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A corpus-driven study of the expression of necessity in Luganda (Bantu, JE15)

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Abstract: This article reports on the analysis of three major markers of necessity in Luganda, i.e. the modal auxiliaries *-téekw-* and *-lina* and the verbal prefix *-andi-*. On the basis a 4-million-word corpus it is argued that, overall, the auxiliary *-téekw-* is more established as a necessity marker, as it is involved in the expression of all necessity subcategories except participant-inherent dynamic necessity. The auxiliary *-lina* is less semantically diversified, expressing only participant-imposed, situational and deontic necessity, while the verbal prefix *-andi-* expresses only deontic necessity. A comparison of corpus data with data from older literature on Luganda further shows that the objective category of participant-inherent dynamic necessity, which is not associated with any of the three markers described, is perhaps expressed by less-grammaticalised forms. These forms are also, together with other grammaticalised forms that have increasingly become rare, assumed to be part of the devices that could have been responsible for expressing necessity in earlier stages of the language, given that the three markers described in this research have only begun to meaningfully express necessity since the second half of the 20th century.

Introduction: The rationale for studying the necessity markers *-téekw-*, *-lina* and *-andi-*

The understanding of necessity adopted in this article is that it is one of the two major sub-domains of modality, the other being possibility (Palmer 1986: 20; van der Auwera and Plungian 1998: 80; Kratzer 2012: 28). We use the typology proposed by Nuyts (2006, see also Nuyts 2016), in which three types of necessity are recognised. Dynamic necessity concerns 'the indication of a need or necessity for the first-argument participant' (Nuyts 2006: 3). If the needs or necessities are fully inherent to the first-argument participant or subject, it is referred to as participant-inherent dynamic necessity. If the necessity is determined by external circumstances, it is participant-imposed dynamic necessity, and for necessities/inevitabilities inherent in the situation described in the state of affairs, it is called situational dynamic necessity. Deontic necessity is generally defined as an assessment of the degree of moral acceptability of the state of affairs, while epistemic necessity is concerned with a high likelihood or probability that the state of affairs expressed in the clause applies in the world.

In (older) Luganda dictionaries, grammars and handbooks, a number of forms with meanings associated with the concept of 'necessity' can be identified. These forms, some of which are auxiliaries or auxiliary-like verbs, include *-téekw-* 'must, be obliged, be bound', *-étaag-* 'need, require, want, desire, crave, long for', *-gwán(ír)-* 'ought, be expedient, be necessary, be obligatory, must, be fitting, be suitable, behove', *-sáan(ír)-* 'ought, be behoved' and *-lina* 'have' (see O'Flaherty 1892; Pilkington 1892; Livinhac and Denoit 1894; Pilkington 1899; Crabtree 1902; Le Veux 1914; 1917; Livinhac, Denoit and Wolters 1921; Kirwan and Gore 1951; Mulira and Ndawula 1952; Ashton, Mulira, Ndawula and Tucker 1954; Chesswas 1963; Cole 1967; Snoxall 1967; Kamoga and Stevick 1968; Nosova and Yakovleva 1969; Murphy 1972). Some lexicographers, such as Le Veux (1917), Mulira and Ndawula (1952), Snoxall (1967), Nosova and Yakovleva (1969) and Murphy (1972), also list the verb *-édaag-* with the meaning 'need, be in great/sore need of'.[1]

In this article, we focus on the more grammaticalised markers, i.e. the modal auxiliaries *-téekw-* and *-lina*, and in addition consider the verbal prefix *-andi-*, whose modal status has already been described in a previous study (Kawalya, de Schryver and Bostoen 2018). In the literature, *-téekw-* has explicitly been described and used as an auxiliary verb followed by an infinitive (Murphy 1972: 537; see also Snoxall 1967: 307), compared to, for example, *-étaag-* which has been described and used as a transitive lexical verb (Livinhac, Denoit and Wolters 1921: 54; Mulira and Ndawula 1952: 21; Murphy 1972: 527).[2]

The three modal markers brought together in this article were also chosen for their more widespread use, according to a preliminary corpus search, as well as native-speaker intuition. This is, to some degree, supported by the literature. Of the older grammars and dictionaries surveyed, *-gwán(ír)-* is found in only those works written in the late 19th and early 20th century. The latest source in which it is found is Mulira and Ndawula (1952), which is itself a revised version of an earlier dictionary, that of Kitching and Blackledge (1925).

In the remaining part of this introductory section, we review the literature on *-téekw-* and *-lina*, and briefly describe how the corpus was used for the analysis of these two auxiliaries. In the second, third and fourth sections, we respectively provide the different uses of the three selected modal markers, *-téekw-*, *-lina* and *-andi-*, on the basis of a 4-million-word Luganda corpus. We also carry out a distributional corpus analysis for each of these three necessity markers, overall and over time. Findings are discussed in the fifth section, while conclusions are provided in the sixth.

Literature review in respect of -téekw- *and* -lina

The auxiliaries *-téekw-* and *-lina* have not received substantial consideration in the existing literature. At most, only simple glosses are provided, mainly in bilingual dictionaries and grammars. For example, *-téekw-* has been described as an auxiliary verb used with an infinitive, with the meaning 'must, be obliged, be bound' (Kirwan and Gore 1951: 23; Mulira and Ndawula 1952: 184; Snoxall 1967: 307; Kamoga and Stevick 1968: 270, 281; Murphy 1972: 477, 518, 537, 565, 592).

According to Snoxall (1967), *-téekw-* is a passive form derived from the verb *-téek-* which means 'make a law, edict' or 'bind (by law)', as shown in (1). The passive in Luganda is formed by adding the passive suffix *-w-* or *-ibw-*/*-ebw-* to the verb root (Ashton et al. 1954: 25).

(1) *Bátútéékedde ettéékâ*.
ba-Ø-tu-teek-edde e-tteeka
SP_2-PRS-OP_{1PL}-bind-APPL.PFV AUG_5-NP_5.law
'They have bound us by law.'
(Snoxall 1967: 307)

The form *-téekw-* is first sighted in Le Veux (1914: 411), where it appears only once in this 475-page Luganda manual. As shown in (2), it is given as an alternative to the seemingly more established lexical verb *-lágír-* 'command, order, charge' (cf. Snoxall 1967: 171). In addition to portraying *-téekw-* as a likely newcomer in the language, whose meaning could best be arrived at by considering the more established synonym *-lágírw-*, the usage in (2) shows that *-téekw-* emerged as a passivised command verb.

(2) *Túlagirwa ou tútekwá ókújúná ábánáku*.[3]
tu-Ø-lagir-w-a **ou** **tu-Ø-teekw-a**
SP_{1PL}-PRS-command-PASS-IPFV **or** **SP_{1PL}-PRS-be_obliged-IPFV**
o-ku-jun-a a-ba-naku
AUG_{15}-NP_{15}-help-FV AUG_2-NP_2-destitute
'We are commanded/obliged to help the destitute.'
(Le Veux 1914: 411)

The auxiliary use of *-lina* has generally not been described in the literature on Luganda. As a full verb, it has been shown to have developed as a combination of the auxiliary *-li* 'be' and the conjunction *na*

'with' to mean 'be with' or 'have' (see O'Flaherty 1892: 9; Livinhac, Denoit and Wolters 1921: 187; Mulira and Ndawula 1952: 166; Ashton et al. 1954: 117; Chesswas 1963: 121–122). Indeed, in many older dictionaries and grammars, it is defined or used to mean 'have' (see Pilkington 1899; Le Veux 1917; Snoxall 1967; among others). Wilson (1882: 36–37) is perhaps the first to have called it an auxiliary, although the example he provides, in (3), depicts it as a full verb. From the literature, it can be assumed, therefore, that the current auxiliary (and thus modal) use of *-lina* is a later development. A recent dictionary, Kiingi (2009), does not include an entry for *-lina*, but in the running text of the introductory front matter it is used adjacent to a well-established lexical necessity marker, *-sáán(ír)-* 'ought, be behoved, be necessary', as shown in (4). Although *-lina* has become an established form for 'have', its constituent morphemes *-li* and *na* have also continued to exist as independent forms for 'be' and 'with, and' respectively. Written separately (*-li* + *na*), *-li* performs its copulative role and *na* its conjunctive role. It is when they are written together that *-lina* is used as a lexical verb. In the latter case, it functions as a possessive of the copula *-li*.

This is why, strictly speaking, sentence (3) would be wrong in present-day Luganda, since Luganda does not form possession for the noun *njala* 'hunger'. As a full verb, *-lina* is, to some degree, defective. It can for example only be inflected for the remote past. In other tenses, it has to be preceded by the auxiliary *-ba* 'be' which carries tense.

(3) *Ninâ njala*.[4]
N-Ø-lina N-jala
SP_{1SG}-PRS-have NP_9-hunger
'I have hunger.'/'I am hungry.'
(Wilson 1882: 37)

(4) *…ffe abóógézí báálwó túlíná obá kítúsáánidde okúgóndélá né okúgóbélélá ebyo abákúgú ábásíngílá ddálá ábá 1947 mú búkénkufu bye básémbye*.

ffe	a-ba-ogezi	ba-alwo	**tu-Ø-lina**	**oba**	
we	AUG_2-NP_2-speaker	PP_2-$POSS_5$	**SP_{1PL}-PRS-have**	**or**	
ki-Ø-tu-saanidde		o-ku-gondel-a		ne	
SP_7-PRS-OP_{1PL}-be_necessary.PFV		AUG_{15}-NP_{15}-respect-FV		and	
o-ku-gobelel-a	e-bi-o		a-ba-kugu		
AUG_{15}-NP_{15}-follow-FV	AUG_8-PP_8-DEMb		AUG_2-NP_2-expert		
a-ba-Ø-sing-il-a		ddala	a-ba-a	1947	mu
AUG_2-PP_2-PRS-surpass-APPL-IPFV		very	AUG_2-PP_2-CONN	1947	LOC_{18}
bu-kenkufu	bi-e	ba-Ø-semb-ye			
NP_{14}-expertise	PP_7-REL	SP_2-PRS-recommend-PFV			

'…we, its speakers, have or it is necessary for us to respect and follow what the experts who by far surpass those of 1947 in expertise, have recommended.'
(Kiingi 2009: xiii)

***The corpus in respect of* -téekw-** ***and* -lina**

The description of *-téekw-* and *-lina* in this article is based on a 4 053 739-word Luganda corpus, comprising materials from 13 decades (i.e. 1890s to 2010s) and 18 topics/genres (i.e. agricultural documents, cultural texts, environmental documents, financial texts, folktales, health documents, historical texts, inspirational materials, instructional materials, legal texts, magazines, newspapers, novels, plays, political documents, radio news, religious texts, and songs). Using WordSmith Tools (Scott 1996–2019), the items **teekw** and **teekeddwa* were queried in the case of *-téekw-*. The latter is treated as a perfective form of *-téekw-* in some sources (e.g. Snoxall 1967: 307), but we treat both as mere variations as they can substitute each other without any change in meaning. In actual fact, **teekeddwa* can only be a perfective form of *-téekébw-*, which in itself is the passive of the verb *-téek-*, but now with the meaning 'put, place'. The forms **tekw** and **tekeddwa* were also queried in order to cater for the former orthography. The asterisks represent any number of letters that may precede or follow these stems. The description of *-téekw-* and subsequent distributions are based on

a sample of 597 randomly selected instances (including its variations) out of the total of 1 985 actual occurrences in the entire corpus. We searched the diachronic corpus once, so for the description, examples are drawn from all over the corpus, in the different time periods. Thereafter, the same 597 instances were organised into their respective decades for the diachronic corpus analysis.

As for *-lina*, it is found in the corpus with both independent and auxiliary uses. However, in order to avoid the risk of missing a large number of cases of its auxiliary uses during the automated sampling process, we limited our scope to searching for only instances where *-lina* is followed by a *ku*-prefixed word form, henceforth *ku-* NP form. With this search, we aimed at retrieving all uses of *-lina* in double-verb constructions, i.e. where *-lina* is followed by a main verb in the infinitive. Thus, we searched for the items: **lina ku*, *lina oku*, nnina ku*, nnina oku*, nina ku** and *nina oku**. The forms *nnina/nina* are results of the Ganda Law, aka Meinhof's rule, from *n* + *lina*, i.e. '[w]hen two successive syllables both begin with a nasal plus a following voiced plosive, the plosive of the first syllable is lost' (Herbert 1977: 340). As Katamba (1978: 156–157; quoting Meinhof, Werner and Van Warmelo 1932: 183) states, sometimes the rule 'may apply even when the following syllable has a nasal without a following plosive', which is the case for *-lina*. The *nn* represents the current Luganda orthography, while the *n* represents the old orthography. Therefore, the lexical uses of *-lina* discussed in this article are limited to only those where *-lina* is used with object nouns of class 15. Lexical uses where the verb is followed by other nouns outside class 15 would be overwhelmingly many, thereby obscuring a good number of auxiliary uses of *-lina* in any sample. Used with a *ku-* NP form, *-lina* occurs 2 846 times in the 4 053 739-word Luganda corpus. A sample of 499 instances was analysed.

A corpus-driven description of the modal auxiliary *-téekw-*

A careful study of the 597 corpus instances shows that *-téekw-* is indeed used as an auxiliary, combining with a main verb, mainly in the infinitive, to express all three categories of necessity, i.e. dynamic necessity, deontic necessity and epistemic necessity.

***Dynamic necessity uses of* -téekw-**

No clear cases of *-téekw-* expressing participant-inherent dynamic necessity could be found in the corpus sample. The auxiliary can, however, express participant-imposed dynamic necessity and situational dynamic necessity as shown in (5) and (6) respectively.

(5) *Yalí alíngá aliná ettu. N'ólwékyo, nga báteekwá ókwángúyá éntégéká zaabwé*.

a-a-li	a-li	nga	a-Ø-lina	e-ttu	noolwekyo
SP_1-PST_2-be	SP_1-be	like	SP_1-PRS-have	AUG_5-NP_5.pregnancy	therefore
nga	**ba-Ø-teekw-a**		o-ku-anguy-a		
that	**SP_2-PRS-have-IPFV**		AUG_{15}-NP_{15}-expedite-FV		
e-N-tegeka			zi-abwe		
AUG_{10}-NP_{10}-arrangement			PP_{10}-$POSS_2$		

'She appeared to be pregnant. Therefore, they had to expedite their arrangements.'
(Pawulo, novels, 1980s)

(6) *Né bw'óyágála né bw'ótáyágála ebyóbúwángwa bítéékwá bútéekwá ókúkyûká…*

ne	bwe	o-Ø-yagal-a	ne	bwe	o-ta-Ø-yagal-a
even	if	SP_{2SG}-PRS-like-IPFV	even	if	SP_{2SG}-NEG-PRS-like-IPFV
e-bi-a		o-bu-wangwa	**bi-Ø-teekw-a**		bu-teekwa
AUG_8-PP_8-CONN		AUG14-NP_{14}-culture	**SP_8-PRS-must-IPFV**		PP_{14}-must
o-ku-kyuk-a					
AUG_{15}-NP_{15}-change-FV					

'Whether you like it or not, culture has just got to change…'
(Emmunyeenye, instructional materials, 2000s)

In (5), the necessity to expedite the arrangements is imposed upon the subject by external circumstances beyond the control of the participants, i.e. the fact that she is pregnant, while in (6), the change in culture is presented as being inevitable.

In both cases, *-téekw-* is prefixed with a subject marker which refers to the controlling participant(s) in the state of affairs. In (5) *-téekw-* is followed by the main verb in the infinitive. The use of *-téekw-* with an infinitival main verb is its default syntactic structure. In some cases, as in (6), however, the sequence modal auxiliary + infinitival main verb can be interrupted by another element, in this case an adverbial derived from the verb *-téekw-* by means of the addition of the adverbial formative *bu-*. The adverbial appears to be adding emphasis or increasing the force of the auxiliary. However, with main verbs, the addition of the prefix *bu-* (especially with the suffix *-i*) to a repeated form of the main verb lessens the force of that verb (see Ashton et al. 1954: 246).

Furthermore, *-téekw-* can be followed by the main verb in the subjunctive, as in (7) where the main verb is the copula *-ba*, and *-téekw-* expresses participant-imposed dynamic necessity

(7) *Omúntú ókútúukírízá ómúlímu gwe, atéekwá ábé múlúngi.*
o-mu-ntu o-ku-tuukiriz-a o-mu-limu
AUG_1-NP_1-person AUG_{15}-NP_{15}-accomplish-FV AUG_3-NP_3-task
gu-e **a-Ø-teekw-a** **a-ba-e** mu-lungi
PP_3-$POSS_1$ **SP_1-PRS-must-IPFV** **SP_1-be-SBJV** PP_1-good
'For a person to accomplish his/her task, he/she must be good.'
(Okukula, inspirational materials, 1940s)

***Deontic necessity uses of* -téekw-**

It is important to note, first of all, that the term 'deontic' is used here in the broad sense, incorporating both directive uses (obligation) and those uses involving degrees of moral desirability of the state of affairs (see Nuyts, Byloo and Diepeveen 2010). *-Téekw-* is associated with both uses. In (8), for example, a person suffering from smallpox must be quarantined, while in (9), a widower is obliged, according to societal norms, to mourn his wife for a full year.

(8) *Kawaali akwátá nnyô, omúntú álwáddé atéekwá ókwáwulíbwá mú kálántíiní*.
Ø-kawaali a-Ø-kwat-a nnyo o-mu-ntu
NP_1-smallpox SP_1-PRS-be_contagious-IPFV very AUG_1-NP_1-person
a-Ø-lwadde **a-Ø-teekw-a** o-ku-awul-ibw-a
SP_1-PRS-be_affected.PFV **SP_1-PRS-must-IPFV** AUG_{15}-NP_{15}-separate-PASS-FV
mu Ø-kalantiini
LOC_{18} NP_1-quarantine
'Smallpox is highly contagious; an affected person must be put in quarantine.'
(Okukula, inspirational materials, 1940s)

(9) *Atê mpísa yaffe ssémwándú atéekwá ókúkûngúbágá ókúmálá ómwâka mulámbâ*.
ate N-pisa y-affe Ø-ssemwandu **a-Ø-teekw-a**
and NP_9-custom PP_9-$POSS_{1PL}$ NP_1-widower **SP_1-PRS-must-IPFV**
o-ku-kungubag-a o-ku-mal-a o-mu-aka
AUG_{15}-NP_{15}-mourn-FV AUG_{15}-NP_{15}-complete-FV AUG_3-NP_3-year
mu-lamba
PP_3-full
'And it is our custom, a widower must mourn for a full year.'
(Pawulo, novels, 1980s)

Like with dynamic necessity, *-téekw-* is generally followed by the main verb in the infinitive when expressing deontic necessity. There are, however, exceptions to this more or less default structure. In (10), for example, it is followed by a subjunctive main verb form.

(10) *Olw'ókútáasá ómwána alí mu lubúto obútásíígibwa ndwáddé zá búkába ng'enzíku, kabóótóngó, atéekwá ákébérébwé endwáddé ezo.*

olwa	o-ku-taas-a	o-mu-ana	a-Ø-li	mu
for	AUG_{15}-NP_{15}-save-FV	AUG_1-NP_1-child	SP_1-PRS-be	LOC_{18}
lu-buto	o-bu-ta-siig-ibw-a		N-dwadde	zi-a
NP_{11}-womb	AUG_{14}-NP_{14}-NEG-infect-PASS-FV		NP_{10}-disease	PP_{10}-CONN
bukaba nga	e-N-ziku	Ø-kabootongo	**a-Ø-teekw-a**	
venereal like	AUG_3-NP_3-gonorrhoea	NP_1-syphilis	**SP_1-PRS-must-IPFV**	
a-keber-ebw-e	e-N-dwadde	e-zi-o		
SP_1-test-PASS-SBJV	AUG_{10}-NP_{10}-disease	AUG_{10}-PP_{10}-DEMb		

'To save the child in the womb from getting infected with venereal diseases like gonorrhoea, syphilis, she should be tested for those diseases.'
(Mukenenya, health documents, 2010s)

In Luganda, the second of two successive commands or words of allowing is expressed in the subjunctive (Ashton et al. 1954: 66, 94, 220). The use of the subjunctive to express modality in Bantu languages has been discussed in some literature (see Leonard 1980; Ngonyani 2013; Persohn 2017; Nurse and Devos 2019). Nurse and Devos (2019: 224) note that the subjunctive in Bantu mainly expresses participant-external necessity and that participant-external possibility uses are mainly found in questions. In like manner, Ashton et al. (1954: 220) identify two main uses of the subjunctive in Luganda: (i) to express a statement or a question of a permissive nature, as in (11); and (ii) to express a direct command in the plural affirmative, as in (12). This is similar to the situation in Nyakyusa (M31), where the subjunctive is used for directives or 'as a counterpart to the imperative for the second person plural' (Persohn 2017: 271). Given the well-known relationship between commands and permission, and modality, the subjunctive may, therefore, be considered as a device for expressing modality in Luganda. A detailed analysis of the uses of the subjunctive in Luganda, however, requires a separate study.

(11) *Tusomé?*
tu-Ø-som-e
SP_{1PL}-PRS-read-SBJV
'May we read? Shall we read?'
(Ashton et al. 1954: 221)

(12) *Muleeté ebikájjo.*

mu-Ø-leet-e	e-bi-kajjo
SP_{2PL}-PRS-bring-SBJV	AUG_8-NP_8-sugarcane

'Bring (ye) sugar canes.'
(Ashton et al. 1954: 221)

The auxiliary-infinitival main verb sequence can also be interrupted by a parenthetical element as in (13). In this kind of construction, however, *-téekw-* was found in two legal texts, both of which are translations from English.

(13) *Omulamuzi táteekwa mu bigámbo bye obá ennéeyísá yê okúlágá kyékúbíírâ obá okubóolá ómúntú yenna.*

o-mu-lamuzi	**te-a-Ø-teekw-a**	**mu**	**bi-gambo**	
AUG_1-NP_1-judge	**NEG-SP_1-PRS-must-IPFV**	**LOC_{18}**	**NP_8-word**	
bi-e	**oba**	**e-N-neeyisa**	**y-e**	**o-ku-lag-a**
PP_8-$POSS_1$	**or**	**AUG_9-NP_9-behaviour**	**PP_9-$POSS_1$**	**AUG_{15}-NP_{15}-show-FV**
Ø-kyekubiira	oba	o-ku-bool-a		o-mu-ntu
NP_1-bias	or	AUG_{15}-NP_{15}-discriminate_against-FV		AUG_1-NP_1-person

y-enna
PP_1-any
'A judge must not, in his/her words or his/her behaviour, show bias or discriminate against any person.'
(Ekitabo 2, legal texts, 2010s)

Additionally, *-téekw-* can be found in constructions where it is preceded by its infinitival main verb, as in (14). Here, the main verb and auxiliary are linked by an object relative pronoun referring to a thing in class 7, and the main verb functions as an antecedent or head noun modified by the relative clause containing the auxiliary.

(14) *Emirûndi míngi kya ssányu okukóla ky'ótéékwâ*.

e-mi-rundi	mi-ngi	ki-a	ssanyu
AUG_4-NP_4-time	PP_4-many	PP_7-CONN	NP_5.joy
o-ku-kol-a	**ki-e**	**o-Ø-teekw-a**	
AUG_{15}-NP_{15}-do-FV	**PP_7-REL**	**SP_{2SG}-PRS-have-IPFV**	

'Many times, it is joyful to do what you have to.'
(Okukula, inspirational materials, 1940s)

***Epistemic necessity uses of* -téekw-**

In sentences (15) and (16), *-téekw-* expresses epistemic necessity. In (15), it is highly likely, according to the speaker, that what is being talked about is true compared to how Napoleon speaks otherwise. Similarly, in (16), it is almost certain, according to the speaker's judgment, that the person being referred to searched many books, letters and papers.

(15) *Obá Mugánda waffe Napóólíyâni ayogéddé bw'âtyo erá kítéékwá kúbá kitúufú.*

oba	Ø-muganda		w-affe	Napooliyani	a-Ø-yogedde
if	NP_1-brother		PP_1-$POSS_{1PL}$	Napoleon	SP_1-PRS-talk.PFV
bwe	a-tyo	era	**ki-Ø-teekw-a**	**ku-ba**	ki-tuufu
like	PP_1-that	then	**SP_7-PRS-must-IPFV**	**NP_{15}-be**	PP_7-true

'If our brother Napoleon has talked like that, then it must be true.'
(Amaka, novels, 1980s)

(16) *Atéekwá ókúbá nga yawênja ebitábó n'ébbálúwa n'êmpapula ndúlundú*.

a-Ø-teekw-a		**o-ku-ba**	nga	a-a-wenj-a
SP_1-PRS-must-IPFV		**AUG_{15}-NP_{15}-be**	that	SP_1-PST_2-search-PFV
e-bi-tabo	ne	e-bbaluwa	ne	e-N-papula
AUG_8-NP_8-book	and	AUG_{10}-NP_{10}.letter	and	AUG_{10}-NP_{10}-paper
ndulundu				
many				

'He must have searched many books, letters and papers.'
(Obulamu bwa Mugwanya, historical texts, 1960s)

In both (15) and (16), *-téekw-* is followed by the infinitive of *-ba* 'be'. There are, however, cases where it is followed by the infinitive of a verb other than *-ba*, as in (17).

(17) *Eee Nakíru abántú bonná ngá bákutúnúúlírá! Leeró otéekwá ókúfúna omubéezí, abo abavúbúká bonná bányúmíddwá nnyó enzíná yô*.

eee	Nakiru	a-ba-ntu	ba-onna	nga	ba-Ø-ku-tunuulir-a
eh	Nakiru	AUG_2-NP_2-person	PP_2-all	as	SP_2-PRS-OP_{2SG}-look_at-IPFV
leero	**o-Ø-teekw-a**	**o-ku-fun-a**			o-mu-beezi
today	**SP_{2SG}-PRS-must-IPFV**	**AUG_{15}-NP_{15}-get-FV**			AUG_1-NP_1-partner

a-ba-o	a-ba-vubuka	ba-onna	ba-Ø-nyumiddwa
AUG_2-PP_2-DEM_b	AUG_2-NP_2-guy	PP_2-all	SP_2-PRS-enjoy.PFV
nnyo	e-N-zina	y-o	
very_much	AUG_9-NP_9-dance	PP_9-$POSS_{2SG}$	

'Eh, Nakiru, all people are looking at you! Today you must get a partner, all those guys have enjoyed your dance very much.'
(Ekkomera Eriggule 2, plays, 2000s)

***Discussion in respect of* -téekw-**

In all examples (5) to (17), *-téekw-* is used in combination with another verb to form a monoclausal verb phrase. In this case, it conforms to Anderson's (1986: 5) definition of 'auxiliary' and behaves more or less like its Luganda modal auxiliary counterparts *-sóból-* and *-yînz-* (see Kawalya, Bostoen and de Schryver 2014). However, unlike *-sóból-* and *-yînz-*, *-téekw-* deviates considerably from other formal characteristics of full verbs which *-sóból-* and *-yînz-* conform to. For instance, it can neither form nouns nor be used as a noun itself; it does not take a direct object or object concords and it is not modified by intensifiers. Furthermore, it cannot be inflected for the perfective and it is not freely inflected for the past and future tenses. Whenever used with a past or future tense marker, it takes the progressive suffix *-ang-* in addition. The inability of *-téekw-* to take a perfective suffix could be explained by the relationship between tense and modality. Perfective aspect is associated with past or completed situations and deontic modality, which is the predominant meaning of *-téekw-* (see next section), is incompatible with past, given that deontics are considered to be future oriented (see Squartini 2016: 56). This probably explains why whenever used with a past tense marker, it is in addition suffixed with the progressive marker *-ang-*.

***Distributional corpus analysis of* -téekw-**

The auxiliary *-téekw-* is mostly used to express deontic necessity. Extrapolating from the corpus sample used for this analysis, out of the total 1 985 occurrences of *-téekw-*, it is used 1 772 times to express deontic necessity, which corresponds to 89%. This is followed in frequency by its use to express situational dynamic necessity, in which it is found 91 times, corresponding to 5%. It is used to express participant-imposed dynamic necessity 72 times, and 50 times to express epistemic necessity. These correspond to 4% and 2% respectively. This semantic distribution is summarised in Figure 1.

The semantic distribution of *-téekw-* was also analysed diachronically, whereby the corpus used was organised into 13 time periods (1890s–2010s). The frequency distribution of *-téekw-* over time presented in Figure 2 shows, first of all, that no single occurrence of *-téekw-* is attested in the first three decades of the period covered by the corpus (i.e. 1890s to 1910s). Moreover, even when it is first attested in the 1920s, it occurs with a very low frequency of only 0.3 times for every 10 000 words. Except for two decades, i.e. the 1940s and 1970s where there is a high usage frequency (of

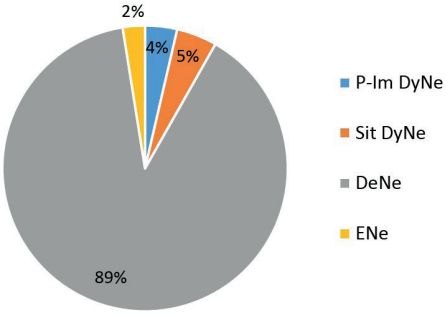

Figure 1: Overall semantic distribution of *-téekw-*

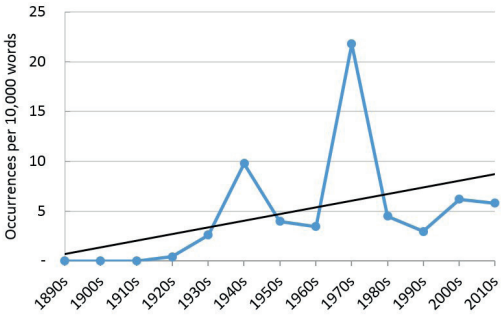

Figure 2: Overall occurrence frequency of *-téekw-* through time

9.8 and 21.8 for every 10 000 words respectively), the usage of *-téekw-* generally increases steadily, from about 0.3 times in the 1920s to about 5.8 times for every 10 000 words in the 2010s.

The exceptionally high frequencies of *-téekw-* in the 1940s and 1970s can be attributed to the internal composition of corpus materials in those two decades. In the 1940s, about two-thirds (63%) of the occurrences of *-téekw-* come from a single source: an inspirational book which is not only the second biggest of the 24 texts in that decade, accounting for 12% of the total number of words in that decade, but also with a subject matter (i.e. civics) that is connected with deontics. For the 1970s it is even more extreme, as virtually all (99%) of the cases of *-téekw-* are from a single source: a religious text (Missale), constituting a full 60% of the materials in that decade. Although religious material was not considered for the 2000s and 2010s, it was retained in other decades, as removing it from a decade like this one would have left such decades underrepresented. The high occurrences of *-téekw-* in the 1940s and 1970s, therefore, may not necessarily portray higher usage frequencies in these decades, per se, but are instead usage peculiarities in these specific texts.

Figure 3 and Figure 4 show the distribution of the meanings of *-téekw-* over time. In Figure 3, the actual occurrences per 10 000 words are shown, while in Figure 4 the different meanings in each decade are shown using percentages.

From Figure 3 and Figure 4, it can be seen that *-téekw-* is first attested in the 1920s, expressing participant-imposed dynamic necessity, situational dynamic necessity and deontic necessity. For five decades after its first appearance in the 1920s, until the 1960s, *-téekw-* expresses this same range of meanings. In the 1970s, it expresses only deontic necessity. It should be noted that these meanings have something in common, especially in the typology of van der Auwera and Plungian (1998), who subsume Nuyts' (2006) situational dynamic necessity under their participant-external necessity, while at the same time considering deontic necessity as a special case of participant-external necessity (van der Auwera and Plungian 1998: 81). With this typology, the three subcategories may, therefore, be considered to belong to one overarching category, which van der Auwera and Ammann (2013) have called 'situational necessity'. This kind of categorisation is not new. In other literature, it has been called 'deontic' or 'root' necessity and stands in opposition with epistemic necessity (see Lyons 1977; Coates 1983; Sweetser 1990).

What is also clear from Figure 3 and Figure 4 is that dynamic necessity meanings (i.e. participant-imposed and situational) are not only minimal in the decades where they occur, their share of the total also reduces over time. In the present decade (2010s), no single occurrence is attested for these meanings.

Deontic necessity uses of *-téekw-* are significant from the 1930s to the present. In fact, its share as a deontic necessity marker increases over time. One might even say that these uses have replaced the dynamic necessity uses at present.

Finally, we note that epistemic necessity entered the semantic range of *-téekw-* only recently, in the 1980s. Its frequency as an epistemic necessity marker has remained low through to the 2010s. Indeed, to many current Luganda speakers, *-téekw-* is mainly regarded as a verb used to impose an obligation on the hearer, but also to express a high likelihood of the occurrence of a state of affairs.

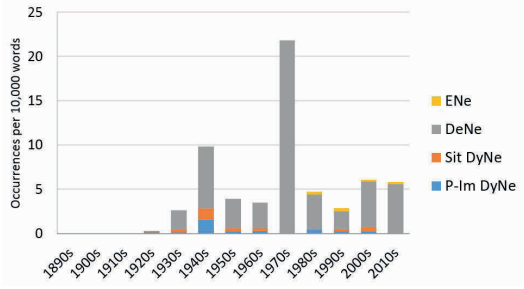

Figure 3: Distribution of the actual occurrences of the uses of *-téekw-* over time

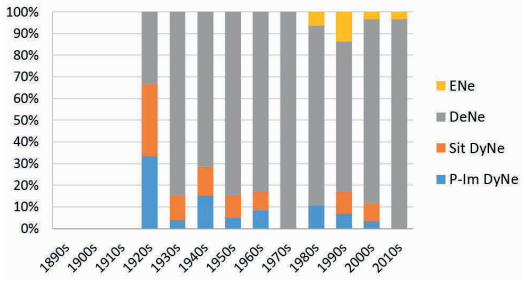

Figure 4: Percentage distribution of the uses of *-téekw-* over time

A corpus-driven description of the modal auxiliary *-lina*

From the analysis of the 499 corpus instances, lexical, dynamic and deontic necessity meanings were found.

***Lexical uses of* -lina**

As expected, the lexical meaning of *-lina* (followed by a nominal object of class 15) is 'have' in the corpus, as seen in (18) and (19).

(18) *Nábágámba nti Kikí ekíbátísá, abálíná okúkkírízá ókútónó?*

ne	a-Ø-ba-gamb-a	nti	kiki	e-ki-Ø-ba-tis-a
and	SP_1-PST_2-OP_2-tell-PFV	that	what	AUG_7-PP_7-PRS-OP_{2SG}-scare-IPFV
a-ba-Ø-lina	o-ku-kkiriz-a			o-ku-tono
AUG_2-PP_2-PRS-have	AUG_{15}-NP_{15}-faith-FV			AUG_{15}-PP_{15}-little

'And he told them that "What is scaring you, you who have little faith"?'
(Ekitabo eky'okusaba, religious texts, 1910s)

(19) *Erinnya lye ye Long John Silver era alina okugulu kumu*.

e-ri-nnya	li-e	ye	Long John Silver	era
AUG_5-NP_5-name	PP_5-$POSS_1$	is	Long John Silver	and
a-Ø-lina	o-ku-gulu	ku-mu		
SP_1-PRS-have	AUG_{15}-NP_{15}-leg	PP_{15}-one		

'His name is Long John Silver and he has one leg.'
(Ekizinga, folktales, 1950s)

***Dynamic necessity uses of* -lina**

As a modal marker, *-lina* also carries the meaning 'have', both when it expresses dynamic necessity (this section) and deontic necessity (next section). Among the dynamic necessity uses, there are no clear instances of participant-inherent dynamic necessity. The closest uses, such as the one in (20), can be considered instances of participant-imposed dynamic necessity in Nuyts' typology (see Bostoen, Mberamihigo and de Schryver 2012: 8, footnote 4).[5] In this example, there is a necessity or need for the subject participant to eat fruit, but this is conditioned by the need to increase the strength of the body's self-defence. In other words, increasing the strength of the body's self-defence is considered a factor that makes it necessary to eat a lot of fruit. With participant-imposed dynamic necessity, 'the need to perform the action is motivated by circumstances outside the control of the subject participant' (Gbegble 2012: 117).

(20) *Túlíná okulyá nnyó ebíbala kubánga bítúyámbá nnyó mukwongérá ámáanyi mu bwékúúmí bw'ómubírí*.

tu-Ø-lina	o-ku-li-a	nnyo	e-bi-bala	
SP_{1PL}-PRS-have	AUG_{15}-NP_{15}-eat-IPFV	a_lot	AUG_8-NP_8-fruit	
kubanga	bi-Ø-tu-yamb-a	nnyo		mu
because	SP_8-PRS-OP_{1PL}-help-IPFV	very_much		LOC_{18}
ku-onger-a	a-ma-anyi	mu	bu-ekuumi	
NP_{15}-increase-FV	AUG_6-NP_6-strength	LOC_{18}	NP_{14}-self-defence	
bu-a	o-mu-biri			
PP_{14}-CONN	AUG_3-NP_3-body			

'We have to eat fruits a lot because they help us very much in increasing the strength of the body's self-defence.'
(NCDC2, instructional materials, 2000s)

Other examples of participant-imposed dynamic necessity uses of *-lina* include (21) and (22). In (21), the need to find the murderer is conditioned by the need to survive, while in (22) it is because of the need to keep the skin looking good that it is necessary for the speaker to do different things.

(21) *Kati okusóbólá ókúbásumattuka túlíná kuzúúlá mútémú né túmúbálágâ.*
kati o-ku-sobol-a o-ku-ba-sumattuk-a
now AUG_{15}-NP_{15}-be_able-FV AUG_{15}-NP_{15}-OP_2-survive-FV
tu-Ø-lin-a ku-zuul-a mu-temu ne
SP_{1PL}-PRS-have-IPFV NP_{15}-find-FV NP_1-murderer and
tu-Ø-mu-ba-lag-a
SP_{1PL}-PRS-OP_1-OP_2-show-IPFV
'Now to be able to survive them, we have to find the murderer and we show him to them.'
(Guluma, novels, 1990s)

(22) *…nniná omúkúgú mú by'ênsúsú ámpá amagézi ku bintú éby'énjáwulo byé nniná okukóla okúkúúmá ólúlúsu lwangé nga lúlábíká búlúngi.*
N-Ø-lina o-mu-kugu mu bi-a
SP_{1SG}-PRS-have AUG_1-NP_1-specialist LOC_{18} PP_8-CONN
e-N-susu a-Ø-N-pa a-ma-gezi ku
AUG_{10}-NP_{10}-skin SP_1-PRS-OP_{1SG}-give AUG_6-NP_6-advice LOC_{17}
bi-ntu e-bi-a e-N-jawulo bi-e
NP_8-thing AUG_8-PP_8-CONN AUG_9-NP_9-different PP_8-REL
N-Ø-lina o-ku-kol-a o-ku-kuum-a
SP_{1SG}-PRS-have AUG_{15}-NP_{15}-do-FV AUG_{15}-NP_{15}-keep-FV
o-lu-lusu lu-ange nga lu-Ø-lab-ik-a
AUG_{11}-NP_{11}-skin PP_{11}-$POSS_{1SG}$ while SP_{11}-PRS-look-NEUT-IPFV
bu-lungi
PP_{14}-good
'…I have got a specialist in skin issues who gives me advice on the different things that I have to do in order to keep my skin looking good.'
(BU111118-Sirina, newspapers, 2010s)

In (23) *-lina* is used to express situational dynamic necessity. The fact that a creature is alive makes it inevitable for its heart to also be alive.

(23) *Ekitónde okubá ekirámu, omutíma gúlíná okubá omulámu*.
e-ki-tonde o-ku-ba e-ki-lamu
AUG_7-NP_7-creature AUG_{15}-NP_{15}-be AUG_7-PP_7-life
o-mu-tima **gu-Ø-lina** o-ku-ba o-mu-lamu
AUG_3-NP_3-heart **SP_3-PRS-have** AUG_{15}-NP_{15}-be AUG_3-PP_3-life
'For a creature to be alive, the heart has to be alive.'
(Amazina, historical texts, 1990s)

***Deontic necessity uses of* -lina**

Like *-téekw-*, *-lina* has both directive deontic uses (obligation) as well as degree of moral desirability uses. In (24), the speaker imposes an obligation on the hearer to take the responsibility of making Bemba believe that he is winning the battle, while he is losing it. For the case of (25), although the person referred to was obliged to buy an in-law's robe, aunt's dress and *kaasuzekatya*,[6] it can also be seen as morally desirable for the person referred to to buy these things. Similarly, whereas in (26) a king is obliged to respect the *kaddulubaale*,[7] it can also be seen as a moral desirability for a king to respect the *kaddulubaale*. In other words, in (24), the necessity is imposed by a person (a speaker), while in (25) and (26) it is imposed by societal norms or a cultural institution.

(24) *Wálúkággâ, obwo obuvúnaanyizibwa obw'ókulówóózésá Bémbá nti awángúlá ólútálo*, *ssó até ng'awangulwa, oliná okubútuukírízá…*

Walukagga	o-bu-o		o-bu-vunaanyizibwa		
Walukagga	AUG_{14}-PP_{14}-DEMb		AUG_{14}-NP_{14}-responsibility		
o-bu-a		o-ku-lowooz-es-a		Bemba	nti
AUG_{14}-PP_{14}-CONN		AUG_{15}-NP_{15}-think-CAUS-FV		Bemba	that
a-Ø-wangul-a		o-lu-talo		sso_ate	nga
SP_1-PRS-win-IPFV		AUG_{11}-NP_{11}-battle		yet	while
a-Ø-wangul-w-a		**o-Ø-lina**		o-ku-bu-tuukiriz-a	
SP_1-PRS-defeat-PASS-IPFV		**SP_{2SG}-PRS-have**		AUG_{15}-NP_{15}-OP_{14}-fulfil-FV	

'Walukagga, that responsibility of making Bemba think that he is winning the battle, while he is being defeated, you have to fulfil it…'
(Bemba, plays, 1980s)

(25) …*wábula ng'êmpísá y'énsí bw'éri, yalí alinâ okúgúlá ékkánzú y'ómúkô, olugóyé lwá sséngá wamú né káásúzékátyâ*.

wabula	nga	e-N-pisa	y-a	e-N-si	
however	as	AUG_9-NP_9-tradition	PP_9-CONN	AUG_9-NP-country	
bwe	e-Ø-ri	a-a-li	**a-Ø-lina**	o-ku-gul-a	
like	SP_9-PRS-be	SP_1-PST_2-be	**SP_1-PRS-have**	AUG_{15}-NP_{15}-buy-FV	
e-kkanzu		y-a	o-mu-ko	o-lu-goye	
AUG_9-NP_9.robe		PP_9-CONN	AUG_1-NP_1-in-law	AUG_{11}-NP_{11}-dress	
lu-a		Ø-ssenga	wamu ne	Ø-kaasuzekatya	
PP_{11}-CONN		NP_1-aunt	together with	NP_1-kaasuzekatya	

'…however, as the country tradition is like, he had to buy the in-law's robe, the aunt's dress as well as *kaasuzekatya*.'
(Mafuta, novels, 1990s)

(26) *Omúntú ómúlálá ómúkúlú énnyó Kabáka gw'álíná okússáámú ekitíibwa ye Káddúlúbáale*.

o-mu-ntu	o-mu-lala	o-mu-kulu		ennyo
AUG_1-NP_1-person	AUG_1-PP_1-other	AUG_1-PP_1-important		very
Ø-kabaka	gu-e	**a-Ø-lina**	o-ku-ss-a-mu	
NP_1-king	PP_1-REL	**SP_1-PRS-have**	AUG_{15}-NP_{15}-put-FV-LOC_{18}	
e-ki-tiibwa	ye	Ø-kaddulubaale		
AUG_7-NP_7-respect	is	NP_1-kaddulubaale		

'The other very important person that a king has to respect is the *kaddulubaale*.'
(Omuganda, cultural texts, 1990s)

***Distributional corpus analysis of* -lina**

The distributional corpus analysis of *-lina* presented in this section also concerns its use with a *ku-* NP word form, that is, either in double-verb constructions with a main verb in the infinitive or with a nominal object of class 15. The corpus sample reveals that 90% are cases where *-lina* occurs in double-verb constructions. Used in this way, *-lina* expresses mostly deontic necessity, which constitutes 77% of the total occurrences of *-lina* with a *ku-* NP form. This is followed in frequency by cases where it expresses participant-imposed dynamic necessity, contributing 10%. Situational dynamic necessity is expressed in 3% of the total occurrences. In only 10% of the cases is *-lina* used as a lexical verb, outside double-verb constructions. This usage distribution is summarised in Figure 5.

Diachronically, the usage frequency of *-lina* over time is shown in Figure 6. When used with a *ku-* NP word form, its frequency remains very low in the first nine decades of the corpus (1890s to 1970s). In each of these decades, *-lina* occurs less than twice for every 10 000 words. It is not until the 1980s that its frequency increases to 2.3 occurrences for every 10 000 words. From then, its frequency increases all the way to about 18 occurrences for every 10 000 words in the 2010s.

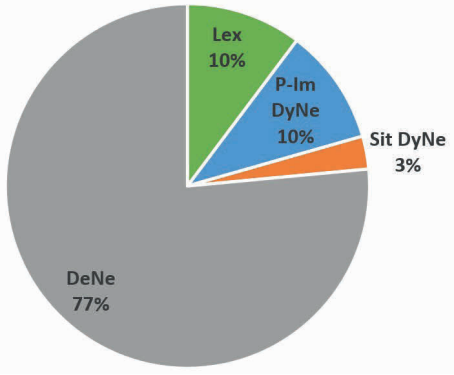

Figure 5: Overall semantic distribution of *-lina* (with a *ku-* NP word form)

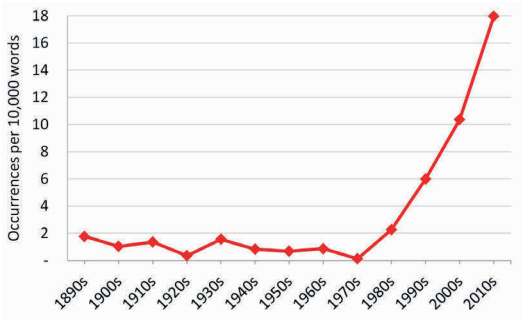

Figure 6: Overall occurrence frequency of *-lina* (with a *ku-* NP word form) over time

In Figure 7, the different meanings expressed by *-lina* are shown for each of the 13 decades represented in the corpus, presented as actual occurrences per 10 000 words. The same semantic distribution is given in Figure 8, this time presented as a percentage.

In Figure 5, lexical uses were shown to account for only 10% of the total uses of *-lina* with a *ku-* NP word form. Figure 7 and Figure 8 further indicate that *-lina*'s lexical meanings are the main use during the first nine decades of the corpus. In fact, in three decades, i.e. the 1920s, 1950s and 1970s, there is no single auxiliary use of *-lina* attested. Given that numerous other lexical uses of *-lina* were purposefully left out in the search process, this clearly indicates that *-lina* is likely to have been used solely as a lexical verb in earlier stages of the language's history. The same situation can be observed from the analysis of older literature on Luganda, in which the verb was found to be used exclusively as lexical.

We further note that until the 1970s, whenever *-lina* is used as an auxiliary, it expresses deontic necessity. These deontic necessity uses are seen to shoot up exponentially from the 1980s to the 2010s. Participant-imposed and situational dynamic necessity meanings emerge during the same time period. Overall, it is apparent that lexical uses of *-lina* dominate the largest part of the 20th century; while towards the end of that century and in the beginning of the 21st century, modal uses of the verb increase spectacularly, with even additional modal categories joining its semantic range.

This development suggests that *-lina* as a lexical verb with the meaning 'have' first extended to deontic necessity as its original modal uses, while it developed especially participant-imposed dynamic necessity around the turn of the millennium. Even more recently, *-lina* has also acquired situational dynamic necessity uses. This path of development taken by *-lina*, i.e. from a lexical verb meaning 'have' to acquiring deontic necessity uses and then participant-imposed necessity uses,

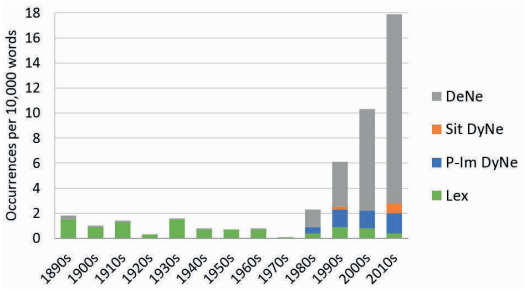

Figure 7: Distribution of the actual occurrences of the uses of *-lina* (with a *ku-* NP word form) over time

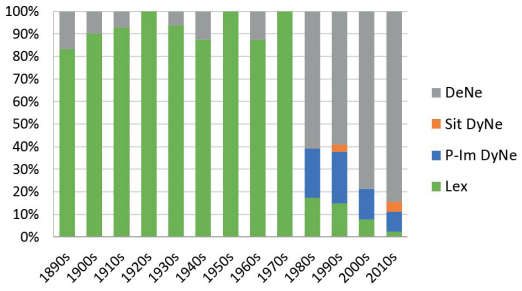

Figure 8: Percentage distribution of the uses of *-lina* (with a *ku-* NP word form) over time

is compatible with the cross-linguistic semantic paths provided by van der Auwera and Plungian (1998) in their semantic map of modality. They hypothesise that a verb originally meaning 'have' can develop deontic necessity uses and then participant-external necessity uses. Epistemic necessity uses can then develop from either of these (van der Auwera and Plungian 1998: 96–97). The Luganda corpus does not show evidence of epistemic necessity uses of *-lina*, although these are possible in present-day Luganda.

A corpus-driven description of the verbal prefix *-andi-*

Using the same 4-million-word Luganda corpus, Kawalya, de Schryver and Bostoen (2018) made a detailed analysis of the modal verbal prefix *-andi-*. They note, first of all, that the affix has both conditional and modal uses. Furthermore, like *-lina*, *-andi-* has became strongly associated with modality in recent decades. In earlier periods, it was mainly associated with conditional meanings, particularly counterfactuality and hypotheticality, with limited cases of modal meanings, specifically deontic necessity. Epistemic possibility meanings entered the semantic range of *-andi-* only around the 1940s. In order to enable us to sketch a more complete picture of the expression of necessity in Luganda, we now provide a summary of the distributional corpus analysis of *-andi-*.

***Distributional corpus analysis of* -andi-**

Figure 9 gives an overall distribution of the meanings of *-andi-*. It is shown that *-andi-* expresses modality in 46% of its total occurrences: 37% expressing (deontic) necessity and 9% expressing epistemic possibility. In 5% of the instances, it combines (deontic) necessity meanings with counterfactual meanings. The remaining 49% are cases where *-andi-* expresses conditional meanings, with counterfactuality contributing 31% and hypotheticality contributing 18%.

Overall, *-andi-* occurs 3 998 times in the 4-million-word Luganda corpus. Figure 10 and Figure 11 show the distribution of the different uses of *-andi-* over time, presented as actual occurrences per 10 000 words in Figure 10 and as percentages in Figure 11.

As may be seen from Figure 10 and Figure 11, *-andi-* mostly expressed conditional meanings (i.e. counterfactuality and hypotheticality) in the earlier decades. It is in the more recent decades that it has increasingly been engaged in the expression of modal meanings (i.e. deontic necessity and epistemic possibility). Epistemic possibility meanings are first sighted in the 1940s, with their share increasing over time. Regarding necessity, *-andi-* expresses only deontic necessity.

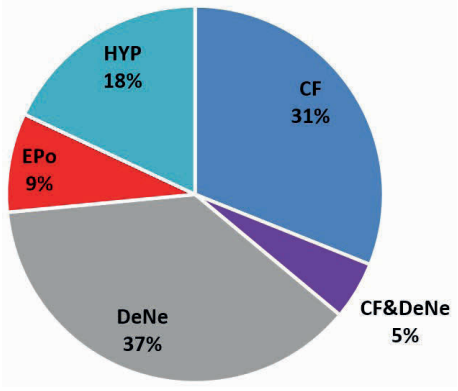

Figure 9: Overall distribution of the uses of *-andi-*

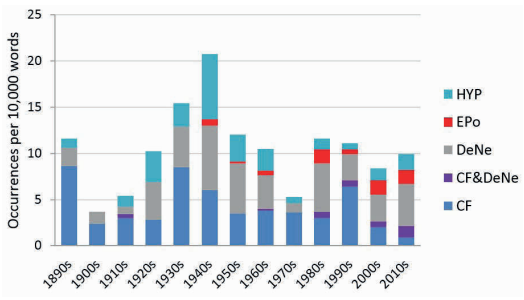

Figure 10: Distribution of the actual occurrences of the uses of *-andi-* over time

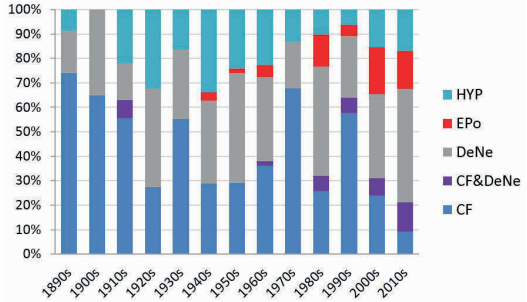

Figure 11: Percentage distribution of the uses of *-andi-* over time

Discussion

Table 1 shows the contribution of each of the three necessity markers, *-téekw-*, *-lina* and *-andi*, to the expression of necessity, presented as actual counts in the 4-million-word Luganda corpus.

From Table 1, it can be deduced that among the three markers studied, *-lina* is the most frequent marker of necessity for the period covered by the corpus. It expresses necessity in 2 554 instances. This is followed by *-téekw-*, which occurs 1 985 times as a marker of necessity. In third position is *-andi-*, with 1 496 instances in the entire corpus. Furthermore, unlike *-lina* which, in addition to necessity meanings, also expresses lexical meanings, *-téekw-* occurs only as a necessity marker. Recall that *-andi-* also expresses conditionality as well as epistemic possibility in addition to (deontic) necessity. Given that *-téekw-* is not associated with lexical usage and since its semantic range extends to epistemic necessity, it implies that it is more semantically diversified with regard to necessity compared to *-lina*, which expresses only dynamic and deontic necessity, and *-andi-*, which only expresses deontic necessity. Furthermore, the association of *-téekw-* with the more subjective category of epistemic necessity makes it a more important modal marker than *-lina* which is only associated with lexical meanings and the more objective dynamic and deontic necessity.

Participant-inherent dynamic necessity is not clearly associated with any of the three markers. It appears that this more objective necessity category is expressed through less-grammaticalised modal markers, for example the pseudo-reflexive necessity verb *-étaag-* 'need'. A similar situation exists in Manda (N11), where the two major necessity markers *-londek-* 'have' and *-yenelek-* 'have' express participant-external and deontic necessity,[8] but not participant-internal necessity. Instead, another verb *-lond-* 'need', which also conveys desires, is recruited to express this modality sub-type (Bernander 2017: 273). Indeed, a brief perusal of the 2010s section of our corpus for cases of *-étaag-* reveals many incidences of the verb's use to expresses participant-inherent dynamic necessity. It can be used outside double-verb constructions, as in (27) where it is followed by an object noun phrase or in double-verb constructions, as in (28). Moreover, van der Auwera and Plungian (1998: 96–97) provide a semantic path for 'need' verbs, developing participant-internal necessity meanings, and then participant-external necessity. This is unlike 'have' verbs which directly acquire participant-external necessity, without first going through participant-internal necessity.

Table 1: Interaction of *-téekw-*, *-lina* and *-andi-* in relation to necessity

Meaning	*-téekw-*	*-lina* (+ *ku-* NP)	*-andi-*	SUM
Lex	–	292	–	**292**
P-Im DyNe	73	294	–	**367**
Sit DyNe	95	83	–	**178**
DeNe	1 767	2 177	1 496	**5 460**
ENe	50	–	–	**50**
SUM	**1 985**	**2 554**	**1 496**	**6 055**

(27) *Nayé kikúlu abáana abéétáágá eddágálá lino okutândíká ókúlíkozésá ámángú ddálá ngá bwekísóbóka*.

naye	ki-kulu	a-ba-ana	**a-ba-Ø-etaag-a**
but	PP_7-important	AUG_2-NP_2-child	**AUG_2-PP_2-PRS-need-IPFV**
e-ddagala		li-no	o-ku-tandik-a
AUG_5-NP_5.medicine		PP_5-DEMa	AUG_{15}-NP_{15}-start-FV
o-ku-li-kozes-a		amangu ddala	nga bwe
AUG_{15}-NP_{15}-OP_5-use-FV		soon very	as when
ki-Ø-sobok-a			
SP_7-PRS-be_possible-IPFV			

'But it is important for the children who need this medicine to start using it as soon as possible.'
(Okulabirira, health documents, 2010s)

(28) …*n'ábantú ábéétáágá okúlóngóósá abéétáágá omusaayi nabó bángi ddálá*.

ne	a-ba-ntu	**a-ba-Ø-etaag-a**	
even	AUG_2-NP_2-person	**AUG_2-PP_2-PRS-need-IPFV**	
o-ku-longoos-a		a-ba-Ø-etaag-a	
AUG_{15}-NP_{15}-operate-FV		AUG_2-PP_2-PRS-need-IPFV	
o-mu-saayi	nabo	ba-ngi	ddala
AUG_3-NP_3-blood	and_them	PP_2-many	very

'…even people who need to be operated on and need blood are also numerous.'
(ED130603-Kiki, newspapers, 2010s)

Diachronically, the evolution of the three necessity markers with regard to their necessity uses is compared in Figure 12. For *-téekw-* and *-lina*, their necessity usage is equivalent to their modal usage, as they have not been found to express possibility. Recall that in the first three decades of the corpus (1890s to 1910s), *-téekw-* is not attested at all. It only appears in the 1920s, but still with a low frequency of about 0.3 times for every 10 000 words. From the 1930s onwards, there is a marginal increase in its use, from 2.6 occurrences to 5.8 occurrences for every 10 000 words in the 2010s, save for two decades with outstandingly high frequencies (i.e. the 1940s and 1970s). As pointed out earlier, these high frequencies are caused by the nature of the material in a particular text in each of these two decades.

For *-lina*, it is especially engaged in the expression of necessity from the 1980s onwards, with 2.3 occurrences for every 10 000 words. From then, its necessity uses grow exponentially to 17.9 occurrences for every 10 000 words in the 2010s. In fact, from the 1990s until today, it is clear that *-lina* has taken over from *-téekw-* as the most important marker of necessity; *-téekw-* was more important than *-lina* from the former's appearance in the 1920s until around the 1980s. Despite

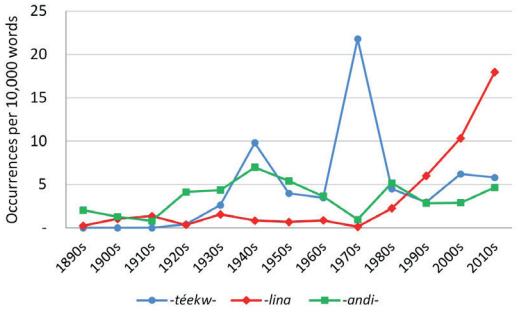

Figure 12: Interaction of *-téekw-*, *-lina* (+ *ku-* NP) and *-andi* over time, with regard to necessity

expressing only one category of necessity, i.e. deontic necessity, *-andi-* was definitely a more important necessity marker than *-lina* and almost of equal importance as *-téekw-* until the 1980s after which both markers took over from it.

From Figure 12, it is also clearly seen that none of the three markers meaningfully expressed necessity in the earlier decades represented in the corpus. Currently, *-lina* is the most frequent necessity marker, having grown its necessity uses exponentially from around the 1980s. However, as shown earlier, *-téekw-* is the most important in terms of usage diversification, having acquired epistemic necessity uses since the 1980s. These developments suggest that in the earlier decades, necessity was probably expressed through other means than with the ones discussed here. Perhaps necessity was expressed through some less-grammaticalised verb forms, such as *-étaag-* in earlier periods, before the emergence and takeover of the more grammaticalised forms discussed in this article. For example, in (29) *-étaag-* appears to express participant-imposed dynamic necessity despite taking a direct object.

(29) *Okújjúzá éssúwa eryo wéétaagá énsúwá z'ámázzi nnyíngi*.
o-ku-jjuz-a e-ssuwa e-ly-o
AUG_{15}-NP_{15}-fill-FV AUG_{5}-NP_{5}.pot AUG_{5}-PP_{5}-DEMb
o-Ø-etaag-a **e-N-suwa** zi-a
SP_{2SG}-PRS-need-IPFV **AUG_{10}-NP_{10}-pot** PP_{10}-CONN
a-ma-zzi N-yingi
AUG_{6}-NP_{6}-water PP_{10}-many
'You need many pots of water to fill that huge pot.'
(Ashton et al. 1954: 363)

It is also likely that there are grammaticalised forms that expressed necessity in earlier periods, which have either reduced in use or disappeared from the language. An example is the currently rare auxiliary-like verb *-gwánír-*, which is used in a double-verb construction in (30) to express deontic necessity.

(30) *Kitugwanide okuwandika tutya*?
ki-Ø-tu-gwanidde **o-ku-wandiik-a** tu-tya
SP_{7}-PRS-OP_{1PL}-ought.PFV **AUG_{15}-NP_{15}-write-FV** SP_{1PL}-how
'How ought we to write?'
(Pilkington 1892: 63)

Conclusions

In this article, an analysis of three Luganda necessity markers – namely *-téekw-*, *-lina* and *-andi-* – has been made. On the basis of data from a 4-million-word Luganda corpus, we have shown that although *-lina* is the most frequent of the three markers, *-téekw-* is the most semantically diversified. Within the modal subdomain of necessity, *-téekw-*, which is only used as an auxiliary, is also the most subjectified since its semantic range extends to cover the more subjective category of epistemic necessity, unlike *-lina* which is not only associated with lexical uses but also has a semantic range that does not go beyond deontic necessity, and *-andi-* which only expresses deontic necessity.

Corpus evidence, as well as evidence from older Luganda dictionaries and grammars, has shown that *-téekw-* probably originated as a passive of the verb *-téek-* 'make a law, bind (by law)'. The historically bound form *-téek- + w* could then have undergone a process of lexicalisation to now be used as a non-compositional form *-téekw-* 'be bound (by law)', and hence acquiring its deontic necessity use.

Furthermore, we have provided evidence that the more objective category of participant-inherent dynamic necessity, which is not clearly expressed by any of the three markers, is conveyed by less-grammaticalised forms such as the pseudo-reflexive necessity verb *-étaag-*.

Diachronically speaking, we have shown that *-téekw-* and *-lina* began to meaningfully express necessity around the 1930s and 1980s respectively, while *-andi-*'s involvement in expressing

necessity has been stable throughout the period covered by the corpus. Although we could not show with empirical corpus evidence which marker(s) was/were used to convey necessity in earlier time periods, our assumption, partly based on evidence from older literature on Luganda and comparative evidence from Manda (Bernander 2017), is that necessity was expressed by less-grammaticalised markers, such as the verb *-étaag-* and/or modal auxiliaries such as *-gwán(ír)-*, whose use has greatly reduced.

The path of development for *-téekw-*, i.e. from the more objective dynamic necessity uses to the more subjective deontic and epistemic necessity uses, indicates that the most semantically diversified necessity marker has also undergone subjectification, from expressing objective meanings pertaining to the outside world to expressing meanings based in the speaker's subjective belief state (Traugott 1989: 35). The auxiliary *-lina* has undergone a slightly different development process, involving a shift from deontic necessity to participant-imposed dynamic necessity. Although this path is catered for in van der Auwera and Plungian's (1998) cross-linguistic semantic map of modality, it appears more like a desubjectification process. However, in models such as van der Auwera and Plungian's (1998), in which deontic modality is grouped together with participant-imposed dynamic modality under the broader category of 'participant-external' modality, *-lina* could still be considered to be undergoing a subjectification process involving a shift from lexical usage to the comparatively more subjective 'participant-external' necessity.

The analysis has revealed that other devices for conveying necessity in Luganda exist, over and above those described in this article. Among these is the use of the subjunctive to express mainly deontic necessity and lexical verbs for especially dynamic necessity categories. A more comprehensive study of the expression of necessity is therefore needed in order to unearth all devices used in its expression, as well as to trace their diachronic evolution.

The Luganda data presented in this article are generally in agreement with van der Auwera and Plungian's (1998) cross-linguistic semantic map of modality, in which the more subjective participant-external modality meanings are shown to emerge from the more objective dynamic meanings. The data can also be relied upon, together with similar findings in other Bantu languages, to derive hypotheses about the origins and/or development of necessity expressions in Bantu. Finally, for the diachronic study of modality or other topics in grammar, semantics and pragmatics, our method combining corpus linguistics with comparative research based on existing dictionaries and grammars from the earliest period of documentation onwards can also be applied to other Bantu and African languages, certainly the better-documented ones.

Abbreviations and symbols

APPL	applicative
AUGx	augment of class x
CAUS	causative
CF	counterfactuality
CONN	connective
DEMa	proximal demonstrative
DEMb	medial demonstrative
DeNe	deontic necessity
ENe	epistemic necessity
FV	final vowel
HYP	hypotheticality
IPFV	imperfective
Lex	lexical meaning
LOCx	locative of class x
N	homorganic nasal
NEG	negative
NEUT	neuter
NPx	nominal prefix of class x
Ø	null morpheme

OPx	object prefix of class x
PASS	passive
PFV	perfective
P-Im DyNe	participant-imposed dynamic necessity
PL	plural
POSSx	possessive of class x
PPx	pronominal prefix of class x
PRS	present
PST_2	remote past
REL	relative
SBJV	subjunctive
SG	singular
Sit DyNe	situational dynamic necessity
SPx	subject prefix of class x

Endnotes

[1] This verb is not known by present-day speakers of Luganda. In the literature surveyed, it is only found in these five dictionaries. It is a known fact, however, that several of these early Luganda lexicographical works drew a lot from each other (see Kawalya and de Schryver 2013: 173). We cannot, therefore, rule out the possibility that subsequent dictionary compilers simply copied over the entry for *-édaag-*. According to Snoxall (1967: 40), who is known to have drawn a lot from Le Veux (1917), the reflexive verb *-édaag-* derives from the intransitive verb *-dáag-* 'weep, lament'. He equates *-édaag-* to *-étaag-* which he, perhaps by analogy, again claims to have derived from *-táag-*. First of all, the development of a reflexive form *-édaag-* from a (purely) intransitive verb *-dáag-* is unlikely. Secondly, whereas *-dáag-* is a known form among Luganda speakers, *-táag-* is not. In this regard, providing *-étaag-* as an example, Cole (1967: 122) notes that '[a] number of verbal forms with reflexive prefix appear to have no corresponding "simplex" or non-reflexive forms'.

[2] For instance, in (i) *-étaag-* is followed by an object noun phrase with an implicit head noun, *bantu* 'people', which is modified by a relative clause. In this sentence, it expresses a lexical meaning, 'need', rather than being used as an auxiliary.

(i) *Sétaga batamanyí kuwándíka.*

si-Ø-etaag-a	**ba-ta-Ø-manyi**	ku-wandiik-a
NEG.$SP1_{SG}$-PRS-need-IPFV	**PP_2-NEG-PRS-know**	NP15-write-FV

Je n'ai pas besoin (de gens) qui ne savent pas écrire.
'I don't need (people) who cannot write.'
(Livinhac, Denoit and Wolters 1921: 54)

Furthermore, *-étaag-* has morphosyntactic properties that distinguish it from true auxiliaries. It can for example form a passive (see Ashton et al. 1954: 185), and is the base of such deverbative nouns as *ekyetaago* 'need, requirement' and *obwetaavu* 'need, necessity, requirement' (Murphy 1972: 57, 257).

[3] The word *ou* is in French, the language in which the grammar is written.

[4] In present-day Luganda, this sentence would be '*Nniná enjala.*'

[5] In his personal communication to the authors of Bostoen, Mberamihigo and de Schryver (2012), Nuyts considers van der Auwera and Plungian's (1998) similar example of participant-internal necessity, i.e. 'Boris needs to sleep ten hours every night for him to function properly', a case of participant-imposed dynamic necessity because the proper functioning of a person is a contextual factor that makes it necessary for Boris to sleep ten hours every night.

[6] *Kaasuzekatya* refers to 'a tin of kerosine [sic] or a gourd of beer given to the parents of one's bride' (Murphy 1972: 127).

[7] *Kaddulubaale* is 'the principle wife of a king' (Murphy 1972: 133).

[8] In Manda, another auxiliary, namely *-kotok-*, is used to mark negation in deontic-necessity clauses as well as in several other non-main (or non-standard) domains (Bernander 2018: 658).

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