.

omulenzi, omupiira namala oguggyayo, nga ppusi eridde ebyennyanja bye.
Luckily, he got the ball, but the cat had already eaten his fish.

The total score of the child in the production task was below 50% of the maximum score, yet several components of the narrative macrostructure (setting, goal, attempt, outcome) can be identified in the text. The child scored high on items describing actions, e.g., expression that the cat jumped to catch the butterfly, the cat moved closer to the fish, the cat ate the fish, etc. In contrast, items relating to feelings or emotional reactions were mostly missing from the narrative, e.g., there was no mention of the boy's feeling when getting the ball or the satisfaction of the cat after eating the fish (with the exception of the internal state of seeing (e.g., *the cat saw them*). Instead, sentential adverbs were used to express the narrator's outlook on the situation, e.g., *unfortunately*, *luckily*. Similarly, with the exception of Episode 1, goals were missing, e.g., the child did not express what the boy wanted to do to get his ball back, or what the cat planned or wanted to do to get the fish. Rather, the description of the events focused on the actions taken by each of the characters and the outcomes of these actions. It should be noted,

10–12-year-olds); A was high in the production of the younger children but least frequently used by the older ones (N=18, 31.5% vs. N=2, 13.3%, respectively); both groups had the same number of G only (N=3), which constituted a considerably higher percentage of the episodes in the production of the 10–12-year-olds (5% vs. 23%); finally, the two groups differed in the absolute number of episodes which contained neither A, O or G (N 13, 7–9-year-olds; N=3, 10–12-year-olds). However, considering the percentages of these episodes out of the total number of episodes per group reveals that their proportion was quite similar (22.8%, 7–9-year-olds; 23%, 10–12-year-olds).

however, that these observations are based only on one narrative, and should be compared to the rest of the narratives to detect general linguistic patterns and cultural characteristics.

5 Conclusion

The present paper focused on how the MAIN instrument was adapted to Luganda for assessing the narrative skills of Luganda-speaking children. In the paper, MAIN was introduced along with the relevant typological and linguistic characteristics of Luganda. In addition, recommendations were made for the adaptation of the picture sets to the African culture and setting (i.e., animal and human figures, objects and food) to make them more appealing to an African audience. The latter sections of the paper described the adaptation process, administration of MAIN to elicit Luganda narratives, processing of the recorded narratives and a preliminary analysis of the narrative macrostructure, i.e., analyses of SS by age, story type and episode, and SC by episode and age. As noted, the adaptation process did not go without challenges. These included bureaucratic, linguistic, and technical challenges (e.g., lack of cooperation from some of the schools, difficulties in getting parents to sign ICFs, lack of translational equivalents of some words in the manual, difficulties encountered by researchers in understanding manual instructions, missing information in the consent forms, difficulty in obtaining the adapted picture sequences, etc.).

The preliminary analysis of the results provides a glimpse into the macrostructural characteristics of the narratives produced by Luganda-speaking children. The findings should be further analyzed in the light of narrative macrostructure and microstructure to provide more insights regarding these aspects. For example, at the macrostructural level, the use of internal state terms should be examined, and at the microstructural level, relevant aspects may include clause structure, noun phrase types, as well as the use of lexical elements, like connectors, verbs, and adverbs. The findings should also be compared to the African storytelling traditions to detect language and culture specific patterns compared to universal trends.

To conclude, the Luganda version of MAIN will prove useful in research on narrative production by children and adults from different age, gender, and socioeconomic status (SES) groups, as well as for clinical assessment. MAIN results can serve several purposes: (1) as a scientific basis for recommendations on how to develop children's narrative skills and narrative-based teaching programs in the local languages; (2) as a reference for teaching language aspects at language programs in academic institutions in Uganda; (3) cases of repetitions, hesitations and vocabulary errors evident in the narratives can shed light on how language is processed among children; (4) the results can form the basis for evidence-based intervention programs for remedying language communication challenges. In sum, Luganda MAIN is one of the very few existing assessment tools adapted to a native Ugandan language and piloted. Its complete implementation holds promise both for academic research and for clinical practices.

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