

Full Length Research Paper

Cultural astronomy in Uganda from the perspectives of the Acholi, Banyankole, Iteso and Lugbara

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Cultural astronomy in Uganda has been explored a second time considering another set of four ethnic groups, giving a wide range of perspectives in the subject and setting a baseline for exploring cultural astronomy in other African countries. Qualitative data have been collected using interviews and questionnaire survey, conducted with mutual consent of the respondents. Both purposive sampling and snow-ball sampling of respondents are employed to give opportunity only to those people having relevant information. A sample size of 80 members of each ethnic group is considered, and only those members aged 40 years and above have been approached for responses. Most natural phenomena involving celestial objects are considered mysterious, yet ethnic groups have attempted to explain them in their own ways; an eclipse is interpreted as the fight between the sun and moon as they cross each other's paths; the moon's appearance and disappearance on a monthly basis are taken as rehearsal steps towards weather changes; certain stars, clusters and constellations are believed to influence human activities; the moon is an enigmatic object which is thought to have activities on it similar to those on earth; and so forth. Some phenomena are thought to be caused by the actions of the gods. The results show that cultural astronomy is a prerequisite for modern astronomy in most African countries where astronomy education is just starting to take shape. It is prayed that telescope observations and scientific presentations will reach the ethnic communities one day upon acquiring some telescopes.

Key words: Astronomy, celestial, culture, galaxies, myths, peculiar, rainbow, Uganda, universe.

INTRODUCTION

According to Idang (2015), culture entails a totality of traits and characters that are peculiar to a group of people. These peculiar traits include language, dressing code, arts, their patterns of work, religious ceremonies,

leisure pursuits, dancing, social norms, taboos and values, among others (Idang, 2015; Itulua-Abumere, 2013). In this context, values are beliefs that are held about what is right and wrong and what is important in life

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(Idang, 2015). Culture is passed on from generation to generation, and its acquisition is a result of socialization. Every human being who grows up in a particular society is likely to become infused with the culture of that society, whether knowingly or unknowingly during the process of social interaction (Idang, 2015). Culture plays an important role in achieving originality and aesthetic value considerations (Mutungi, 2019). Without culture, we would have no language to express ourselves, no self-consciousness, and our ability to reason would be limited (Itulua-Abumere, 2013). Culture has two components; actual behavior (real culture), and ideal culture where people do things and give the reason for doing them (Amone et al., 2013).

Astronomy is a science discipline that studies virtually everything beyond the earth, which includes studying planets, stars, galaxies, nebulae, and the universe at large (Scott, 2010). It emphasizes the *when* and *where* a celestial object can be observed (Oruru et al., 2020). Astronomy requires the skill of careful observation in order to understand and discover depth of the universe. It was through observations that preliminary understanding of timing of days, nights, and monthly patterns was achieved (Scott, 2010). Initially, when there were no answers for some natural occurrences, observers thought that they were caused by the actions of the gods, a reasoning that was matching myths, beliefs and cultures. A couple of millennia ago saw modern astronomy starting to evolve, separating itself from cultural and religious beliefs and superstitions (Karttunen et al., 2017; Oruru et al., 2020). The International Astronomical Union aims to promote and safeguard the science of astronomy (Chapman et al., 2015; Oruru et al., 2020). Cultural astronomy employs astronomical knowledge and beliefs so as to inspire and inform social forms and ideologies (Campion, 1997; Oruru et al., 2020). In Africa, cultural astronomy is rich with mythical figures and divination methods, and it is also entwined with religious beliefs and practices, folklore, and social hierarchies, among others (Holbrook, 2007; Urama and Holbrook, 2009). Our first endeavour to unveil cultural astronomy in Uganda (Oruru et al., 2020) and the present study is compatible with African cultural astronomy. The gap between African cultural astronomy and modern astronomy is something worth mitigating.

The first track of cultural astronomy in Uganda, hereafter Paper I, involves four ethnic groups (Oruru et al., 2020) out of the 56 ethnic groups found in the country (Amone, 2015). The four broad linguistic groups, and the constituent members are reported in Paper I. The cultural groups reported in this paper (hereafter Paper II) are; Acholi, Banyankole, Iteso, and Lugbara. They are found in Northern Uganda, South-western Uganda, Eastern Uganda, and North-western Uganda (West Nile), respectively. The Bakiga share similar perspectives with Banyankole, so do the Madi and Lugbara. Figure 1 shows the map of Uganda of which the various ethnic

groups can be accessed. According to Kanyeihamba (2021), Uganda did not exist as an administrative unit prior to British colonial rule in Africa. The first Europeans to visit the region were accompanied by retainers from the coastal areas of East Africa, who spoke Swahili language of the coast. It was as the result of them mispronouncing the name Buganda that the whole territory came to be known as Uganda (Kanyeihamba, 2021). Apparently, the retainers found it difficult to pronounce the sound *BU* and names such as Buganda, Bugisu, Bunyoro and Busoga were converted to Uganda, Ugisu, Unyoro and Usoga, respectively (Kanyeihamba, 2021). Buganda was the central kingdom where the British founded a base to conquer the rest of the country, and this was possible with the collaboration of the Buganda kingdom rulers (Kanyeihamba, 2021). In the next paragraphs, a brief history of the ethnic groups used in this study is presented.

Ethnicity in Africa is a modern product of the encounter with capitalism and the nation-state in the colonial and post-colonial eras, and no single country in Africa has been immune to the dynamics of ethnicity (Amone and Muura, 2013). The Acholi are a part of Luo people, who migrated to Northern Uganda from Rumbek in South Sudan. The Luo are found in Northern Uganda, Eastern Uganda, South Sudan, Western Kenya, Eastern Congo, Western Ethiopia and Northern Tanzania, respectively (Amone and Muura, 2013). In Uganda, the Acholi are found in the northern districts of Gulu, Amuru, Nwoya, Kitgum, Lamwo, Pader and Agago, and they are bordered by the Alur, Jonam and Madi to the west, the Banyoro, Chope and Langi to the south, and the Karimojong, Jie and Labwor to the east (Amone and Muura, 2013) (Figure 1). The modern-day Acholi are more or less like the traditional Acholi, because when things are really critical, an Acholi will first consult a traditional medicine person or diviner (*ajwaka*), before going to a priest or medical doctor (Ocaya, 1988).

It is important to understand how the name *Acholi*, an English word for *Acoli*, originated. According to Amone and Muura (2013), the Arab slave and ivory traders were the first harbingers of British rule in Uganda. They were soon joined in the trade by the Europeans. The harbingers were from the north, and the Acholi named them *Kuturia*. The name Acholi was given by the kuturia. Before then, the Acholi were known by different people by such names as *Ganyi*, *Gangi* and *Luo* (Amone and Muura, 2013). But when the kuturia arrived, they recognized that the language spoken by the *Ganyi* was similar to that of the *Shilluk*, whom they had spent years with in Sudan and learnt some of their dialect. The Kuturia then began calling their hosts *Shulli* or *Shooli*, which became *Cooli* and *Acoli* (Amone and Muura, 2013; Ocaya, 1988). It is thought that the word *Acoli* might have also been derived from *col*, an Acholi word meaning dark or black (Ocaya, 1988). This way, the Acholi themselves first used the word *Acoli* to distinguish themselves from



Figure 1. Map of Uganda showing neighbouring countries and ethnic group distribution (Achieve Global Safaris-Uganda, 2021).

the white men who emerged from the north (Ocaya, 1988).

The Banyankole, the people of Ankole in South-western Uganda (Mutungi, 2019), consist of two main groups; the *Bairu*, who are mainly crop growers, form the large majority of Banyankole; and the *Bahima* who are mainly cattle keepers (Ntozi and Kabera, 1988; Mutungi, 2019). Both groups speak *Runyankole*, one of major Bantu dialects in Uganda. Until about 1990, the Banyankole were one of the ethnic groups with the highest fertility

rates in the country (Ntozi and Kabera, 1988). Before occupying Ankole kingdom, which was a creation of British rule at the beginning of the 20th Century, the Banyankole are believed to have lived in Rwanda, Tanzania, Democratic Republic of Congo, and other districts of Uganda (Mutungi, 2019). Before 1900, there were several independent kingdoms and chieftainships in the area, and *Nkore* was the strongest of all. The 1900 Buganda agreement established British protectorate rule in Buganda, and the 1901 Ankole agreement resulted in

the creation of Ankole kingdom, which was a merger of Nkore with other smaller kingdoms and chieftainships such as Igara, Buhweju, Bunyarguru, Buzimba, and principalities of Mpororo such as Nshenyi, Obwera and Bwishikatwa (Mutungi, 2019). Ankole was a colonial name given to Nkore because the Baganda agents and the British could not pronounce the word Nkore. Ankore or Ankole was therefore adopted to encompass the merged pre-colonial Nkore and small neighboring kingdoms, and the occupants of Ankole kingdom could be interchangeably called Banyankore or Banyankole (Mutungi, 2019).

According to the Encyclopedia of World Cultures (Encyclopedia, 1995), the Iteso comprise the second largest ethnic group in Uganda. Their traditions imply that they originated in the present-day Sudan and moved south over a period of centuries. A body of the Iteso is said to have separated from the Karamojong and moved further south, a separation that may have happened quite early because the clan names and ritual customs associated with the second of two distinctive groups of Karamojong and Jie people are not found among the Iteso (Encyclopedia, 1995). Unlike the Karamojong and Jie who are nomads, agriculture has played a significant role in the social and economic lives of the Iteso. The clan names of the Iteso reveal a history of standing ethnic interactions. The Iteso were probably well established in their Northern Uganda heartland by the mid-eighteenth century, when they began to move farther south, and traditions indicate two waves of their migration (Encyclopedia, 1995). The first was said to be family based and peaceful, but it was followed by a more extensive and aggressive migration that left the Iteso in control of a large territory, which was extended as far as the western highlands of Kenya. Turbulent interactions with European travelers caused the Iteso to retreat to their current territory in Kenya. Since then, the Northern and Southern Iteso territories have been separated, in which the Iteso are regionally separated into two groups; those who live in Teso and Bukedi Districts of Uganda, and those who live in Samia Locality of Kenya and adjacent Tororo District of Uganda. The former have been called Northern Iteso and the latter Southern Iteso (Nagashima, 1976). They all speak *Ateso*, a Nilo-Hamite language, similar to the languages spoken by the Karamojong, Jie and Turkana (Nagashima, 1976). Relations with other societies throughout the precolonial period were said to be peaceful and acrimonious, which resulted into intermarriages (Encyclopedia, 1995).

The Lugbara are a Sudanic-speaking subgroup of the Moru-Madi group of the Eastern Sudanic group (Alidri, 2016; Dalfovo, 1998). They live in North-western Uganda and North-eastern Democratic Republic of Congo, and are considered probably the oldest in this part of Africa, speaking a predominantly monosyllabic and tonal language (Dalfovo, 1998). The origin of the Lugbara is traced to the Bari land in the modern-day Rejaf-Juba

region in South Sudan. The Moru-Madi group was displaced by the Lotuko and Bari invasions between 1000 and 1500 AD, and settled in the present-day Lugbara territory, which was initially occupied by the Lendu and Okebu (Alidri, 2016). The Lugbara ethnic group is said to have emerged in the 19th century, as a result of the assimilation and intermingling between Moru-Madi and the Lendu and Okebu (Alidri, 2016). This cultural unification and assimilation process, described as *Lugbara-isation*, might have occurred between 1790 and 1850 (Alidri, 2016). However, the unification and assimilation led to population increase and pressure on the environmental resources, which often caused conflicts, and the Lugbara had to develop practical solutions to social and environmental problems, guided by custom, values, morals, and beliefs accumulated over time. This wisdom transformed into social norms and practice used to maintain order and stability among the Lugbara (Alidri, 2016).

MATERIALS AND METHODS

The study adopted similar materials and methods used in Paper I, in which the stars, constellations, and other celestial objects of public interest were identified. The celestial objects considered were mainly the sun, moon, earth, morning and evening stars, and clearly visible constellations, such as Orion and Taurus. Ethnographic qualitative research design was employed to explore the four ethnic groups, in order to understand, describe and interpret their perspectives of the celestial objects. Qualitative data were collected using interviews and questionnaire survey, conducted with mutual interactions with the respondents. The respondents were informed of the study objectives beforehand, as well as the particulars of the study team, so as to enable them participate willingly. The study mainly used questionnaire as instrument of data collection, but the researchers also asked guided questions using an interview guide, to obtain information that could not easily be obtained by the use of questionnaires.

Both probability sampling and non-probability sampling were used to suit the study objectives. In the first place, we considered clustering of respondents into homogeneous units of ethnic groups. Then, purposive sampling followed, and this was preferred because it gave the opportunity to identify only relevant people that could give required information. In addition, snow-ball sampling was used, where key informants nominated other people who could be contacted for the study. Although the study was conducted at a time when there were restricted movements in fear of the *Corona virus pandemic*, a sample size of 80 members was considered for each ethnic group, maintaining 30% women and 70% men, and only those aged 40 years and above. The study chose not to involve the young people because they were considered influenced by modern living styles, religions and educational systems, which could lead to biased data. After all, not much information was obtained from them in Paper I. As stated in Paper I, men got the lion's share because they are usually members of their ethnic groups from womb to tomb, but women may be married to or from other ethnic groups. Table 1 summarizes the targets realized during study implementation.

The data collected were analyzed qualitatively, since no much numerical information was needed. The information were categorized to identify any patterns and organized coherently. A number of direct quotations have been used in the texts that follow,

Table 1. Data collection for the ethnic groups using interview guides and questionnaires.

Ethnic group	Contacted	Responses	Score (%)
Acholi	78	75	96
Banyankole	90	84	93
Iteso	82	80	98
Lugbara	65	64	98

in order to give the reader a better insight of the thoughts of the ethnic groups. The information that were gathered from the respondents have been treated with utmost confidentiality, to ensure protection of the respondents from readers who may otherwise use the information for some hidden motives.

FINDINGS

Celestial objects in the sky

The Acholi people have commonly known the sun (*ceng*), moon (*dwe*), and stars (*lakalatwe*), which are collectively called sky objects (*jami matye i pol*). The Banyankole know them as celestial objects, considered as bodies created to give light on earth; the sun (*eizooba*), moon (*okweezi*), and stars (*enyonyoozi*). The Iteso call them space objects (*luka kujju*); the sun (*akolong*), moon (*elap*), stars (*aicer*), morning star (*etop*), clouds, planets, and satellites. The Lugbara say they are God's creatures of assorted stars (*bi'bio*) and moon (*emba*) that illuminate at night, and sun (*etu*) that illuminates during the day. Unfortunately, most members have not yet used modern scientific instruments to view celestial objects. Only very few privileged members have used telescopes, solar viewers, binoculars, and periscopes. However, attempts have been made by the ethnic community to view solar eclipses with water in a basin and photographic films.

According to the Acholi, there are also things beyond the sky (*jami matye inge pol*). These may not be seen, and could be other planets that resemble the earth - as taught at school. They must be very distant objects beyond eye sight and nobody can describe what they look like. They could also be other stars and spirit (*jok*) that manifests itself in different forms. The Banyankole consider that things like galaxies, heaven (*iguru*), and ringed planets that they have heard of, are unseen sky objects. The Iteso and Lugbara also regard unseen objects as; other planets, space stations, black holes, galaxies, and also ghosts and spirits. However, some members of the ethnic groups say that all objects should be visible, otherwise they do not exist, asserting further that:

Apart from the stars, moon and sun, space is filled with air and vacuum, which hold the visible objects in their positions. Why should one think of things beyond the sky? Does the sky have a limit?

The ethnic groups love watching the night sky, of which they think there must be scientific explanation. They find celestial objects so beautiful to look at with their amazing brightness. The Acholi wonder how many other things there are apart from those known on the earth. They consider that the movements of sky objects, their sparkling colours, and patterns beautify the sky. The fact that the moon and stars give out light at night, yet the night remains cold is a mystery. The stars are evenly distributed in space, and even those seen moving very fast do not strike the others. Likewise, the Banyankole say that it is interesting that stars only appear at night with amazing colours and brightness. They seek to explore how objects are suspended in space, their source of light, and how they came into being. They also say that there are too many stars to count, and they shine beautifully. They alleged that seeing them enabled ancestors to predict seasons and weather. A member had this to say:

The objects are very pleasing to the eyesight and make one gets lost in wonder of their creator... They move and hide in the clouds, only to reappear afterwards. The moon grows from day to day, but why not the sun?

The Iteso say that stars are a sign of victory and hope, and they also display sky beauty with their amazing patterns. Sometimes, the moon and stars appear to be in motion, and some stars occasionally project at great speeds. The Lugbara notice that during the dry season, a variety of stars appears and illuminates the sky. There are some star patterns that change according to seasons, and the moon, which interesting features on its surface, seems to follow someone who is moving.

Community knowledge of celestial objects

Although formal education has been in Uganda for more than one hundred years, modern astronomy knowledge is still scanty in most communities. Thus, the majority members of the ethnic groups have known about celestial objects through informal education, although some members say that they obtained unconvincing explanation from teachers besides their cultural knowledge. For example, they have been told that the blue sky is where the eye sight stops; that people have been to the moon,

yet the sun is unreachable; that the stars are always there in the sky even when we cannot see them. Some members have, however, endeavored to acquire more knowledge from the internet, media, as well as reading text books and articles on the subject. Common knowledge is normally acquired from parents, grandparents, and elders in the community, and to a less extent the religious leaders. This is usually done at a tender age. The Acholi normally pass the information at a fire place. The elders have told them that when it is raining and there is sunshine, then a leopard is giving birth. The Iteso have been told that when the moon is tilted, there is a bad event that will happen. The Lugbara have heard that what people do here on earth is also done on the moon.

It has been noted that most members of the ethnic groups thirst for scientific explanation of the celestial objects. The Acholi would like to know more about stellar clusters and constellations, and what the bright stars in the sky are – especially one that appears very early in the evening and the other one seen early morning. They also say that fast moving stars cannot be taken for granted. Some members inquired as follows:

Are there knowledgeable scientists in this country who can explain these things to us? Why does relevant knowledge come to us so late? Perhaps God does not want us to know more about those objects, lest we get closer to him and disobey him...

The Banyankole yearn to understand how celestial objects were created, and the content of the universe in general. One is fascinated by the distances of the heavenly bodies - from the earth and between the objects themselves, and the great speeds with which some of them move. In addition, they want to understand how stars get the lights they emit, and why the stars and other objects in space are held in their positions. On their part, the Iteso take keen interest in the continuous revolution and rotation of the earth, why weather changes are experienced on earth, and why stars twinkle and some of them move very fast. The Lugbara are curious to know if the stars are habitable, and their actual size because they look so tiny. They also want to master the seasons in which particular stars appear.

Members of the ethnic groups follow the patterns in which celestial objects appear. The Acholi say that stars appear more often during the dry season when the sky is clear, appearing quite early as well; fewer stars are seen during the wet seasons, appearing somewhat late in the evening. Their positions also change according to the seasons of the year. They say that most stars start appearing at 7:30 pm when the sky is dark. The Banyankole recognize that there are two bright objects that appear alternately – could be Venus and another star or planet. Some prominent stars appear early morning in the east, and there are those that appear in the evening

just around sunset. They say that, to the naked eye, stars appear to be more often when the moon is away, but they may appear throughout the year beyond the celestial curtains, as long as they have not gone into extinction. They also recognize that stars change seasonally, with very few seen during the rainy seasons, and many of them appear during the dry seasons. The Iteso and Lugbara also agree that stars are seasonal, as witnessed by different stellar patterns observed throughout the year. They also agree that dry seasons are decorated with plenty of stars, whereas one hardly sees stars during rainy seasons.

Each of the space objects is considered distinct from the others. The Acholi say that stars are smaller and not so bright, the sun is bigger and hotter, and the moon is also big yet it is cold. They also recognize that even some stars are bigger than the others, and their brightness also varies – the bigger stars seem to be brighter than the small stars, and they are not certain if this could result from stellar distances. The Banyankole say that celestial objects do not resemble; differing in size, colour and brightness. They say that each of them is unique and serves a different purpose. They notice only resemblance among stars by way of twinkling, and many of them could be perceived to be the same size because of enormous distances. The Iteso say that the sun is always round and has the same size; the moon changes shape and size constantly; and stars have different sizes, brightness and glitter in different colours. They stress that the objects give different amounts of light, with the sun producing the largest. The Lugbara uniquely recognize that the sun shines during the day, whereas the moon and stars during the night, and that stars twinkle in different colours.

The moon, earth and sun as peculiar objects

Other than the earth that human beings live on, the ethnic groups find it special to also have the sun and the moon. They consider that the moon is used for counting the months of the year, while the sun for counting the days of the month. The ethnic groups recognize that there are dark spots on the surface of the moon as observed from the earth. These have locally attracted interesting interpretations, depending on the viewing angle. Figure 2 shows the view of the moon at full phase, with interpretations following.

Every ethnic group says that there is a picture of a human being on the moon. Enlightened Acholi say that the dark spots show that the surface of the moon is not smooth, comprising depressions or valleys. Traditionally, they say that there is a picture of a woman carrying a baby, most likely *Mother Mary* carrying *Baby Jesus*. The Banyankole say that people do not understand the dark spots or pictures, although they appear clearly when the moon is full. Some members see something that looks like a map or a sleeping cat. Traditional folklore says

that it is the picture of a woman carrying firewood and a baby on her back. Emphasizing on this, one woman had this to say:

In every aspect, the blame is always on us the women. It is said that the woman on the moon was punished by God (Ruhanga) for fetching firewood on Sunday. That way, Ruhanga wanted to let everyone know that Sunday is for prayers and resting.

Some Iteso also think that the dark patches could be deep valleys or mountains, and there could be water bodies on the moon. The patches also trace a person's image, but not clearly seen due to the moon's distance. They think that the picture could be an astronaut who had landed on the moon. Besides the picture of a woman carrying a baby, the Lugbara also see other things like pools of water or gardens on the moon, and they have been told by elders that there are rivers and mountains on the moon. In general, the picture of a woman on the moon makes it strange and frightening. Besides the funny images on the moon, the ethnic groups take keen interest on the phases of the moon. The Acholi say that the moon changes size all the times in a cyclic fashion. The Banyankole say that the size of the moon keeps changing until one counts about 28 days, then it starts all over again. Sometimes the moon disappears completely from sight. The moon can also be full, bright and yet feels cold. The Iteso also say that the phases of the moon leave one puzzled, and that the moon sometimes appears to be shaking. The Lugbara say that people are really anxious to see the appearance of the crescent moon. When in this sickle shape, the bottom side shows where more deaths would be experienced.

The shape of the earth, as known by the ethnic groups, is another thing that calls for scientific interactions with the communities. The Acholi say that the earth is flat like a table, the reason it appears to meet the sky. Only a few Banyankole say that the earth is spherical as always represented by a simple model with known radius. They majority members, however, say that the earth ends where it touches the sky. The Iteso and Lugbara say that (culturally) the earth is flat, but science teaches that it is oval or spherical like an egg. Still, the ethnic groups do not seem to comprehend why the sky seems to touch the earth. The Acholi think that the earth just blocks the sky. They say that eye sight or vision stops at the horizon, so the earth does not touch the sky because when someone goes to the point where the earth seems to meet the sky, the horizon moves ahead. Some other members say that there must be something (the sky) to hold the earth. The Banyankole say that it is also a wonder that the earth and the sky meet, but some of them have heard about the dome shape of the earth and limitation of sense of sight with distance. The Iteso also say that it is because we see things from a distance – so the earth and sky seem to meet at the horizon. Some members, however, believe

that the sky is round - so meets the earth at its ends, so we see a sky hemisphere. The Lugbara also blames limitation of human vision, giving a ball shape of the sky touching the earth (*nyaku*). They say that the horizon is the point where the sky seems to touch the earth, due to distance and the extent to which human eye can see.

The ethnic groups unanimously say that the sun is an object of its own kind. Its size and brightness surpass everything, and therefore the sun cannot be a star. The Acholi say that the sun is the sun and stars are stars, the latter being smaller and not hot. The moon is also moon. They emphasize that there is only one sun which is a major source of energy, where the stars and moon only reflect the associated sunlight. The Banyankole say that the sun is a stand-alone heavenly body. It is far bigger than the stars and seen only during day time. It is called sun not star, also nearer to the earth than stars and it gives much heat. For the Iteso, they say that if the stars can also produce light and enormous heat, then the sun could also be a star. But the sun has been known to be a different object, the biggest and brightest object in space that provides light to the earth, moon, stars and planets. Likewise, the Lugbara say that the sun is not a star; otherwise it would be with its fellow stars at night. Although stars are said to produce light as the sun, the latter is much bigger and brighter.

Attempts have been made by the ethnic groups to justify why the sun is not seen at night. Culturally, the Acholi say that the sun goes behind the horizon and gets blocked, or the sun goes to another planet. Enlightened members say that the earth would have turned its back to the sun, so the sun can still be seen shining in other places. The Banyankole think that, at night, the sun and its light are blocked by the moon that hides it for 12 hours of darkness. It is also thought to move back in the east when people are asleep, so it can rise again the next morning. In this regard, some people have attempted to watch the sun at night in vain. Other members have been told that the sun is stationary, but due to the earth's rotation the sun shines on the other half of the earth initially in darkness during the day. The elders say that the sun also goes to sleep at night behind the hills. For the Iteso, the sun hides behind the moon (quite rare), and that the sun moves to shine on other planets during night time. This notion is also shared by the Lugbara, who also think that the sun hides behind the clouds. Scientific explanation has been heard among the ethnic groups that the earth's rotation causes relative movement of the sun. So, during the night, the dark side of the earth will have rotated away from the sun and therefore it does not receive sunlight. This means that the earth can be partitioned with different time zones.

The moon, unlike the sun, is known by the ethnic group as something seasonal and cannot be seen daily. The moon is said to move, and can be hidden from sight. Besides, its light is not as strong enough to be seen when it has moved very far. The Acholi think that the moon and



Figure 2. Appearance of the moon as observed at full phase (Fink, 2015). Dark images on the surface are depicted in many aspects by ethnic groups in Uganda.

earth orbit the sun, and the latter is stationary. Other members hold that the moon moves around the earth and at some point it is difficult to see it, yet others think that the earth revolves around the moon and the sun at different speeds. Because of these, the moon appears seasonally and takes about 28 days to repeat itself. Therefore, it is used for counting the days of the month. Most Banyankole understand that the moon moves around the earth, while the earth itself spins and moves around the sun. However, some hold that the moon and the sun take different orbits, so that all of them cannot be visible daily. Interestingly, there are some members who say that God (*Ruhanga*) knows that people must rest during the night from the work of the day, so need for little or no light. This is not the case with the sun needed daily for various activities and processes. The Iteso also hold that the earth and moon revolve around the sun at different rates. Some members contend that it is God's arrangement that the moon comes monthly, so there should be a few days in between to prepare. Some other members think that there could be moments when the moon is too close to the sun that the sun's brightness cannot allow one to see the moon. The Lugbara seem to have interacted with many scientists. They say that the sun is stationary with respect to planets, and the moon is smaller and mobile - so it must be seasonal. The moon

therefore goes away at times in order for the seasons to change.

Local names of celestial objects

As in Paper I, it has already been mentioned that the most common celestial objects known to the ethnic groups are: the sun, moon and stars. The objects and the local names that have been identified are presented in Table 2.

The naming of these objects have been explained by elders of the ethnic groups, sometimes by way of storytelling (folklore). The convergence is that the objects were called so based on their characteristics and functionality. For the Acholi, the sun is called *ceng* because of its glazing hotness; stars - *lakalatwe* because of blinking or flashing pattern and colours; moon - *dwe* because it is appealing at night and comes monthly, so used to count the months. They think that their naming was based on shapes, appearance and heat produced, as well as wisdom from God. The Banyankole say that the naming depended on their uses, shiny nature and the time they provide light on the earth. The sun (*eizooba*) means from day to day, that is, the sun gives light every day; moon (*omweezi*) because it appears every month,

Table 2. Celestial objects and their local names for some ethnic groups in Uganda.

Object	Acholi	Banyankole	Iteso	Lugbara
Sun	Ceng	Eizooba	Akolong	Etu
Moon	Dwe	Omweezi	Elap	Emba
Stars	Lakalatwe	Enyonyoozi	Aicer	bi'bio
Shooting stars	-	Ekibonomwe	-	Nyaraka'dio
Evening star	-	Engazi	-	-
Morning star	Latwok	Enyonyoozi y'obusheeshe	Etop	Lelewu
Clouds	Pol	Ekiiku	-	Iriti

stars (*enyonyoozi* or *omushana*) because of their twinkling nature and they are so shiny; evening star (*enganzi*) means *Prime Minister* – a bright star which appears near the moon just like the *Prime Minister* relates with the *President (King)*. Shooting star (*ekibonomwe*) is a quick moving bright object that disappears before other people can see it. The Iteso believe that the objects were named based on the importance of the objects; the sun (*akolong*) is the one that bathes us (*ailong*). It is seen during day time, and it is also bright and hot; moon (*elap*) appears and disappears for days before reappearing. It is mostly seen at night – the largest and brightest object seen by the naked eye; stars (*aicer*) are any other bodies other than the sun and moon, so planets form part of the stars. They are smaller bodies that also give out light, and they are well scattered. For the Lugbara, naming of the objects depends on the time of appearance and the characteristics of the objects; sun (*etu*) gives light and heat during the day (*etusi*); moon (*emba*) gives light during the night. It also appears every month, so used for counting months of the year; and stars (*bi'bio*) because of the characteristic light they produce.

The Acholi are able to recognize the following stellar clusters and constellations: Orion from its belt (*lyer nyim*), Pleiades (*yuku* or *nyobi* or *onyubu*), also called *cing lyec* - because the cluster resembles the trunk of the elephant, southern cross (*yataria*), and line of the Milky Way, which comprises cloudy tiny stars lined up across the sky – sign of dry season coming or ending, depending on its passage in the sky. The Banyankole also recognize the line of the Milky Way - described as many stars appearing joined by ash-like substance, straight line stars, and groups of many stars. Some stars stand on their own and are very bright like the moon. The Iteso notice stars that form zigzag pattern; rectangular pattern, hunter (*amejan*), six to ten stars always together (Pleiades) and Orion, identified by the linear stars. The Lugbara recognize small stars in groups (*elinya*) which they say depict a sign of dry season, bright stars of dawn and dusk, straight line stars (*cuvu/mkpil*), cow-pulling (*tise-tise*), goat-pulling (*ndrise-ndrise*), simsim flowers

(*anyufu-anyufu*), and pointers (*leleo*).

The Acholi regard the evening stars as the usual stars that appear after sunset. The morning star (*latwok* or *lacee*) appears at around 4 am, which shows that it is about day break. Both stars help in telling time, that is, either night time or daybreak is setting in. The Banyankole also say that the evening star (*enganzi*) appears in the west after sunset close to the moon; the morning star (*enyonyoozi y'obusheeshe*) appears in the east before sunrise, also close to the moon. People have heard that these stars could be planets of the solar system. The Iteso mostly recognize the morning star (*etop*) that appears before sunrise, and they have to that effect a local newspaper called *Etop*. For the Lugbara, both the morning star (*leleo o'bitiri*) and evening star (*leleo ondra beri*) separate day and night. The morning star shows that it is about day time, and the evening star shows that night is coming in. Amateur astronomers confirm that what is locally called the morning and evening stars are planets Jupiter and Venus, respectively, with the two appearing in the sky alternately. Figure 3 shows the two planets, each captured next to the moon.

Weather change and celestial objects

The ethnic groups say that the nature and appearance of celestial objects go hand in hand with weather changes.

The Acholi say that when the moon and stars are hardly visible within a given time, then it is wet season. The onset of rainy season is deduced when the moon and stars appear dim, and the moon is somewhat brownish in colour. The line of the Milky Way usually divides the sky such that one side is somewhat plain and the other side full of stars, implying the proportions of rainy and dry seasons, respectively. The new moon is usually accompanied by some rain, that is, there may be some rain at the beginning of every month. The Banyankole also agree that stars do not appear quite many during the rainy season due to cloud cover. surrounded by a big circle of cloud-like feature in a particular night, then they are sure it will rain the following



Figure 3. Waxing crescent moon with Venus (left) and waning crescent moon with Jupiter (right). Courtesy of google images.

day. The Iteso particularly emphasize the manner in which the moon is tilted, that will show whether there will be rain or sunshine. At full moon, there is little rain. When the moon has disappeared, then the new moon is expected with some rain to wash it. The Lugbara say that the appearance of stars and their patterns prepare people to be ready for change of seasons. In particular, when many stars arrange themselves south to north in the evening, then dry season is about to set in.

Celestial objects in agriculture

Rain is essential in farming, and as search the ethnic groups watch the sky for planning purposes. The size of the rainy season as seen in the sky determines how long planting can go on. Planting is done when there is rain, for which the stars are few and moon appears dim, otherwise drying of crops. The Acholi say that the new moon determines whether there will be good harvest or not, as it is seen tilted on one side. For example, the new moon in Figure 3 (left) alerts the Acholi that the harvest in the south would be poor. On sighting Orion belt (*Iyer nyim*) and Pleiades (*onyubu* or *cing lyec*), they say it is about time to harvest simsim (*nyim*). So, they prepare the stand for drying simsim (*Iyer nyim*), something likened to the three stars in Orion belt (Figure 4). The morning star (*latwok*) helps them to wake up early for gardening. The Banyankole appreciate that domestic animals can search for food even at night using moonlight. The Lugbara say that when small stars (*elinya*) are seen rising from the east at about 4 am, then it is the season for planting. There will be fewer stars and the moon will be dim. They say that the naming of the moon means it affects

activities. It is believed to appear with blessing of rain. So, when the new moon is sighted in the months of March to September, agricultural activities start. The appearance of star pattern of simsim flowers (*anyufu-anyufu*) determines when to plant simsim.

Celestial objects in fishing

Fishermen do get a bad catch when the moon is very bright. The Acholi are not quite keen on this since there are no big water bodies nearby, but are told fish tend to eat much and reproduce during rainy season. Therefore, rainy season is best time for fishing. They have been told that bright moonlight is not good for fishing, unless one is using hooks. Some members (with their small rivers) go fishing during the dry season because of favorable weather conditions. For the Banyankole, fishermen go fishing when moon is dark, the time lake tides are not higher. Also, the stars are used to tell time for fishermen in the lake. The Iteso say that fish tend to hide deeper in the water when the moon and stars are very bright, so it is hard to catch *mukene*. There is high catch when the moon is dark, but too much rain is not good for fishing either. The Lugbara assert that the few days the moon does not appear are good for fishing. When the moon is too bright, only small fish can come to the water surface and they are not the target.

Celestial objects in hunting

The Acholi normally go for hunting during dry season after burning down the dry and heavy impenetrable



Figure 4. Simsim drying in Acholi-land (left), and sky view showing Orion, Taurus and Pleiades (right). The red stars are Betelgeuse and Aldebaran in Orion and Taurus constellations, respectively.

bushes. This is the time when men are not quite active in garden work, so move around to get something to supplement domestic diet. At night, bright moonlight makes the animals sensible, so hunters may only use this time for laying/setting traps to catch animals. The Banyankole and Iteso also take advantage of the fact that animals use moonlight to search for food at night, so they can be trapped. They say that new moon comes with rain, so hunters can spot the foot marks of animals, from which they can lay traps or nets. The Lugbara are grateful for the appearance of small stars (*elinya*) in the west to mark dry season, so they can go hunting. They say that bright moon is not good for collecting white ants and grasshoppers, although some hunters use the moonlight to target resting animals.

Events associated with celestial objects

Apparently, there are no much traditional talks for the current generation, which could lead to cultural degeneration. The Acholi say that moonlight is good for story tellers and vigils, and it is from November to February that most social functions, for example, marriages are held. Traditional and spiritual rituals are easy to perform in the presence of the moon. In cases of sickness or barrenness, the sick person is pulled under a granary to invoke the spirit (*jok aywaya*). Traditional Acholi believe that when a ring forms around the sun (or moon), it signifies the death of a clan chief or a prominent person. One member had to stress as follows:

We saw this thing when Archbishop Janani Luwum was murdered by the forces of former dictator Idi Amin Dada. There was a clearly visible yellow ring around the sun,

and shortly some form of darkness covered the earth. Everyone was worried, and later on the news came to us that the Archbishop was dead.

Muslims use the appearance of new moon to begin or end their fasting periods. For the Banyankole, traditional healers use certain stars to administer medicines, as well as the moon at its full phase. Some religions also consider stars as a blessing and beauty of God's creation. The sorcerers or night dancers are scarce when the moonlight is bright, so their dark deeds are performed in dark nights. The Iteso also say night dancers are notorious with dark moonlight, but traditional dancers use the full moon when it is clear and cool. There are also pregnancy rituals done at full moon, as well as last funeral rites. They say that on Christmas Day, the sun comes out shaking, which means that Jesus' birth was significant to all creatures. For the Lugbara, festive seasons and rituals are associated with many small stars (*elinya*) appearing in the evening sky. For example, harvesting season (*anya loza*) is associated with *elinya*. The deaf and dumb also tend to hear and talk during this period, but for planting season (*aliburu*), the small stars (*elinya*) appear in the morning hours from the east. Certain rituals require new moon as people believe they are appeasing god of the land to bless them.

Myths about celestial objects and night sky

It is common knowledge that after sunset, there will be darkness or the moon and stars will give some light and hope. The ethnic groups agree that the night is not the best time to stay outside, even if stars are believed not to harm. They say that darkness favours criminality of which

someone is likely to fall a victim. Even night dancers are very common in the villages, as well as wild animals. But traditional people who predict seasons usually stay outside at night to watch the stars and moon. Although some members of the ethnic groups have known that the earth's rotation causes the relative movements of celestial objects, some members still think that the wind in the sky causes the objects to move, otherwise it is the making of God (*Ruhanga*) that all celestial objects should move, which is the cause of seasonal changes.

The Acholi say that fast moving stars that appear and disappear suddenly show the power of God over gods. The Banyankole believe that during darkness, a big-sized spirit (*mureesa*) could appear, leading to the death of a king. They also believe that an eagle is a servant of Jupiter. They discourage members from walking at night because the small god (*bachweezi*) would kidnap the victim to a strange place; that the angels also move at night from door to door. The Iteso say that shooting stars are associated with satanic events and evils. People are told not to point at it or show to a friend, otherwise one will remain static. They also believe that the day the sun stops to appear, then *Jesus Christ* will come again, as the Bible says. The Lugbara say that at night, the dead usually come out of their graves and sit on top, and that the devils also work at night. It is also said that the number of stars represents the number of people who have died. Across the ethnic divides, members appreciate that the stars still exist in the sky during day time even if they cannot be seen. They say that the stars are usually suppressed by the bright sunlight, but can be seen by people who climb underground to sink or empty pit latrines, due to the limited sunlight that enters inside the pit. However, some members still think that it is a natural occurrence that the sun is for the day and stars come during the night, or the stars visit another planet during day time.

The eclipses

Although a few members have known that eclipses can be explained scientifically, the ethnic groups hold some cultural ideas. The Acholi say that the sun and moon meet when they cross each other's path or share a path. This does not happen frequently; one overpowers the other, and may signify the changing of seasons. The Banyankole say that the sun and the moon will fight, a wonderful experience brought about by the overlap of their orbits. In that case, the sun is expected to burn the moon, but it does not happen. Their fight is mainly to determine who should rule the day time, which the sun was endowed by the creator. The Iteso say that it is usually a fight, an unfortunate day, where darkness will fall on the earth. The Lugbara also wonder why the sun does not burn the moon when they meet, given its hotness. They say eclipse occurs every five years, the time when the gods of rain and sunshine are fighting,

which results in darkness.

The birth and death of celestial objects

The ethnic groups hold the biblical context of creation dearly. They believe that God created the universe, which is made up of stars and large scale structures. The Acholi and Banyankole say that no one knows the details of creation except God himself. In stressing this one member said:

Haven't you read the creation story in the Bible in Genesis 1:3, which says: "And God said, let there be light and there was light." This shows that the objects came into existence not by guess work but God (Ruhanga) created them perfectly.

Some members of the ethnic groups think that the objects existed naturally, perhaps a kind of happening of the Big Bang, where by at one point in time, everything was a single unit. An explosion occurred and different objects were formed, including the sun, moon, earth, and stars. According to the ethnic groups, celestial objects cannot disappear at once. One member of Acholi community said the following:

That thinking is not in Acholi! if a person dies, there will be the birth of another person for replacement. This should be the same scenario with sky objects, otherwise everything would come to a standstill and total darkness, the end of the world because life depends on those objects, especially the sun and moon.

The Banyankole also see an impossibility since these objects have existed for quite long (trillions of millennia). But if they are to disappear, it may be on the last day (*ekiro kyahamuheru*), where there would be total darkness, frighteningly dark beyond human imagination, and night and day would be inseparable on earth and elsewhere; the universe would cease to exist. The Iteso think that in such a scenario, there would be lack of coordination and everything would cease to work. This can be at the second coming of Jesus Christ.

Adoration of celestial objects

The ethnic groups have held attachments to some celestial objects. Muslim members are in unison with the global sect, as they use the new moon to begin or end their fasting periods. The Acholi people regard the moon as one of the gods. They believe that evil spirits are found in water and forests. The Banyankole believe that *kazooba nyamuhanga* (god of the sun) provides energy, and people are told that God is in heaven which could be somewhere in the sky. There is also *nyakwezi* (goddess of the moon) and *ekireebomwe* (miracle star) which predicts

that something strange would happen, to you and your family. The Iteso say that some planets are gods, that is why they cannot be seen. They also hold the moon dearly as god of the rain. The morning star (*etop*) is regarded as light of the clan. The Lugbara say that gods have specific roles, so control specific stars. They believe that shooting star (*nyarakad'io*) strikes a person who makes an oath and revokes it. Their members do not go for marriage until the new moon is sighted.

Thinking louder

The rainbow is one other thing that attracts interest and local interpretation from the ethnic groups. The Acholi say that upon sighting the rainbow, the rain will stop immediately. They think that the rainbow comes from a giant snake in a river, which blows it out. Its appearance can lead to a bad harvest. Whoever walks across the rainbow gets burnt seriously, so a traditional ritual must be done. The Banyankole believe that when the rainbow appears, the gods are drinking water from the earth, and where it is situated, one side will be experiencing rain but the other side sunshine with some drizzles. It is a sign that rain would be very little, may be a rain maker's craft. For the Iteso, the appearance of the rainbow serves as a symbol of peace and society's hope, motivation and good luck. The Lugbara say that when the rainbow (*gari* or *tunduru*) appears, the gods would be moving from one river to another, or they are drinking water from two rivers. It is believed that the rainbow stops rain and thunder from striking, but whoever makes an oath (*oyosoza*) and reverses it will be struck dead. Anyone who attempts to cross the rainbow will change colour. Those members of the ethnic groups inclined to religion believe that the rainbow is a sign that God will not flood the earth again with water as a punishment for their sins, a covenant which God made with Noah.

Another bunch of puzzling things exists: The underworld and the origin of lightning. The Banyankole say that the earth is where human beings live and carry out all activities, while the underworld is the home of Satan and evil spirits, and heaven is where God lives the righteous people will join him there. Upon these backgrounds, scientific explanation is needed to clear some traditional myths. One needs to understand how lightning comes with some rain. The saying that the sky is the limit is like the acknowledgment of defeat, since one may never know the full extent of space. It is mind boggling, so it is difficult to think beyond what is observable. Perhaps God has activities he does on those numerous objects to keep them active. The African perspectives need to be penetrated by scientific facts. This way, humanity will appreciate that celestial objects are held in space by forces, and that the moon and sun have to be at proportionate distances from the earth in order that they appear to be the same size. The sky could be having stars and objects that need exploration. The

development of urban centers and cities has reduced sky beauty owing to light pollution.

Conclusion

Cultural astronomy in Uganda is a subject of interest. The ethnic groups have many points of convergence and a few divergence in the treatment of particular celestial objects. Terminologies of astronomy are beginning to permeate the ethnic knowledge, such as galaxies and black holes, which are thought to be among unseen objects. The most commonly known astronomical objects by the ethnic groups are the sun, moon and stars. The local names differ from ethnic group to the other, yet they are all derived from the characteristics and functionalities of the objects. Some local names from the Banyankole are identical with those of other Bantu ethnic groups reported in Paper I, especially the Baganda and Banyoro. It is interesting to note that the local names of celestial objects as known by the Langi (Paper I) are like borrowings from Acholi and Iteso in proportion, which strengthens the view that the Langi might have lost their Ateker identity and resorted to Luo (Paper I). The Lugbara present local names which reveal that their Sudanic dialect is quite distinct from the Bantu, Luo and Ateker groups, respectively. All the ethnic groups consider the night sky as a God given natural laboratory that presents a number of scientific phenomena which require knowledgeable persons to unveil. Whereas all the ethnic groups take keen interest in watching celestial objects, the Acholi are interested to know more about star clusters and constellations, which could be a shared view with the Langi (Paper I) and Lugbara, since these ethnic groups seem to recognize a number of clusters and constellations. The Banyankole on the other hand are a step ahead to understand the formation of celestial objects and content of the universe; the Iteso take interest in the continuous revolution and rotation of planet earth and connection to weather changes, and the Lugbara's curiosity lies in the habitability of stars as well as mastery of the seasons in which particular stars appear. Whereas myths carry some weight in the cultural understanding of many celestial phenomena, there are certain aspects that fit into science coincidentally. For example, from a science perspective, eclipses involve linear interactions between the sun, earth and moon, and culture says that the sun and the moon meet in a fight, the effect of which is felt on earth. This means cultural astronomy may be a necessary and effective way of introducing space dynamics to the indigenous population. For the second time, the subject has been expanded considering another set of four ethnic groups. This has created more affinity for the remaining ethnic groups, so that the Pearl of Africa sets a baseline for exploring cultural astronomy in the African continent. It is envisaged that star gazing, telescope observations, and scientific presentations will make the ethnic communities

appreciate nature the more.

CONFLICT OF INTERESTS

The authors have not declared any conflict of interests..

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