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Lightning Myths versus Science Facts: Traditional Beliefs on Thunderstorm among Rwandans

Ndihokubwayo Kizito

African Centre of Excellence for Innovative Teaching and Learning Mathematics and
Science (ACEITLMS).

University of Rwanda-College of Education

P.O. Box 55, Rwamagana Kayonza, Rwanda

Email: ndihokubwayokizito@gmail.com

Mob.: (+250) 788970243

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Nkundabakura Phéneas

School of Education, Department of Mathematics, Science and Physical Education

University of Rwanda-College of Education

P.O. Box 55, Rwamagana. Kayonza, Rwanda

Email: nkundapheneas@yahoo.fr

Mob.: (+250) 785517032

Abstract

The paper aimed at revealing lightning myths and traditional beliefs among Rwandans. It provides an overview of their feelings, opinions, and worries as well as facts on thunderstorms using summative-written text and focus-group discussion where about 315 people participated in this research. The conception of the thunder in Rwandan culture was found different from the one we learn from Physics class. For instance, in this study, we found that more traditional beliefs are found in old and non-educated people. Even though some traces are found in intellectuals, however, they are overcome as they become more educated. Though it is believed that witch doctors can traditionally use the term 'thunder' attributed in their activities as the same lightning phenomenon, this occurs in unplanned time and situation, striking their so-called "own enemies". Overcoming the worries related to traditional beliefs using scientific researchers' testimonies and safety were also discussed. For instance, though none can be totally safe from a lightning hit, prevention strategies can lessen risks. Thus, avoidance of

lightning damage should be an individual duty and everyone should know daily local weather predictions and harmful consequences.

Key words: thunderstorm, lightning myths, traditional beliefs, a witch doctor

Introduction

The lightning strikes either inside a cloud, between clouds, or from clouds to the ground. The latter is likely to occur under our observation. A lightning is a flow of electrons that zigzags downward in a forked shaped pattern producing a huge amount of energy in form of heat, light, and extravagant sound that damage property and humankind. In a cloud, the movement of air makes raindrops to collide resulting to a separation of charges, positive charges upper and negative charges down, because while the light molecules (ice) move to the upper side of the cloud, the heavy molecules (water) move downward. In other words, if enough charges build up due to friction, then a spark (a charge moving through the air, heating up the air seeing light and hearing the sound) will form. The negative charges down from cloud induce, in form of stepped leader, the positive charges from the ground, resulting in equalized charges. Thus, this neutralization results to an explosion which is known as the thunder. The moving charge is an electric current which makes lightning be dangerous. In other words, when a ladder and a streamer meet, the current flows, therefore the air around the strike becomes tremendously hot resulting in the explosion.

Lightning is one of the most dominant and a great natural phenomenon that manhood has ever met. While more than 1,000 people were hit by lightning every year, approximately 100 of them die as a result of the strike in the United States (Zavisa, 2000). Lightning is a beautiful manifestation, but scary at the same time. In the tropical regions, about 20% of the lightning sparks strike the ground, whereas the rest occurs inside a cloud (Elsom, 2000; Cooray, Cooray and Andrews, 2007). During a lightning strike (Cooray et al., 2007), the channel temperature will be raised in a few microseconds and, as a result, the pressure in the channel may increase to several atmospheres. In fact, lightning can heat the air it passes through about 5 times hotter than the surface of the sun (27,760 degrees Celsius) while a usual lightning flash is about 300 million Volts and about 30,000 Amps (Prahm *et al.*, 2013).

From history, however, the mystery of lightning has been attributed to the magic fire from the sky that man captured and used to keep warm at night and the wild animals away ("Lightning Facts & Information," 2010). Greeks believed lightning to be a weapon of Zeus and a manifestation of the gods. For instance, any spot struck by lightning was viewed as sacred ("Lightning Facts & Information," 2010). Scandinavian mythology refers to Thor, the Thunderer, who was the foe of all demons (Institute of National Lightning and Safety, 1999). In the Hindu religion, Indra was the god of heaven, lightning, rain, storms, and thunder while Umpundulo was considered as the lightning bird-god of the Bantu tribesmen in Africa (Hrodrigues, 2008).

In the early 1800s in Russia, when rain was needed, three men climbed a tree. The first man knocked two fire-brands together, the triggers imitating lightning. The second man poured water over branches, imitating rain while the third man would knock on a kettle to attract the thunder ("Lightning Facts & Information," 2010). In that time, people and property like British ship, churches were damaged and burned by lightning resulting a solution of installing lightning rods invented by Benjamin Franklin through his kite and key experiments in 1752 presuming that lightning was electricity in order to overcome superstitions observed as cause and effect,

which now has been fortified as science. Socrates added that Zeus was not up there rather it was a vortex of air (“Lightning Facts & Information,” 2010).

In the early 20th century, many researchers and philosophers looked at the relationship between religion, philosophy, and science in which the more sophisticated ways of observing at the world replaced the older ways. Religion, on one hand, was often thought to arise from magic. Science must, on the other hand, assume the reality of its matters so that it minimizes a critical metaphysical attitude (Kelley & Berridge, 2002). Therefore, this paper aimed at (a) revealing lightning myths as well as traditional beliefs on thunderstorm among Rwandans and (b) overcome the misconceptions and worries related to traditional beliefs using scientific researches and safety guidelines.

Methodology of the Study

This is a qualitative study and used a grounded theory. According to Glaser *et al.* (2006) and Wanjiku *et al.* (2014), grounded theory is a qualitative research method where the analysis of social processes and human interactions are used. Since the purpose of this study was to outline lightning myths, to reveal traditional beliefs on thunderstorm and to use other pieces of work to overcome the worries that people may have towards lightning. Therefore question-guided this research was no more than: “What do you understand by the thunderstorm?” and structured sub-questions to orient the main question were based on the difference between lightning and thunderstorm, lightning conductor and prevention, the timing a lightning is likely to occur, and so on.

The opinions were written down by pupils, students, and intellectuals, while group discussion was administered to the nursery, street children, and non-educated adults—old and non-intellectual people, witch doctors—were used to collect information from respondents. The researchers visited all kind of people including learners in schools (40 nursery school children, 40 primary 2 and 40 primary 5 pupils, and 50 and 120 senior 3 and senior 6 secondary school students respectively), 15-drop out and street children (10-20 years old), 6 intellectual people (mostly teachers) and 4 non-intellectual old people including witch doctors in Nyagatare district, Rwanda. The total of respondents was 315.

From the ethical point of view, when we talked to children, we first arranged with their teachers so that the discussion could go through playing and most of the questions were guided by the teachers themselves. The adults, on the other hand, were requested to provide a time for a visit, so that at the time of the meeting, they were all aware and well prepared. However, their full identity was kept anonymous.

Findings and Discussion

The data were analyzed, described qualitatively (Ndiokubwayo, 2017) and reported in narrative form using direct quotes and/or paraphrases (Ndayambaje, 2018). Written texts in case of pupils and students were summarized in common sense and paraphrased, in the case of teachers’ direct quotes were accumulated while group discussion was thematically aligned, summarized and paraphrased. Since the questions were asked in Kinyarwanda to some group of respondents, written text and group discussion data from nursery children, primary pupils, and non-intellectuals respectively were translated along their analysis. Both responses and location of the respondents are presented in order of nursery children, drop out and street children, grade 2 and 5 primary school pupils, grade 9 and grade 12 secondary school students,

educated people such as teachers in various expertise, and old non-intellectual people as well as witch doctors.

i. Nursery children

“A thunder is Satan, bad, buffalo, lightning, water, porridge, bread and located in the heaven... A lightning is a parent, it is fire...”! Said by children from Umusamaliya Nursery School, Matimba.

Oh, what funny answers! Children from nursery schools are used to answer to questions referring to what they think directly. For instance, at that time, they were from break time that is why most of the answers were “thunder is porridge”. By observation, children saw how lightning flashes like that is why without hesitating they say “thunder is fire”.

ii. Drop out and street children

“A thunder is a rude man, it is a girl, it is a big cock, it is a frog, it is a sound from heaven, and poison of witch doctors...”

In this study, drop out and street children are between 10 to 20 years old, they do not mind telling what they had been told as a story. “A frog and thunder” is a written story in primary school textbook before 2000, from where a cock was figured as thunder.

iii. Grade 2 and 5 Primary school pupils

When brainstormed, primary school pupils from Groupe Scholaire Matimba in 2013 said: “The thunder of rain sounds from the sky, when coming down, it strikes many people cutting trees and kills cows.” “You cannot expose your teeth during the thunderstorm.” “The thunder is against radios because it is fire and light. It is against someone who wears red clothes and it likes where blue lizards are exposed” (*Grade 2 Primary school pupils*).

“The thunder is located in clouds. When a cold wind from up meets the hot wind from down, we get lightning. The thunder is a magnet meeting with the down magnet, then they beat each other and we get lightning. The sound is what is called thunder, light plus fire is called lightning and lightning are coming before the thunder. Flash comes before the sound as it travels faster. It acts as a poison; people send it to kill others. We prevent thunder by putting lightning conductor on the house to the soil using salt and charcoal when the thunder beats, it is captured and returns back” (*Grade 5 Primary school pupils*).

Students from primary school try to say what they have experienced and told by their parents and neighbors or what they saw done by technicians. They also use information learned in elementary science and technology (Rwanda Education Board, 2015) to describe the phenomenon of lightning.

iv. Grade 9 Secondary school students

“Some local people argue that it is like a cock and used by witch doctors to kill enemies.” “The thunderstorm is formed between positive and negative sides in case of attraction. It is caused by electrons.” “A lightning is a flash of fire flashing when the rain comes because of forces of clouds attracting ones of underground and the thunder occurs.” “Lightning and thunder occur when the earth becomes positive and meets with the negative clouds in the atmosphere; it is a meeting of forces which deteriorate everything, so to prevent it we use a wire containing acid.” “It has some dangerous effects like interrupting the musical instruments which use electricity power hence causing an accident, we should use a lightning conductor because it kills a human

being (may cause people to lose their lives) and animals, it strikes plants such as trees and food crop” (*Grade 9 Secondary school students*).

v. Grade 12 Secondary school students

“A thunder happens when positive and negative charges from tree and clouds meet. It is caused by the charges of atmosphere and is having rays, and these rays are called lightning.” “Lightning is a light which comes from to the vibration of storms due to forces in the atmosphere.” “When we build a house, we use the wires made of negative charges because the earth is composed of positive while the atmosphere is composed of negative one” (*students from languages option*).

“A thunder is a naturally geographical circuit which makes sounds in the sky.” “Thunder produces heat, lightning gives light and sound that is why it is prohibited to walk without shoes during rain. It is said physically that there are two different charges, that is to say, negative and positive charges. When those charges collide, it results in a thunderstorm.” “To shelter under a tree is prohibited when it is raining because a tree has water and water has a negative charge, when those ones meet with those of the atmosphere (positive) they produce a thunder which beats to produce fire and echo sound. The thunder may decrease the population as well as the economy of a country, so to avoid its effects; we use the lightning conductor which acts as an insulator” (*students from social studies option*).

“The thunder is the cloud paddles overhead; it inductively acts on the conductor. It is a sound made by the air from the ground and that of atmosphere when they meet each other. People who suffer from a heart attack may die due to that sound and people say the person was struck by the thunder. It is a meeting of electrons, some electrons come from undergrounds (in soil) other from clouds and clouds have positive electrons (+) while soil has negative electrons (-). We get a light because of moving clouds, they move up from the ground being massive (clouds), they produce a noise and a light.” “It seems like, as clouds move, they get charged when rubbing with air. When a charged cloud is closed to the earth or when two opposite charges end of the cloud is close a very large momentary current following them”. “It destroys electrical wires and other properties like churches, tall buildings. A lightning conductor is used to safeguard structures such as buildings and towers from damage by lightning. It is a form of thick copper strip fixed on the outside the wall lifted above the highest point of the building and ending in several sharp spikes, its lower is fixed to a metal plate buried in the ground” (*students from science option*).

Though it may be difficult to describe the whole lightning phenomenon in terms of the position of electrical charges, students of secondary schools give different answers and strong ideas on thunderstorms; this may be because of the advanced level they were climbing as they discuss electrostatics since lower level secondary.

vi. Educated people

Most of the people asked are teachers of TTC Matimba, having a different career, field, and background because many of them come from different countries, they present their opinions hereafter.

“Lightning is a supernatural force used by witches and sent to harm their enemies. It is prohibited to ring some metals like spoons, needles when it is raining as they prevent from thunder striking. Clouds were attributed a sign of a good product because when presented the offerings to someone who can stop or bring the rain ‘umuvubyi’, he sent to them a heavy cloud

giving a rain so that they can cultivate and get a good harvest” (*Physical education teacher, personal communication, 2013*).

When lightning strikes a cow or a tree (*ICT teacher, personal communication, 2013*), it is needed to “purify” or “surgeon” the people or the area stricken, so that they can be able to eat meats struck by the thunder or use the firewood from the stricken tree; otherwise it will come back. Witch doctors do strike a lightning to somebody who killed, stole, raped and so on. It likes to strike ‘umuvumu’ (a kind of big tree common in Rwandan villages).

According to our tradition (*English teacher, personal communication, 2013*), lightning is dangerous and destructive. Therefore old people say: (a) people should not put on red clothes when it is raining as this attracts thunder, (b) Christians believe that if one sees lightning and says “amen” three times, he/she cannot be struck by thunder, (c) all people should sit down when it is raining and keep quiet, (d) putting on rubber shoes prevents one from being struck by lightning, (e) one should light a lamp or fire inside the house, (f) other people put metallic things outside when it is raining, for instance, a bottle, an axe, to scare away thunder, (g) when lightning strikes the cow, the owner should be happy because the cows would increase in number, however, the stricken cows are not eaten by people, rather buried.

“The thunder is the sound produced by the clouds which meet in the atmosphere when it is going to rain. When I grew up some people used to say that thunder was God showing his anger. Thunder also has a gender; it can be male or female for example if lightning strikes someone it marries him or she then takes them to heaven” (*Mathematics teacher, personal communication, 2013*).

According to an Educational foundation teacher from Uganda (*personal communication, 2013*), the most dangerous lightning is called “dry lightning” (a thunderstorm occurs without rain). It strikes everything related to electricity and when it is going to occur, it starts with a light and ends with the sound. Traditionally, thunder is associated with fear. My mother used to tell me that when thunder strikes someone, people should cheer up, and sing which implies they were considering it as a human minded, powerful man beyond our visual limits. It is only when I went to school that I learned the whole truth about thunder which is my earliest unfounded belief. At school, we learnt that thunder is a result of an electrical circuit resulting from the meeting of positive and negative charges, especially when it rains.

Science teacher (*personal communication, 2013*) said that: the thunderstorm is a naturally occurring product of Mother Nature, whose effect most often have been advanced to mankind and his environment. When it erupts in form of thunder, catastrophic events have always shown up, this always results from the unfriendly electrical interaction between thunder and electrical power lines that cause short circuiting and burning down of buildings and affects economic loss for the community.

With educated people, they give different opinions considering where they have lived, what they are told, what they feel, and the education they have attended. In educated people’s opinions, they present their worries to touch a lightning victim. This is the most terrifying of lightning myths. Imagine if someone died because people were afraid to give cardiopulmonary resuscitation (“Lightning Facts & Information,” 2010). These worries are removed by Viemeister (1961) and Prahm et al. (2013) saying that if a lightning victim is electrified, you can touch them to give them first aid and you will not be electrocuted because the human body does not store electricity. Not only Rwandans, Greek, and Roman (Viemeister (1961) perceive

that the Thunderbolts were invented by Minerva the goddess of wisdom. Subsequently, lightning which was the gods' manifestation, any spot struck by lightning was attributed as sacred ("Lightning Facts & Information," 2010) and temples often were erected at these locations where the gods were worshiped in an attempt to appease them.

vii. Old non-intellectual people and witch doctors

Old people think much about the thunderstorm, relating it to witches, they have beliefs of primitive religion and they believe in ancestors. The fact that previous respondents mentioned their perceptions of traditional thunder, the authors visited witch doctor in order to ask what they think about it. With a long talk held by witch doctor and his wife, living in Kagezi 2 sub-cell, Rwentanga cell near Nyabwishongwezi, Matimba sector in Nyagatare District, they told us a lot of things that they have traditionally experienced with their own eyes and what they know about the thunder and lightning.

The wife starts with explaining what a witch doctor is: "A witch doctor is 'umuvuzi gakondo', someone who surgeon the traditional chemicals (uburozi) and fights against anger and cruelty 'ubugome'. Witch doctors are people taking supernatural power from ancestors hereditarily. They are said to have black power. We asked her if really a thunder 'y'indogano' (poisoned lightning) exists. And she replied: "Oh yes, it exists! You see, there are people who hate others, but the cases are as rare as whoever is sent by thunder is really annoyed someone who took that decision." "Let me tell you what I have seen with my own naked eyes, (a testimony by witch doctor), in 1978 when I was 16 years old, a man called Musonera was a witch doctor, but he died in 1994. Then Sebuturo, a son of Jinja and Pascasie (mother) went to request black power (gucisha) from him. On return Sebuturo has to thank Musonera, he went and took a good black young cow from father and mother by force and gave to him. His mother got annoyed and slope somewhere in another powerful witch doctor, after only two days that black young cow was stricken among other cows, it was about 1:00 pm."

As in the visited witch doctor's home, there were many patients, one among, an old man gave another example: "One example is where a young girlfriend had a quarrel with his boyfriend and they separated, the gentleman decided to take his complaint to a witch doctor, on a daylight a girl on street walking with children was struck by the thunder, however, a little rain has first begun to rain before heating her. Interestingly, she was burned and children stayed safe! As you can be poisoned and get mad, you can also be sent thunder and die on spot." Another caretaker from Kirehe district who was around when we visited witch doctor's home told: "different kinds of witches exist as different types of poisons also exist. One is called thunder. You may be poisoned by acids and any other chemical products but witch doctors have other traditional tragedies in form of noise or abstract power. While some poisons can be swallowed, introduced through bodies, put in the way and someone on the street who is targeted steps on them, others may be sent to you and attack including the thunder burns and strikes."

While reflecting on what were perceived by previous respondents, we asked visited witch doctor's wife about surgeon where and what the thunderstruck, she said that: "when thunder struck an object in your presence, you cannot leave the place and use the stricken firewood's before purifying it and the place otherwise it stays there for a long time but I cannot prove. The stricken tree provides traditional medicaments, but do not ask how to use (... roughing), and they use a tree called 'igikakarubamba' (Aloe Vera) when the surgeon is taking place." She added; the thunder mostly strikes big trees not only 'umuvumu' and area where a reptile called 'icyugu' is located. The Thunder without water is the one sent to wrongdoers, but it comes first

a small cloud as 'you can't fire a lamp without a match'. A thunder is received by another that is why you hear one noise here and another noise occurs there respectively, but a poisoned (sent) thunder occurs once. "The fact that women use to say 'subya subya' when lightning, is just a sign of 'gutsirika' so that thunder may come weak and fails to destroy people and properties," said by witch doctor's wife (*personal communication, 2013*). "Sending a thunder to someone is because of jealousy, hate or someone has done worse to another or in society, it strikes like the one from heaven. Yeah, it is called thunder!" She added.

Lightning often strikes the same place many times, particularly if it is a tall, pointy, and isolated object (Prahm *et al.*, 2013). For instance, the Canadian National Tower, at a height of 553m, is the one of the tallest human-made, self-supporting structure in the world. While the number of flashes per year per square kilometer in Toronto is about 2, the tower actually receives many tens of lightning strikes each year (Hussein, Milewski, Janischewskyj, Noor, & Jabbar, 2007). Therefore, the appropriate diffusion of awareness on lightning protection and safety down to villages is crucial to stop the death of the human beings, livestock, and property since most of the people killed by lightning are villagers in rural areas who mostly work in open fields (Gomes & Kadir, 2011).

Conclusion and Recommendations on Safety

This study outlined various myths and concepts on lightning. The second objective was to overcome the misconceptions and give advice to people on how to prevent lightning. More misconceptions are found in old and non-educated people, even though some traces are found in schooled people, but they are overcome as they climb the school. The government of Rwanda, Rwanda meteorological agency, and media should emphasize on broadcasting radio and TVs emissions related to lightning and how to prevent it using lightning conductor on buildings, and how people should seek safe shelter in case of a strike. However, avoidance of lightning injury generally becomes an individual responsibility; therefore each person must be aware of and monitor lightning safety rules (Zimmermann, Cooper, & Holle, 2002). Although none can be entirely harmless from being struck by lightning, avoidance strategies can at least decrease risks. To be well knowledgeable about the hazards, everybody should be aware of daily local weather forecasts, the local lightning climatology, and lightning's pathways to victims, as well as harmful consequences (Prahm *et al.*, 2013). For example, people should stop swimming and get away from water oceans, beaches, lakes, and rivers, indoor or outdoor pools. However, interestingly fishes do not die because when lightning strikes, most of the electrical discharge occurs near the water's surface and most fish swim below the surface and are unaffected ("Lightning Facts & Information," 2010). Avoids being out in any open areas like sports fields, schoolyards, playgrounds, golf courses, or parking lots (Zavisa, 2000) since you are the tallest thing around, so to crouch down with your head between your knees. People should not shelter under tall objects like trees or towers because tall objects are easy targets and exposed to lightning. Carrying an umbrella during lightning is also dangerous. Put off all structures with metal on the body like jewelry, cell phones, and watches (Zimmermann *et al.*, 2002). Do not ride bicycles and drive motorcycles, do not fly any kites because it will be moving upwards and stay away from forms of metal (Prahm *et al.*, 2013). The staying off electrical appliances, TV wires, computers, metal doors, and windows as well as the plumbing, for instance, if lightning strikes the electronic device line, the strike will travel to every electronic device on the line (Zavisa, 2000).

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