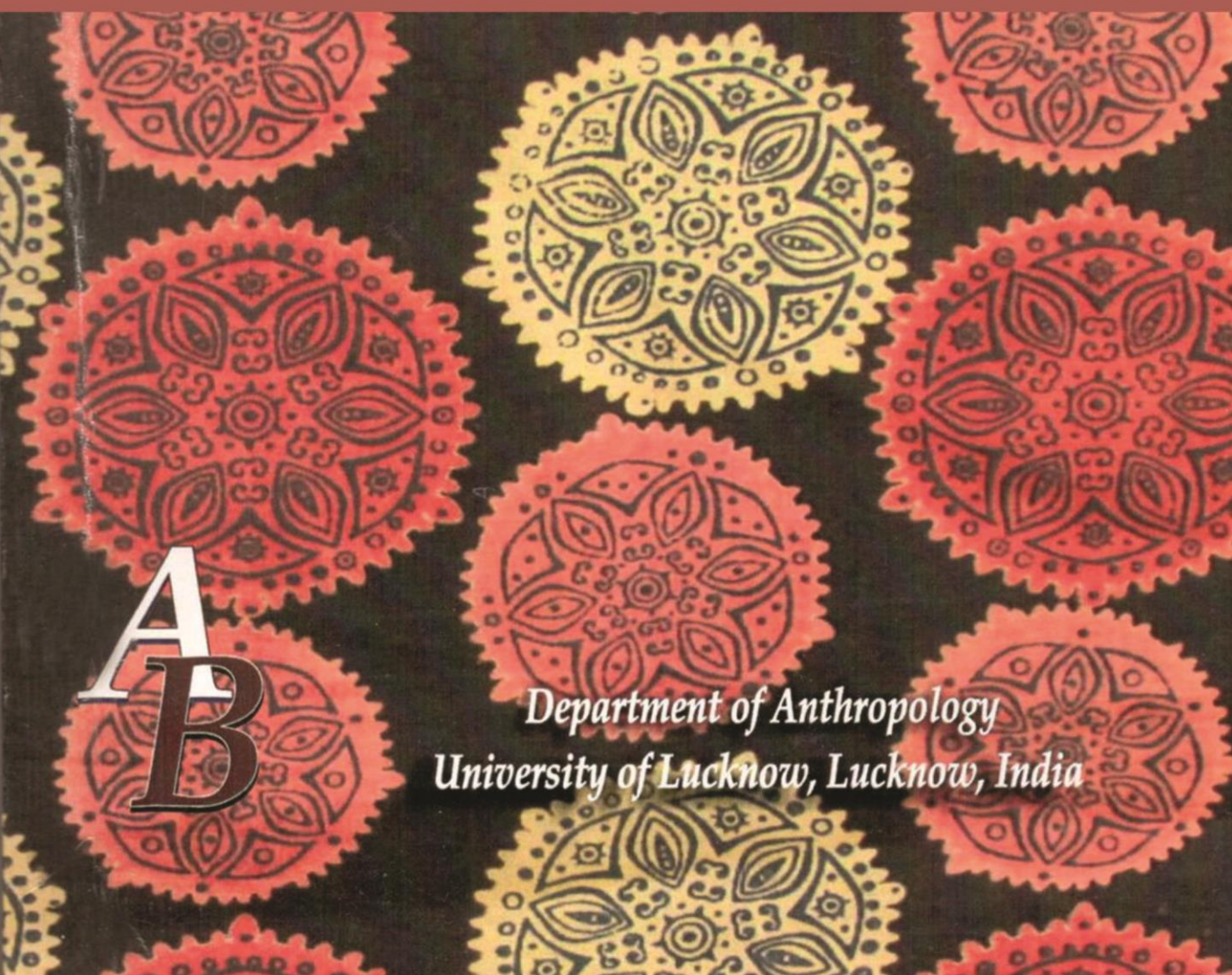


Volume 13, Issue 1
July 2019

ISSN No.:2348-4667

Anthropological *Bulletin*

a peer reviewed international journal



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*Department of Anthropology
University of Lucknow, Lucknow, India*

ANTHROPOLOGICAL BULLETIN

A peer-reviewed International Journal

Volume 13, Issue 1, July 2019.

Published by
Department of Anthropology,
University of Lucknow, Lucknow,
India – 226 007

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The Spirits and the Cosmos: Insights on the Belief System of a Himalayan Tribe

Keya Pandey¹

ABSTRACT

Cosmology is basically the study of origin of the universe and as to how the earth came into existence, how the sun got centralized in the solar system and so on. Anthropological cosmologies are based on the proposition that ideas about the cosmos are an integral part of human cultural and social systems. This paper focuses on the cosmology of the Gaddi, a transhumant tribe, living in the state of Himachal Pradesh. The paper focuses on how cosmology has been attached to the religion, how society perceives and correlates it in context of their religion and culture. The paper also highlights and explores ideas about how the Gaddi cosmology contributes to their society and culture.

Key Words: cosmology, Gaddi, universe, origin, rituals, myths, celestial world, eclipse, plants, animals

Introduction

Man as curious as he has always been had tried to find answers to the questions that came to his mind about the uniqueness of the world and the strange phenomena happening in front of him. Those questions for which he found answers, he called it science and the phenomenon totally out of his comprehensibility he kept them under religion and revered them and feared them.

Anthropological cosmologies are based on the proposition that ideas about the cosmos are integral part of human cultural and social systems. The scholars have tried to find out the relationship and interconnectivity between the myths and cosmology in different religion, different ethnic groups and different regions have got their own myths attached to cosmology, that is, to the origin of the universe, the formation of sun, moon, stars and other heavenly bodies and how these inanimate parts of the earth like- rivers, oceans, mountains and so on were formed and came into existence. Not only these, they have myths regarding the natural calamities occurring as well.

Cosmology is the study of Universe and its components. How it is formed, how it has evolved and what is its future. Cosmology comes from the Greek word 'kosmos' which according to the Shorter Oxford English dictionary means, "the world or Universe as an ordered system" or "order, harmony, a harmonious system". So cosmology means the theory of the Universe as an ordered whole and of general laws which govern it. According to

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Greek thought cosmos came out of chaos - 'the formless void: a state of utter confusion and disorder'- by differentiating the various elements the concept is often associated with cosmogony, 'a theory system account of the generation of the universe. **Edmund Leach (1971)** defined it as, "the system of beliefs and practices with social anthropologists commonly referred to as primitive religion."

In Anthropology, Hocart was an early theorist who established the idea in human existence is the procurement of life. This he claimed, is done through ritual which derives its meaning from the 'life-giving myth' discussing Vedic religious precepts and practices he state, "The participants a deliberately seeking to establish an identity between man and ritual objects, between ritual objects and the world, and so between man and the world, a kind of creative syllogism" (**Hocart, 1970**).

The most comprehensive and holistic study of cosmology is done in Anthropology which connects it as a part of human culture. In Anthropology a 'cosmology' is an analytical construct but above all it an object of study, and it can be defined a set of knowledge, beliefs, interpretations and practices of the society or culture related to explanations about the origins and evolution of the universe as well the role and meaning of humans, life, and the world, within the universe or cosmos. A 'cosmology' involves past, present and future of the society in terms on reasonability behind everything man seeks and all these are a part of Cosmo-eco-ethno genesis, and deals with the origins as well as with the finality and destiny of humans and of other forms of existence. In anthropology, the term 'cosmology' is used to refer to the set of knowledge, beliefs, interpretations and practices, and to the set of overarching cognitive and behavioral templates which are reiterated, transformed and used, by a society to comprehend, interpret, and explain its role within: humanity, life, the world (the Earth), and the cosmos.

These cosmologies have been always been attached to some values by humans which was quite sacred to them, as A. L. Kroeber (1923) says that, Values are the principles of outline and since culture is subjective order of phenomenon of nature, they exist within the 'Cosmos' and at therefore a legitimate and necessary subject of natural science investigation. Cosmology is often a commentary upon this life that is to be executed and set forth the virtues and views of the culture from the point of view of native himself. (Ruth Benedict, 1934).

Though in early times western social scientist never really think about human values related to Cosmos or have weakly gone through it in contrast with the Hindu society and its Shastra discussion of social life passages says and discusses much about significance of man's existence in the world and his relevance of being here in the materialistic world. The Hindu values are much more associated with why they are born, who they were and what will happen to them afterlife. The individual relations with the ultimate principle of the universe is the prime cause and defines his relation with other men: with his family, with the group of society in which he lives or with which he comes in contact, with his village and his country and with entire animate and inanimate creatures in the world, that is, the entire 'Cosmos'.

In trying to find the solution to the relationship of man with the 'Cosmos' **Piccardi (2005)** is of opinion that, "The 'Cosmos' affects men through the mediating effect of water, the liquid is so necessary for the existence of life on our planet. Water has strange physical prospectors that connected us intimately and permanently with cosmic forces."

As cosmos is everywhere we don't have to find it, so how can an Anthropologist be oblivious to such an integral part of man in which he has lived and is living. **Piccardi (2005)** pointed

out ".....to be subjected to the cosmic effects, man does not have to be shot into the spaces; he does not even have to leave his home. Man is always surrounded by the universe, since the universe is everywhere." The man is surrounded by this universe which has evolved to come into the present form and is still undergoing changes. Therefore, the cosmos is present everywhere physically and in words of **Paul Davis** (2003) who has described it in brief that in short everything that is physically relevant is included in the cosmos." Following the influential work of **C.Geertz** (1973), many American anthropologists began to incorporate indigenous cosmological concepts in their ethnographic studies.

Where the term cosmology is often used to refer simply to the scientific study of the universe the philosophers **Stephen Best** and **Douglas Kellner** (2001) usefully suggest that a cosmology is better seen as a set of ideas about the universe and humanity's place. Numerous commentators have reported cosmology as one of the most primitive features of recorded societies. As reflect reflexive beings with the ability to communicate through language, it seems that that the desire to theorize the way in which human beings are related to their surroundings, not just in nature but in the Cosmos as a whole is itself quite universal. As **Thomas Kuhn** has noted in his historical study of the transitions between different cosmologies that Man does not exist for long without inventing a cosmology, because a cosmology can provide him with a world view which permits and gives meaning to his every action practical and spiritual.(Kuhn 1957:6)

It is the *Engels'* (1959) concept that tells how dialectics is related to cosmology. These dialectics operates on two levels first, our observation and understandings of universe created changes in the fundamental ways in which we experience, understand and manage our social universe. But, second, through this mechanism change is affected on a much deeper level. By observing universe, people in societies have transformed themselves.

In 'Cosmos and Psych' *Tarnas* makes the point convincingly, although for the 'world view' he might better have written 'cosmology' "Our world view is not simply the way we look at the world. It reaches inward to constitute an innermost being, an outward to constitute the world. It mirrors but also reinforces and even forges the structures, armoring and possibilities of her interior life. It deeply configures are psychic and somatic experience, the patterns of our sensing, knowing, and interacting with the world."(Tarnas 2006:16)

Cosmology and the tribal world

The cosmologies of indigenous and traditional societies can invoke respect for nature and for human wellbeing, and there is often an appeal to keep a balanced coexistence between all parts of the universe, because people, ecosystems, the biosphere and cosmos are defined as being composed of common components of matter, energy and spirit. The common elements and forces are considered as shared cosmic synergies and humans must request permission and compensate for their use of resources which disrupt other beings or forces. It is not uncommon to find indigenous cultures that today still recreate cosmologies that correlate the existence of their society as part of a larger whole linked to socio- environmental contexts and to climatic, meteorological, astronomic and cosmic dimensions; which is not only a way of signifying their sense of belonging within nature, but of harnessing respect, admiration and responsibility towards it. Cosmologies, for example, are used as key references for decision-making, when indigenous tribes, for example of the Amazon rainforests (*Reichel-Dolmatoff*, 1996, 1976) use natural resources and seek to achieve sustainable use of forests; and to decide human demographic levels and bio-social synergies; and also to establish peace among and within neighboring societies. Many indigenous cosmologies have a coherent scaffolding to include human experiences in rational, spiritual, artistic, emotional and ethical manners and also to invoke an awareness to minimize negative environmental

impacts (**Reichel** 2005), however with the present accelerating social, economic, political, cultural and environmental changes due to globalization these cosmologies and the indigenous modes of life are increasingly endangered worldwide.

Also while talking about cosmology in the primitive societies, **Best and Kellner** argue that “cosmologies are not always benign, throughout the history they have been used as the basis of for establishing power and legitimizing social authority.” (**Best and Kellner** 2001: 135). As **Assman** (2003) notes, the cosmology of these societies is implicated in their architecture, ritual and hierarchy. **Auguste Comte** (1974) asserted that forms of knowledge into three distinct stages: logical, metaphysical and positive. In the first stage associated, with traditional societies, the universe is understood in the religious or mythical terms. The second stage, the metaphysical, is often seen as emerging in ancient Greece society. This introduced the idea that the universe could be understood through human reasoning. Abstract thought deducing things about the universe, could uncover mysteries. The third stage that is the positive stage mainly consisted of the scientific realm of cosmology which was based on observation.

Cosmos as envisaged by 'primitive societies' and certainly by later cosmological societies was very much experienced as a powerful subject influencing human affairs. The idea that primitive societies populated the universe with spirits are at the very least 'Special Powers' residing in things, is well established in numerous anthropological case studies (for classic example **Tylor** (1871); **Muller** (2003). **Tarnas** (2000: 16) makes a central distinction between two pre- modern Cosmos and the modern Cosmos which is too simplistic.

The Area

The area selected for the research was a village named Bundla in the Palampur district of Himachal Pradesh. It is situated in Dhauladhar ranges and Palampur was once part of the Jalandhar Kingdom. The Bundla village had a Neugyal stream and that's why several culverts were built in the village. The fresh water stream was used by the people of the village especially for cleaning and other domestic activities. There was a Vindhyavasini Devi Temple and metalled road built in the whole village and people had only Pucca house.

They are semi- pastorals or nomadic tribes and are in the business of sheep rearing mainly. But now their lifestyle has changed and they live settled life and are producing crops and are engaged in other activities for their livelihood. They belong to Hindu religion and that's why almost all their rituals and food and festivals are similar to those that of the Hindus. They trace their origin as the followers of Lord Shiva and consider themselves as Rajputs. They are sturdily built with wheatish complexion. They too have caste system as they are - Brahman, Rajput, Khatri, Thakur, Rathis and Halis, Sippis, Rehara, Bhadhi, Dom. Also they usually live in joint families.

Perceptions on the origin of the universe

According to them in the beginning there was no Earth, no water, no air, no land, no sky, no death, no immortality, completely nothing was there in the universe. In fact the existence of the universe itself didn't exist in the very beginning. This could be depicted by an '*Enchali*' sung at the beginning of the '*Nwala*'

The lord Shiva who had no shape, no beginning and no end came to consciousness. He took the form and from his parts created Lord Brahma who created the universe and Lord Vishnu, the *Prajapati*, to provide for the well being of the universe as it was quite difficult for the Brahma to administer the universe all alone. So the universe was created with the consciousness itself of the supreme power that is the Lord Shiva.

They say they have been created by the lord Shiva and they have been made stronger than the others to live in such harsh environments. It is indeed their faith that has made them live and live such a difficult life in the mountainous region.

According to the myth that is quite popular there that Goddess Parvati didn't want to marry Lord Shiva so she decided to reside in a snowy clad mountain as per the advice of her maternal uncle. The reason for her disliking for the Lord Shiva in the beginning was because of the things she had heard about him that he is scantily clad with animal skin and uses ashes of the dead to adorn himself; also he wears a garland of heads. All these things made Goddess Parvati quite abhorrent towards him and didn't want to marry him and hence all these tricks. But Lord Shiva made his way for himself and his companions to get to Goddess Parvati and marry her and in this journey in the snow clad mountains the Gaddis and their sheep made and cleared the way for the Lord Shiva's *Baraat*. That is how they were created by the Lord Shiva to guide him in the mountainous region and to make the path for him and his followers. So they consider themselves as the children of the Lord Shiva and hence have a divine origin.

Knowledge on the Celestial Bodies

They worship the celestial bodies as 'Navgrihas' on every ceremony. They consider that they bring happiness and wrath both so they should keep them happy and satisfied. They call the planet as 'grah' while the constellations as 'Nakshatra'.

The nine planets are known and together they form the 'navgrah'. These are the Sun, the Moon, Mars, Mercury, Jupiter, Venus, and Saturn, and the ascending (Rahu) and descending (Ketu) lunar nodes (which appears as Shadow Planets during Surya Grahan and Chandra Grahan).

Surya or Sun: is considered as Ravi, he too was created by the Lord Shiva to give light to this world. The connected to it is 'tvar' (Sunday) and he is offered rice.

Chandrama or Moon: it too was among the creations of the Lord Shiva and it is said that he was produced during the 'churning of the ocean' or the "Samudra Manthan" associated with the 'Svar' (Monday) and rice is offered on this day.

Mangal or Mars: has been said to be originated from the sweat of the Lord Shiva and it is the planets of war as well. It is red in colour and hence, red pulse or Masur Dal is offered to this planet. The day for this planet is 'mangal' (Tuesday).

Budha or Mercury: he is considered as the son of the chandrama and he is associated with 'budhvar' (Wednesday). Green Pulse or Moong is offered to him.

Brihaspati or Jupiter: according to the myths he was the sage for the Gods and was created by the Lord Shiva as well. The day associated with it 'Beervar' (Thursday). He is offered Chana dal.

Shukra or Venus: He is considered as the teacher of 'Asuras' or demons. He too is the creation of the Lord Shiva. The day associated with him is 'Hukkar' or (Friday) and he is offered Wheat.

Shani or Saturn: he is considered to be the son of the surya or the sun and he is considered the Lord of hard work. The day associated with him is 'Sanichar' (Saturday). He is offered 'mah ki dal'.

Besides these 'Rahu' and 'Ketu' too are there who are associated with the solar and lunar eclipse. None of the planets are considered bad and every planetary motion has an effect on the man as well on the animals, that is, on all the locomotive beings of this universe. In fact on the universe itself these planets have their influence. The planetary motion is different for different being. It has been decided by the birth and can be forecasted by making a kundali which is in tabular form. Although none of the planets are considered as Bad for anyone but there are a few planets which when at the wrong position do have bad implications on the future of the person, they are Rahu, Ketu Shani and Surya when placed at the 4th 7th 8th or 12th position in the house in the Kundali.

Constellations do play a major role in deciding the birth the behaviour the nature of the person according to their position at the time of the birth. There are 28 nakshatras which come once a month. A person has 4 stages of Nakshatra in his whole life time though they do not affect much on the life of the people. They are mainly used for knowing the 'tithi' and for getting the notion of auspicious time or inauspicious time for starting a new work or marriage or important ceremonies.

The sun or the Surya has been considered of the Divine origin by the Lord Shiva to give light so did the moon or Chandra from the 'Samudra Manthan' or the churning of the ocean. Both influence the activity of the people there and help in telling the approximate timings.

It is said that in the past the Gaddis while traveling used to gauge the approximate time from the shadow of the sun during day times while on the move. The day assigned to the Surya is 'Tvar' or Sunday and he is offered rice according to his color and so is the Chandra offered but it's day is 'Svar'. Also the waxing and waning of the moon is considered and the 'Amavasya' (new moon) is considered inauspicious while the 'Purnima' is considered auspicious amongst them.

Notion of eclipses

Both solar and lunar eclipses are considered inauspicious amongst the Gaddis and certain taboos are followed like pregnant women do not go out during the eclipse and people give alms to the poor or the lower caste people. They also keep some share of food grain outside their houses so that the lower caste people or the poor people could take that the sun or the moon could get rid of the debt which according to them had been taken from a lower caste person and because of which these eclipses fall. They follow all the abstinence as performed by the Hindus.

The Gaddis do not touch the Gods or worship them and after the occurrence of the eclipse they purify the whole house and the place of worship with the water of Ganga. As pregnant women are more susceptible to evil spirits according to them they are supposed to abstain from activities like cutting vegetables and stitching clothes etc.

Relation with seasons

There are mainly three seasons in the region that are winters called as 'Hyund', summers called 'garimi' and rainy season called as 'Barsala'. Though none of the Seasons are considered inauspicious but rainy season is considered as a bad one because of the landslides and downpour of the rain which might cause several accidents on the road side as well. At the time of such natural calamities people often perform Yajnas and Hawans and worship God to pacify as according to them all these happen because of some misdeeds of the people. Also rainy season makes them and their cattle more vulnerable for the diseases.

There are special festivals that are celebrated in some special Seasons like in winter Lohri is celebrated to commemorate the sowing of the Rabi crop and to celebrate the coming of long days in the Himalayan region. It is observed the night before Makar Sankranti, also known as *Maghi*, and according to the solar part of the lunisolar *Vikram Samvnt*. The Gaddi people make bonfire, dance and eat on this day and make Dham.

In summers they celebrate 'Sair' on the 'sakanr'. It is celebrated to mark the end of the crop harvest and also the rakhi thread are removed and offered to the mother *Sairi*. The walnut and sweets are also offered to relatives and villagers with best wishes. Kheda is also organized for the children near the Panchayat Bhawan for 8-9 days. People dance and sing merrily and 'Kangri Dham' is given on each day of the Kheda.

In rainy season 'Patrodu' is celebrated in which the leaves of Arvi or Kachaloo leaves are fried after putting up a coat of Besan or gram flour on them along with this Bhabru is also made.

The another festival in the rainy season is 'Chirnu' in which the insects of the cattles are burnt so that they would not be afflicted with any disease and remain healthy as for them their cattle is their wealth and rainy comes with lots of insects and diseases.

Relation with the plants

They worship tulsi, peepal and banana trees. Besides this in the marriage ceremonies Panch Pallav or twigs from five sacred trees are worshipped. Many forest trees are considered to be abode of spirits. 'Tutelary spirits are supposed to dwell in large ancient trees'. Banbirs or the spirits of forests live in deodar, lime, fig, kainth, simbal, pomegranate and walnut trees. Bar tree is considered holy. The basis of worship in certain cases is in the utility of the concerned trees.

They worship peepal on Saturdays as according to the myth goddess Lakshmi and lord Vishnu reside in the Peepal tree every Saturday and they bless those who worship the tree on that day. It is also worshipped on the 'Hariali Teej' by the women for long lived of their husbands and well being of the children.

Tulsi is worshipped on every day. There is no specific day assigned for worshipping her. According to the myth there amongst Sippis Tulsi was born in a low caste house but she had been given the boon of being worshipped by all the high caste people.

Drub grass is considered pious. They are two kinds of drub grass one is called as 'Kusha' and the other one is called as 'Druv'. The Kusha is uprooted only once a year on a special 'tithi' that according to the myth, comes on the days before an 'Amavasya' or new moon of Bhadrupad, that is, the black month, the 'Dain Mas' takes place in a place near Janinder Nagar in Himachal Pradesh itself in which the battle between the demons and Gods takes place. This is evidenced by the turning of the green grass in just a night into a plain field and all the area is being seen destroyed. So this Kusha grass is uprooted on the nest day of the 'Dain Mas', that is, on the day of 'Drabya Mas'. It is the only day in the whole year on which this grass is uprooted and then it is preserved for the rest of the year.

Also for getting good agricultural yield a goat is sometimes sacrificed without due propitiation the earth is regarded as infertile. Before beginning to construct a house, the earth god is propitiated with a sacrifice. Legend points to the prevalence of human sacrifice in former times. When building a fort or palace, the chosen person was buried alive beneath the

foundations to ensure stability. But with the passage of time this has been stopped even incidences of sacrificing the animals have been reduced.

Relation with the animals

They live in harmony with animals and they take great care of them as well. They consider cow as holy. They sacrifice sheep on Nvala. Also they believe that spirits dwell in every creature so they should keep them good fed and satisfied as they would get their blessings.

Nvala

Initially Nvala was celebrated when the Gaddi has more than 8 pairs of sheep and he used to wish in front of the Lord Shiva that he will sacrifice after the 9th pair (180) sheep. The sheep was named from the birth in the name of Lord Shiva and was raised for more 4-5 years before sacrificing it. Then it when it was sacrificed, it was taken in front of the lord and if it shivered it meant the lord has accepted the 'Prasad' if not then the sheep won't be sacrificed at all. After sacrificing the sheep they dance for the whole night singing songs in the praise of the Lord Shiva and dancing throughout the night which is divided into 3-4 sessions. 'Dham' is then offered to the Lord and distributed amongst the people. But now- a-days Nvala is celebrated on every occasion whenever a wish is fulfilled.

They also worship 'Nag' devta though there is no special 'Naga cult' there. They worship him in form of symbol attached to the Lord Shiva. The symbol in the form of a stone was found in one or two houses that were placed separately outside the houses. There is no myth behind worshipping the Naga except its attachment to the Lord Shiva. Although two to three families believe that the Nag had come in the Devi avatar on the top of the mountains when requested by a Gaddi.

They do care a lot about their animals that is why they celebrate 'Chirnu' in rainy season in during which a lot of animals get afflicted with insects and these kinds of diseases related to insects and other infections. So in this festival the insects of the cattle are burnt in fire with the prayer to the Lord to keep them healthy and disease free. After burning the insects and doing worship they enjoy with food and give their cattle good food and fodder too.

Relation with the months

They consider month as the 12 months according to Vikram Samvant as followed by the Hindus. They too follow the same. The native names for the months:

January - pau February- Magh March - Faagad April- Chaittar May - Baisakh June - Jeth July - Had August - Haud September - Haunj October - Kati November - Manger December - Bhadru.

They think all the months are good but Bhadru or Bhadruad is known as the 'Black month' as in it no new work is started, no new clothes are purchased and no marriages takes place. In this month the ancestral worship is done and lamp is being lit everyday in all the houses. As according to a myth the Battle of Mahabharata took place in this month and there was no house from which not a blood was shed and hence the people commemorate them and their ancestors and lit the lamp everyday throughout the whole month. People even visit the 'Shamshan Ghat' and to lit the lamps or 'dia' there and offer food to the ancestors. They also give 'pind daan'.

Along with the Vikram samvant or the Hindi calender they also follow the Roman calendar and they use 'Patra' or 'Panchang' for seeing the Vikram samvant or the Hindi calendar. The calamities mostly occur from July to October, that is, from 'Had' to 'Kati', which coincides with the rainy season.

The special festivals that are celebrated on the seasons are-

Bisu (Baisakhi): when they enjoy pindris (flour cakes of bhrais) with ghee and honey.

Patroru: 1st of Bhadon or Bhadrapad of the Vikrami month when patrorus made of kachaloo or Arvi leaves are relished.

Sair: (1st day of Vikrami month of Asauj), an occasion to prepare babrus of leavened wheat flour

Bahori (Lohri): when khichri is the special dish

Relation with weeks

They have seven days in week just like the English days of the week but have their native names for them and that are-

Sunday - Tvar

Monday - Svar

Tuesday - Mangal

Wednesday - Budhvar

Thursday - Birvar

Friday - Hukkar

Saturday - Sanichar

It has been told that every day of the week is associated with some or the other planets like-
Sunday – Tvar – surya (sun) (considered as the creation of the Lord Shiva)

Monday – Svar- Chandra (moon) (considered as the creation of the Lord Shiva and it is said that he was produced during the ‘churning of the ocean’ or the “Samudra Manthan”)

Tuesday – Mangal – Mangal (Mars) (originated from the sweat of the Lord Shiva and it is the planets of war as well and is red in colour) Wednesday – Budhvar – Budh (Mercury) (he is considered as the son of Chandra)

Thursday – Birvar- Brihaspati (Jupiter) (he is considered as the ‘Guru’ or the teacher of Gods)

Friday – Hukkar- Shukra (Venus) (he is said to be the teacher or ‘Guru’ of ‘Asuras’ or demons)

Saturday – Sanichar – Shani (Saturn) (he is considered as the son of ‘Surya’ or the Sun)

Also each day has its own colour and that is why different coloured grains or pulses are offered on different days of the week like-

Sunday- rice or white coloured things

Monday – rice or white coloured things

Tuesday – masur dal or red coloured things

Wednesday – Mong dal or green coloured thing

Thursday- Chana dal or yellow coloured things

Friday- wheat or wheatish coloured things

Saturday- Mah ki dal or black coloured things

In the similar manner they have some or the other rituals attached to the days of weeks and auspicious and inauspicious time.

CONCLUSION

They believe that Universe was created by Lord Shiva and that rest other things like humans, animals, water bodies and other biotic and abiotic components of life have been created by him only. They consider Shiva as the “destroyer” as well as the “creator”. They do not have any scientific basis for the theory in which they believe in but they live rather harmoniously with the nature and respect each and every life. They also believe in having some sort of

spirit in every living creature. Also, they worship the planets in the similar manner as in the Hindu traditions. They also have various myths related to the cosmological phenomenon which had been passing on from one generation to another orally.

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Role and Liability of Intermediaries in Cases of Defamation in Cyberspace: An Analysis

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ABSTRACT

Cyberspace is a concept describing a widespread, interconnected digital technology. It refers to the virtual computer world, and more specifically, is an electronic medium used to form a global computer network to facilitate online communication. Cyberspace allows users to share information, interact, swap ideas, play games, engage in discussions or social forums, conduct business and create intuitive media, among many other activities. The rise of the internet and social media has led to an increase in instances of defamation in cyberspace. Although it seems that the user and the host are exchanging material via the Internet, no transaction is really completed between the two parties alone. Every Internet transaction involves a number of middlemen, and there may be more than two people involved. Intermediaries such as internet service providers, hosting services, and social media platforms play a crucial role in facilitating online communication. This article will examine the role and liability of intermediaries in cases of defamation in cyberspace in India. It will analyze the relevant legal provisions, including the Information Technology Act 2000 and the Intermediaries Guidelines Rules 2011, and the judicial decisions that have shaped the legal framework.

KEYWORDS- Cyberspace, Intermediary, Defamation, Internet, Information Technology Act

I. INTRODUCTION

The probability of utilising the internet as a platform for the transmission of defamatory material has multiplied with the exponential expansion in the use of the internet as a communication tool, necessitating a clear, straightforward interpretation of the law in this area. Although it seems that the user and the host are exchanging material via the Internet,

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no transaction is really completed between the two parties alone. Every Internet transaction involves a number of middlemen, and there may be more than two people involved.³

As "the glue" that holds the internet together and enables third parties to connect across the network, ISPs are the first people that come to a lawman's mind when the topic of responsibility arises. The Internet service provider is mostly responsible for "transmitting or broadcasting third-party content" without taking the initiative or having any input into the choice to disseminate a particular piece of content. Any individual who offers electronic access to information services is referred to as a network service provider.⁴ The primary duties of Internet service providers include building and hosting websites, managing and hosting mailing lists, and providing email services. ISPs are also in charge of offering protection against illegitimate users.

II. ROLE OF INTERMEDIARIES IN CYBERSPACE DEFAMATION

The problematic topic of system operators' liability complicates the Internet defamation legislation. The publisher of the material may also be held liable in defamation law for broadcast and print media, such as the author of a libellous newspaper post. This is occasionally the case. There are strong precedents for deciding who is liable for defamatory claims in conventional media, and the principle of holding publishers accountable for libellous information in these media has been carefully tested and established in court. On the internet, though, these matters are much more ambiguous.⁵

The biggest problem with cybercrimes on social networking sites is how to hold these service providers accountable for any offences committed there. The definition of an intermediary and its purpose must be examined before any blame can be placed on them. A network service provider known as an intermediary may also publish or transport information. In addition to serving as a crucial connection in the transmission, distribution, and publication of information on the World Wide Web, an intermediary provides an interactive wired world.

The intermediary shall include, in respect of specific electronic documentation, any person who gathers, stores or transmits those records or performs some service in relation to that record on behalf of another person. Intermediaries can be classified as information carriers who simply transmit the electronic message without scrutinising it, such as airtel.in; information publishers who publish as well as transmit the information, such as google.com; or information sellers who publish, transmit, and sell the information or product while also exercising reasonable care in its publication.

When there is the transmission of unlawful content, the topic of liability of such intermediaries arises, and such culpability is twofold: civil and criminal.⁶ "Social networking sites like Facebook.com, Myspace.net, Youtube.com, and blogging platforms like Twitter.com" post their own original content as well as third-party content that is uploaded by third parties on the website that serves as a platform for these service providers' websites. It is possible to hold intermediaries accountable for "copyright breaches, trademark infringement/dilution, privacy violations, obscenity, defamation, child pornography,

³Chris Reed, Chap 2 "From Each According to his Ability: Actors and Activities in the Internet World" in *Internet Law: Text and Materials* 24 (Cambridge University Press, 2004).

⁴ Nakul Sharma, "Information Technology Law and Practice" 186 (Universal Law Publishing co. Pvt. Ltd., Delhi, 2005).

⁵Prof. Y.R. Bhatnagar & Abhilasha Bhatnagar, "Online Defamation: A Comparative Analysis and evaluating the responsibility of the Internet Service Providers in the Indian Legal framework" 6 *International Journal of Advances in Engineering Research (IJAER)* 2013.

⁶Ernst-Jan Louwers & Prof. Corien E.J. Prens, Vol 2, *International Computer Law*, 65 (Lexis Nexis, 2004).

spamming, etc., if they act as a facilitator of third-party information, data, or communication links". Injunctions to ban or delete the offensive information, as well as civil and criminal procedures, may be brought against the intermediaries.⁷

Internet service providers serve as evidence in cases when crimes are perpetrated using either a computer as a tool or as a victim. Furthermore, any information pertaining to the emails, location, phone number, and Internet service provider address of the accused's computer can be collected from the ISP in order to take the proper action against the offender. ISPs provide email accounts that are enabled and set up for "3 POP and IMAP". When an "Internet connection is available", you may check your email using these Web-based GUI email addresses from any place and any computer. Finding an available email account when moving to a new place might be challenging.

The main issue in assessing the responsibility of ISPs and computer system operators is their knowledge of or control over the material supplied by them. Levels of obligation for publishers, distributors, common carriers, etc. varied even before the Internet Age.⁸ There is a very slight distinction between the numerous operations that ISPs are involved in. "The role of an access provider, software distributor, host, cache, or content provider can all be handled by an ISP". Since mobile content exists in a borderless environment, these online intermediaries, including ISPs, are primarily liable for content that is transmitted and frequently violates the rights of individuals arising from a contractual relationship or is simply a tort or a criminal offence, such as defamation, copyright infringement, child pornography, fraudulent misrepresentation, privacy, etc.

The intermediary, whose computer network the information is processed, posted, or written on, "shall act within 36 hours and, where appropriate, shall work with the user or owner of the information to deactivate the information" that is in violation of these rules. The intermediary shall obtain knowledge of the information by himself or shall be informed of such information "by the person concerned in writing or by email signed with an electronic signature". The intermediary must also keep these data for at least 90 days in case an inquiry is needed.⁹

III. LIABILITY OF ONLINE INTERMEDIARIES

There is no disagreement that the creator of such a posting should suffer legal repercussions, with the exception of the debate over whether persons who publish defamatory statements while engaged in a flame war should have a legal defence. The issue of how far internet service operators should be held accountable for statements that appear on their platforms, similar to conventional publishers, is more contentious.¹⁰ Whether a court views a third party as a "publisher," "distributor," or "common carrier" determines whether the third party is liable for defamation. Publishers are often responsible for the material they publish since it is assumed that they have some kind of control over it. Given that it is assumed that a distributor has no control over the information it disseminates, a distributor may only be held accountable for the information it disseminates if it is made aware of the information's nature and any claimed legal issues it may have caused and takes no action. A common carrier is a company that provides services to everyone without discrimination. As

⁷Nikita Barman, "Legal Implications of Cyber Crimes on Social Networking Websites" 5 International Journal of Scientific and Research Publications, 315(2015).

⁸Sharon K. Black, *Telecommunications Law in the Internet Age* 419(Morgan Kaufmann Publishers,2002).

⁹Dr.J.P. MISHRA, *An Introduction to Cyber Law* 67(Central Law Publications, Allahabad,2nd edition,2014).

¹⁰IAN J. LLOYD, *Information Technology Law*,554(Oxford University Press,5th edition-2011).

a result, they are required to transport all material and are therefore exempt from liability for the information they carry or send.¹¹

There are two types of service provider responsibility for defamation: publisher liability and distributor liability. Each case's liability parameters are treated separately since they vary.

1. "Liability as a distributor of Defamatory material"

"Defamation" is regarded as a tort as well as a crime in most of the legal systems of the world, as harming the reputation and prestige of a person makes the wrongdoer equally liable for harm to a person's body. A person's personal reputation is carefully guarded by legislation. Like most other illegal activity, defamation also received an increase and the crime rate went up just like electrons became the dominant means of information dissemination, whether health or incriminating.¹²

The judiciary might determine the role of internet intermediaries in defamatory issues and assign appropriate responsibility. "**Cubby Inc. v. CompuServe Inc.**¹³(CompuServe), a landmark decision on the subject, the court determined that CompuServe, as an online intermediary, was a distributor of the Rumorville publication, which they carried as part of their Journalism Forum, and thus was not liable for the defamatory statement against the plaintiff that appeared in Rumorville". The outcome was based on the First Amendment provisions which absolved the distributor for the defamatory contents if he had no knowledge of it. Though, it was decided in **Cianci v. New Times Publishing Co.**¹⁴ that ordinarily "one who repeats or otherwise republishes defamatory matter is subject to liability as if he had originally published it" yet in several other decisions¹⁵, additionally, it was decided that distributors, book stores, and libraries are not responsible if they are unaware of the offensive material.

In **Smith v. California**,¹⁶ the court overturned an ordinance that held a bookstore liable for possessing "an obscene book, regardless of whether the shopkeeper was aware of the contents". The court regarded this provision as trying to achieve the impossible because a bookseller is neither expected nor he is capable of reading each and every book in his shop. "When CompuServe carries the publication as part of a forum that is managed by a different company, it has absolutely no editorial control over the contents". This is analogous to the librarian of a public library or a bookseller who has nothing to do with the editorial job of the books in his possession. "A computerised database is thus, functionally equivalent of a librarian or a news vendor" and hence, to put a greater liability on an online distributor as CompuServe is nothing but hampering the free flow of information which is against the letter and spirit of the First Amendment.

The "plaintiff failing to establish that CompuServe had knowledge, or had reason to know" (as required by the First Amendment) that Rumorville statement had some defamatory element; allowed the court to rightly reach the conclusion that CompuServe was

¹¹Robert Dunne, *Computers and the Law: An Introduction to the Basic Legal Principles And their Application in Cyberspace*, 83 (Cambridge University Press, 1st edition-2009)

¹²Dr. Talat Fatima, *CYBERCRIMES* 51 (Eastern Book Company, 1st edition, 2011)

¹³776 F Supp 135 (SDNY 1991).

¹⁴639 F 2d 54, 61 (2d Cir 1980).

¹⁵*Lerman v. Chuckleberry Publishing Inc.*, 521 F Supp 228, 235 (SDNY 1981); *Macaluso v. Mondadori Publishing Co.*, 527 F Supp 1017, 1019 (EDNY 1981).

¹⁶361 US 147, 152-53 (1959).

the distributor without knowledge of the contents and was hence, not liable. It is thus obvious that as CompuServe neither installed any such electronic gadget of scrutiny nor made arrangements of censorship, his job is restricted to that of a distributor editorial powers and so far as the law provisions go, he is not under obligation to pre-censorship of contents. He is thus rightly absolved from liability.

2. "Liability as a publisher of Defamatory material"

Here, the publisher, who is reviewing and editing the content to be published, is responsible before the law if such content damages someone's reputation. A judicial pronouncement of the Internet Age in "**Stratton Oakmont Inc. v. Prodigy Services Co.**¹⁷(Prodigy)", takes into consideration role of technology in the matter of censorship. "The plaintiffs, Stratton Oakmont Inc., a securities investment banking firm brought an action of defamation against Prodigy, the operator and owner of the computer network on which the defamatory statements appeared".

Prodigy had around "two million subscribers who communicate with each other on his bulletin board Money Talk on which the said statement appeared and members can publish statements on stocks, investments, and other financial topics" on the bulletin board, which is the biggest in the US. "Prodigy contracts with bulletin board leaders who participate in board discussions and also take promotional efforts to encourage usage and increase users". The entire matter revolved around one question and that is whether Prodigy, involved in above activities, is a publisher.

It was shown in the course of the proceedings that Prodigy himself held out that he did exercise editorial power over its contents and this surely draws the distinction between CompuServe and Prodigy. "Prodigy exercised this control through its automatic software screening program, and the guidelines which board leaders were made to follow". Constantly using "technology" as well as "manpower" to erase notes on the basis of offensive and "bad taste" from their computer bulletin boards, they assumed the role of a publisher. Thus, here the precautionary measures, both technical and manual, taken by the defendants to give to its subscribers healthy and pure information, entrenched him in the liability for defamation when such content offended against the plaintiff's reputation while all such restriction even spoke against the freedom of expression.

Perhaps this was one big reason when soon after Prodigy verdict, Congress came up with a covering piece of legislation vide 47 USC Section 230(c)(1)¹⁸ which provided immunity to the ISPs and states. Any provider or consumer of a digital software shall not be regarded as author of any information conveyed by some other provider of information content.

The wordings clearly indicate that the aim of the legislation is to remove the hurdle in the way of free flow of information by imposition of censorship, etc. by the service providers and also to allow the service providers to work in an atmosphere without being apprehensive about the consequent liabilities which may arise from an incriminating content transmitted by an originator. The provision contains the word "publisher" so as to avoid any controversy in future regarding the role of service providers in such situation.

IV. INDIAN PERSPECTIVE OF LIABILITY OF INTERNET SERVICE PROVIDERS (ISPS)

The internet is a relatively new medium that enables everyone to communicate a significant amount of information virtually without geographical or time restrictions.

¹⁷ 23 Media L Rep 1794 (NY Sup Ct 1995).

¹⁸ Added by Communication Decency Act, 1996, S.509, & Pub. L. No. 104-104, 110 Stat. 137, 137-39 (1996).

Practically speaking, this chance is accessible without specialised technological skills.¹⁹ The great potential for the spread of unlawful content is made possible by modern internet and telecommunications technology. According to the categories of the content, liability might relate to many different kinds of content and pose various difficulties.²⁰ Defamatory and libellous content are the most notable types of violations that arise when information is disseminated online.

INDIAN LEGAL PROVISIONS RELATING TO LIABILITY OF INTERNET SERVICE PROVIDERS (ISPS)

The only law in India that specifically refers to the regulation of ISP liability is the IT Act, 2000. The legislation has undergone a significant transformation, expanding the scope of service providers' responsibility, clarifying their legal responsibilities, and limiting and configuring their exemptions. "The IT (Amendment) Act, 2008 (10 of 2009), features a slew of new sections related to the responsibility of the intermediaries" and their legal accountability.²¹ Chapter XII comprising Section 79 has been replaced and the term intermediaries is redefined. "Apart from the IT Act, 2000, rules made by the Central Government and the guidelines issued by the Telecom Department also circumscribe such liability within the legal framework when at the time of issuing the licence to provide service, the ISPs are not only bound to follow the guidelines but they are also to abide by the security conditions of the licensor, i.e. the Government of India". All these provisions specify the ISPs' responsibility exemptions.

"Section 79 of the I.T. Act, 2000 (Information Technology Act, 2000) deals with the Network Service Providers Liability". "The explanation given in this section provides that Network Service Providers means an Intermediary". "According to Section 2 (w) of the IT Act- defines Intermediary, with regard to any specific electronic message 'refers to a person who receives or transmits and stores on behalf of another person or record or provides any service with respect to that message or electronic record'".²¹

Following this, the section specifies that the word includes computer cafés, electronic banking websites, internet trade websites, online marketplaces, and web hosting providers, in addition to network providers, web service providers.²² "This list is non-exhaustive and Section 2(1)(w)²³ also covers entities such as social media websites, blogging platforms, message boards, consumer review websites and so on". This means that, in accordance with

¹⁹ Pablo Baistrocchi, "Liability of Internet Service Providers in EU Directive on Electronic Commerce" 19 Santa Clara Computer and High Technology Law Journal 12 (2018).

²⁰ Lilian Edwards, Role and Responsibility of Internet Intermediaries in the field of Copyright and related Rights (2018), available at: https://eprint.ncl.ac.uk/file_store/production/257356/20EDB711-6EB2-4D63-9E5D-25C951E08167.pdf

²¹ An 'intermediary' has been defined in Section 2(w) of the IT Act as "any person who on behalf of another person receives, stores or transmits that record or provides any service with respect to that record and includes telecom service providers, web-hosting service providers, search engines, online payment sites, online auction sites, online market places and cyber cafes".

²² Smt. Jyothi Vishwanath & Srinivas C Palakonda, Legal Scenario Relating to the Role and Responsibility of the Internet Service Providers in India: An Assessment, available at: <https://www.doccity.com/en/legal-scenario-relating-to-role-and-responsibility/4486586/>

²³ Section 2(1)(w) reads: "Intermediary, with respect to any particular electronic records, means any person who on behalf of another person receives, stores or transmits that record or provides any service with respect to that record and includes telecom service providers, network service providers, Internet service providers, web-hosting service providers, search engines, online payment sites, online-auction sites, online-market places and cyber cafes."

"Section 2(1)(w) of the IT Act, almost any website that hosts user-generated material and has a significant number of Internet service providers meets the criteria of an intermediary".

According to Article 19 of UDHR's 2013 report titled "Internet Intermediaries: Dilemma of Liability"²⁴, three general models of intermediary liability have arisen internationally as a result of these conflicting perspectives. These are:

(1) The strict liability model: User-generated content is subject to absolute liability for intermediaries. In order to comply with the law, intermediaries must monitor material to a sufficient degree; if they fail to do so, they may lose their business licence or face other legal repercussions. China and Thailand are two examples.

(2) The safe-harbour model: If intermediaries adhere to specific legal standards, they are granted conditional exemption from liability stemming from user-generated material.

"This model can be further divided into":

(a) "The vertical model": Depending on the kind of content in question, liability is decided. There are no differences made between the types of services that intermediaries offer, such as hosting vs transmitting.

(b) The horizontal model: Depending on the type of function the intermediary performs, liability is decided. Thus, intermediaries functioning just as content transmitters may be completely protected from responsibility, but intermediaries serving as hosts may be subject to stricter regulations. If the latter do not promptly delete illegal information after being told, they risk losing their immunity. The "notice-and-removal protocols, which are legally required procedures that specify how content takedown requests must be received and handled by intermediaries", are another characteristic of the safe-harbour paradigm. To further stop the dissemination of illegal information, intermediaries may be urged to use technology-based or self-regulatory content filters. This type of intermediary regulation is used by the "Indian IT Act, the US Digital Millennium Copyright Act, and the EU e-commerce Directive".

(3) The broad immunity model: The exemption from responsibility for user-generated content that is granted to intermediaries is generally wide and occasionally conditional. Notably, intermediaries are explicitly released from any responsibility to check for illegal information. Instead of treating intermediaries as content providers, this model views them as messengers who only transfer material on behalf of users. The Communications Decency Act's Section 230 serves as an illustration of this approach.²⁵

Almost all legislative frameworks governing Internet intermediaries, regardless of the model, require intermediaries to take down illegal content from their platforms when requested to do so in compliance with existing legal procedures. "Regulators and intermediaries alike must be aware of the impact of their actions on freedom of expression, which is a fundamental human right recognised under almost all major national and international jurisdictions". This is because "freedom of expression is a fundamental human right" and immunity from liability is only available under some regulatory regimes if takedown requests are complied with quickly.

²⁴Internet intermediaries: Dilemma of Liability, available at: https://www.article19.org/data/files/Intermediaries_ENGLISH.pdf

²⁵Intermediary Liability 2.0: A Shifting Paradigm, 7(SFLC.in, New Delhi ,India)available at : https://sflc.in/sites/default/files/reports/Intermediary_Liability_2_0_-_A_Shifting_Paradigm.pdf.

The freedom of expression will be negatively impacted by regulators who impose ambiguous content restrictions, “ask intermediaries to remove content based on their own judgement while running the risk of losing safe-harbour protection” for failure to do so, and intermediaries who overly comply with takedown requests. According to Google's transparency reports, the amount of material removal requests from governments has sharply increased in recent years. In the second half of 2016, Google received 15,961 such requests, a fifteen-fold increase from the “1,031 such requests it received in the second half of 2009”.²⁶

“Section 79 is currently the provision that guarantees safe-harbour protection to intermediaries for third party content”. “Section 79 of the original Act only protected network service providers²⁷ from liability arising from third party content, if they proved absence of knowledge; or positive application of due diligence on their part to prevent commission of an offence/ contravention”.²⁸

As previously stated, internet intermediaries that host defamatory information are likewise subject to content responsibility. In the year since the Supreme Court issued its key decision in the matter of *Shreya Singhal v Union of India*, there are various open problems surrounding the accountability of intermediaries for online material until the Central Government issues a new set of Intermediary Guidelines.

“Section 79 (Clause1) of the IT Act exempts internet intermediaries like Facebook and Google from liability for defamatory information on their websites”. “It does, however, condition such exemption on either

- (1) The intermediary just playing a technical, mechanical function, or
- (2) The intermediary not intervening with the content in any way, such as starting or amending”.

While the new amendment does not shift the presumption of evidence from the accused to the complainant, it does make it easier for the accused to defend their actions in the incident by claiming that they acted in good faith and met the requirements of “Section 79 of the Act and Rule 3 of the IT Rules, 2011”. Despite the fact that ISPs are not technically accountable for publishing and transmitting defamatory content, they are routinely named as defendants in defamation lawsuits due to their larger financial resources.²⁹

The issue emerges, however, when private intermediaries “receive complaints regarding content” and are compelled to make judicial judgements as to the legality of material and to remove defamatory content upon acquiring “actual knowledge” of such content on their

²⁶ Google, Government Requests to Remove Content, Google Transparency Report, available at: <https://transparencyreport.google.com/government-removals/overview?hl=en>

²⁷ According to the previous Section 79 of the IT Act, network service providers meant - ‘intermediaries’ as defined under the Act

²⁸ Sec. 79 - Network service providers not to be liable in certain cases: For the removal of doubts, it is hereby declared that no person providing any service as a network service provider shall be liable under this Act, rules or regulations made thereunder for any third party information or data made available by him if he proves that the offence or contravention was committed without his knowledge or that he had exercised all due diligence to prevent the commission of such offence or contravention.

Explanation. –For the purposes of this section, – (a) “network service provider” means an intermediary; (b) “third party information” means any information dealt with by a network service provider in his capacity as an intermediary

²⁹ Vivek Kumar Verma “Cyber Defamation & liabilities of Internet Service Providers (ISPs) and Intermediary in India & UK”, available at: <https://indiancaselaws.files.wordpress.com/2014/04/cyber-defamation-liabilities-of-internet-service-providers-isps-and-intermediary.pdf>

websites. "Clause 3 of Section 79, as well as Rule 3 (4) of the Information Technology (Intermediary Guidelines) Rules of 2011", require this. According to a research done by the Centre for Society and Internet, intermediaries are ill-equipped to determine the legality of information and will err on the side of caution, often eliminating perfectly lawful content.³⁰

Furthermore, the requirement of "actual knowledge" was not established or defined under the IT Act, creating confusion about when intermediaries were required to delete such potentially defamatory information. Was it, for example, mandatory that they remove content if a single private individual complained about it? In *Shreya Singhal*³¹, the Supreme Court held unequivocally that "actual notice" amounted to nothing less than a court order, lifting this responsibility from intermediaries. They also stated that Rule 3 (2) of the Intermediary Guidelines should not be interpreted to limit expression beyond what is permitted for in Article 19 (2) of the Constitution.

By virtue of "Section 79 Clause 2 (c) read with Section 87 Clause 2 (zg) of the IT Act, the Central Government is entitled to issue a new set of Intermediary Guidelines". "In light of the *Shreya Singhal* decision, a new set of guidelines followed:

- (a) establish a 'notice and notice' regime for defamation cases,
- (b) align the language of Rule 3 (2) Intermediary Guidelines with Article 19 (2) of the Constitution, and
- (c) include additional safeguards to ensure the transparency and accountability of all content that is removed".

The conventional "Notice and Takedown policy is giving way to a Notice and Notice" approach. The initial regime mandated by "Clause 3 of Section 79 and Rule 3 (4) of the Intermediary Guidelines obliged intermediaries to remove content upon notification", giving rise to the "notice and takedown regime".

"In *Shreya Singhal* case, the Supreme Court has consistently explained that no limit imposed, either through court order or even by government regulation, must be greater than the reasonable restrictions provided in Article 19 (2) of the Constitution". "Rule 3 (2) of the Intermediary Guidelines vicariously censors users beyond what Article 19 (2) of the Constitution permits by requiring intermediaries to publish agreements that make it unlawful for users to upload, modify, transmit or publish content that, among other things;- is extremely offensive, insulting, sacrilegious, slanderous, lewd, immoral, pedophile, libelous, intrusive of the privacy of others, hateful or racist, ethically unacceptable, disgusting, involving or promoting money laundering or gambling, or even unlawful in some manner whatsoever (Rule 3(2)(b))". "Rule 3 (2) of the Intermediary Guidelines has been severely criticised by several groups including, but not limited to; the Centre for Internet and Society, Software Freedom Law Centre and the Centre for Communication Governance, for being excessively wide and exceeding the ambit of Article 19 (2)".

"In light of the discussion in *Shreya Singhal* on Section 66 of the IT Act, and the brief discussion on Section 79, it is clear that any newly promulgated Intermediary Guidelines will have to be limit the scope of Rule 3 (2) to the existing framework provided by Article 19 (2) of the Constitution". Given the significant revisions required to make "Rule 3 (2) and Rule 3 (4) in accordance with *Shreya Singhal*, the

³⁰ Rishabh Dara, *Intermediary Liability in India: Chilling Effects on Free Expression on the Internet*, Centre for Internet & Society, Bangalore (2011), available at: <http://cisindia.org/internet-governance/intermediary-liability-in-india.pdf>.

³¹ [(2015) 5 SCC 1]

purpose of new guidelines should be to promote the openness of the whole takedown process”.

“The following inferences can be drawn to broadly sum-up India’s Intermediary Liability law: (a) Intermediaries need to fulfil the conditions under Section 79 of the IT Act as discussed above (conditional safe-harbour);

(b) Intermediaries are required to comply with all requirements listed under the Intermediaries Guidelines (due diligence rules); and

(c) Intermediaries, other than enforcing their own terms and conditions and privacy policies, are liable to take down content from their platforms only when notified by a court or an authorised government agency and that too for matters listed under Article 19(2) of the Constitution (the actual knowledge requirement)”.

“The Manila Norms, recently adopted by the United Nations Special Rapporteur on Freedom of Expression”, are fostering global agreement on intermediary responsibility principles. “Any re-promulgation of the Intermediary Guidelines should build on them and provide an effective right to be heard before content is removed”. “Furthermore, court orders for takedown should specify how long content should be removed for, and intermediaries should explicitly disclose when content has been removed when users attempt to access such content”.³²

The Manila Principles are a collection of rules describing the precautions that must be applied to intermediary responsibility in all legal frameworks. A collection of digital rights activists and civil society organisations spearheaded the paper during “Rights Con, South East Asia, a multi-stakeholder conference held in Manila, Philippines in 2015”. “In line with the International Covenant on Civil and Political Rights (ICCPR), Universal Declaration of Human Rights (UDHR), also the UN Guiding Principles on Human Rights and Business, the primary function of the Manila Principles is to accelerate the development of interoperable and harmonized liability regimes that can encourage innovation while respecting the rights of users”.

The six broad principles are as:³³

- (1) The intermediaries should be protected from third-party content liability by law.
- (2) Content should not be “restricted without an order from a legal authority”.
- (3) “Content restriction requests must be clear, unambiguous and must follow the due process of law”.
- (4) “Laws and content limiting orders and procedures must conform with the necessity and proportionality tests”.
- (5) Laws and policies and practices relating to content restrictions must respect due process of law.
- (6) Accountability and Transparency “must be built into laws and policies and practices” to restrict content. By offering Internet intermediaries safe harbour protection conferred by “section 79 of the IT Act, India can be said to conform with the first of these principles (Intermediaries must be protected from third party content liability by law)”. The protection

³²Indian defamation law and regulation of online content, vol. 1 Law & Policy Brief 2(2015), available at: http://www.jgls.edu.in/wp-content/uploads/2019/03/law-and-policy-brief_nov-2015-issue-11.pdf

³³ Manila Principles on Intermediary Liability, available at: <https://www.manilaprinciples.org/>

enjoyed by intermediaries is, “of course, conditional, and there is uncertainty in the legislation that makes compliance difficult”, but immunity is nonetheless provided for by the law.

V. INDIAN JUDICIAL APPROACH TOWARDS INTERMEDIARY LIABILITY IN INDIA

Google India v. Visaka Industries³⁴- Visaka Industries has been involved in the production of cement and other related products for asbestos. On 21st November 2008, Gopala Krishnan published an article on a webpage hosted by Google entitled "Poisoning the System; Hindustan Times". The cited article listed many politicians who had been eventually discovered not to have any relation with Visaka Industries management. Again, an article published in July 2008 entitled "Visaka Asbestos Industries Make Gains" included defamatory remarks against the corporation made available via Google to the global audience. Google was fined under Sections 120-B³⁵, 500³⁶, and 501³⁷ of the Indian Penal Code for hosting certain articles as an intermediary.

Google argued that through offering a forum for end-users to upload material, it operated purely as an intermediary, and thus had not published the articles as necessary for liability for defamation. It is contended that Section 79 of the amended Information Technology Act was the epitome of this principle and hence Google could not be held liable. Although Andhra Pradesh 's State High Court accepted that the amended Information Technology Act broadened the protection of intermediaries to crimes under the Indian Penal Code, the court ruled that Google could not demand immunity under section 79 because it did not delete the material promptly once it had received notification of it, as specified by section 79(3). Google is currently appealing this case to the Supreme Court.

Vyakti Vikas Kendra & Others v. Jitender Bagga & Google³⁸ This case, often known as the 'Art of Living' case, is an illustration of how vulnerable public personalities in India are to internet defamation. The Vyakti Vikas Kendra, India Public Charitable Trust was established to encourage and support the Art of Living Foundation of India's spiritual, educational, and developmental initiatives. It is a humanitarian and educational organisation run entirely by volunteers. The Trust filed a defamation claim against Mr. Jitender Bagga for allegedly posting writings that were obscene and disrespectful to the proprietor of the Art of Living Foundation, Sri Sri Ravi Shanker, as well as against Google for broadcasting the challenged content on its website www.blogger.com. The Trust has requested Rs. 5,09,00,000 in damages as well as everlasting and mandatory injunctions against the site.

The court relied on “section 79(3)(b)”, which requires intermediaries to delete unlawful content if actual knowledge is obtained. “Rule 3(4) of the Intermediary Guidelines” further requires libellous data to be destroyed within 36 hours. “Rule 3(3) and Rule 3(2)” also require an intermediary to exercise due diligence on content that is clearly harmful, defamatory, libellous, or otherwise prohibited. The court ordered the removal of the content from www.blogger.com under these terms, “as well as all links containing defamatory content, within 36 hours of becoming aware of the Court's order”.

VI. CONCLUSION

³⁴Google India Pvt. Ltd. v. Visaka Industries 2009 Criminal Petition 7207 of 2009 (India).

³⁵ Indian Penal Code Section 120-B (punishment for criminal conspiracy.)

³⁶ Indian Penal Code Section 500 (punishment for defamation.)

³⁷Indian Penal Code Section 501 (printing or engraving matters known to be defamatory).

³⁸Vyakti Vikas Kendra & Others v. Jitender Bagga & Google, CS (OS) No. 1340/2012, (2012) Delhi High Court (India).

The role and liability of intermediaries in cases of defamation in cyber space is a complex issue that has been widely debated in legal and academic circles. "Intermediaries, such as internet service providers (ISPs) and social media platforms", play a crucial role in facilitating online communication, but they also face a unique set of legal challenges when it comes to defamation. The main issue is whether "intermediaries should be held liable for defamatory content that is posted by third-party users on their platforms". On one hand, some argue that "intermediaries should be held liable for defamatory content" in order to provide victims with a means of redress and to deter intermediaries from hosting defamatory content. On the other hand, others argue that intermediaries should not be held liable for defamatory content because they are not the creators of the content and should not be held responsible for the actions of their users. The question of intermediary liability in cases of defamation in cyberspace is further complicated by the fact that different legal jurisdictions have adopted different approaches to this issue. The problems of jurisdiction, anonymity and flow of data, amongst other, could continue to intensify. The duty of our courts to decipher the technological features of the Internet and to devise well-established precedents cannot be overlooked. For the future, the need to engage in discussions to consider codifying digital defamation in a specific Act may be critical to jettisoning trivial claims, avoiding huge court backlogs, addressing and balancing conflicting interests of freedom of expression and reputation damage as well as addressing online jurisdiction and anonymity challenges among others. In fact, international collaboration may need to be pursued to protect the credibility of the global networking infrastructure in order to resolve cross-border jurisdictional problems and potential global internet concerns.

List of Abbreviations

- EU- European Union
- ICCPR - International Covenant on Civil and Political Rights
- IPC -Indian Penal Code
- ISPS-Internet Service Providers
- IT ACT - Information Technology Act
- UDHR - Universal Declaration of Human Rights
- US- United States

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Debate against separate law on Muslim Men over Triple Talaq

Shirin Abbas*

ABSTRACT

Laws in India have been subjected to judicial reviews whenever the needs have arisen but then there were laws which did not have legal binding, instead had cultural basis, and post-Independence status quo was maintained. State interventions, in order to put a check on the misuse of marital rights, have framed a new legal framework against an alleged malpractice among Muslims, Triple Talaq or Talaq e Biddat. The Indian government was of view that exercising the right to instantly divorce the woman in marriage, as has been followed in Muslims, was a malpractice and is tantamount to desertion of women and issues too. According to Muslim Law, the marriage can be dissolved through a process known as Triple Talaq, in which the husband can grant his wife a divorce by saying Talaq three times in a row. It is not necessary for the wife to be there; a valid excuse is not necessary. The term "Talaq" refers to the husband's rejection of the marriage under Islamic law. Since ancient times, Triple Talaq has been a common practice in the Islamic world as in India. Triple Talaq should be prohibited in light of the aforementioned. In addition to being against the letter of the Constitution and un-Quranic, it is also unjust and inhuman. After getting divorced, a woman may find herself homeless the next day, abandoned with no one to help her raise her kids, or she may suffer permanent trauma that makes it difficult to recover from the shock. The Indian government responded by taking action against Triple Talaq when, in a judgment on Prakash and Others v. Phulavati and Others in October 2016, Judge Anil R Dave and Justice Adarsh Kumar Goel noted that Muslim women face prejudice. This paper happens to be an academic inquiry into this subject of high significance that still awaits its consequences in the years to come. The findings show that despite the jolt in terms of authority and control which Muslim men enjoyed earlier, the application of law has been suggestive largely. This paper explores existing laws and draws its conclusion on their basis, surmising that a new legislation on the same was not necessary. Existing laws could have been cited in support and used to protect the rights of Muslim women. It draws largely from interviews with Legal Luminaries and Rights experts like Dr. Salman Khursheed and Flavia Agnes who agree that a new law on the subject was more a propaganda measure than an effort to deliver justice to Muslim women.

Keywords: Law, Muslim, Women, Triple Talaq, Quran

Introduction:

The Triple Talaq Bill issue as a whole has to be examined through the lens of intersectionality, based on the petitions submitted by Sharaya Bano and other petitioners as

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well as the Supreme Court's *suo moto* PIL. According to this PIL, the Indian Constitution's protections for women's rights are violated by some Islamic personal laws that promote gender discrimination.

From the outside, the entire *Triple Talaq* controversy appears to be a conflict between tradition and modernity. It is neither rational nor acceptable to categorize people's experiences into simplistic categories because Muslim women are largely products of the very power dynamics that keep them in submissive positions.

The author addresses the issue of *Triple Talaq* in light of the recent Supreme Court petition that sought to invalidate *Triple Talaq*. It considers the effects of such a measure, would it come to pass, the laws already in place that preclude the need for new legislation, as well as the views of legal experts and progressive Islamic scholars on the matter.

Background

In the Shayara Bano case, the Supreme Court of India, which was composed of a five-judge constitution bench, issued a major decision in the history of *Triple Talaq* by outlawing the practice. Muslim *Triple Talaq* practice in India was declared unconstitutional and abolished by a 3:2 majority. In front of two witnesses, Shayara Bano (the wife) contested the *talaqnama* that her husband had handed to her. She argued that the divorce should be declared *invalid ab initio* before the Supreme Court, on the claim that it breaches her fundamental rights (Shayara Bano petition). Following this, the Muslim Women (Protection of Rights on Marriage) Bill, 2017 was introduced in the Lok Sabha. This Bill makes instant *Triple Talaq* or *Talaq-e-Biddat* a punishable offence. It follows the Supreme Court judgment on August 22, 2017 in the case of Shayara Bano vs. Union of India.

The apex court set aside instant *Talaq* as a "*manifestly arbitrary*" practice. It also said,

"Given the fact that *Triple Talaq* is instant and irrevocable, it is obvious that any attempt at reconciliation between the husband and wife by two arbiters from their families, which is essential to save the marital tie, cannot ever take place."

The Muslim Women (Protection of Rights on Marriage) Second Ordinance, 2019 (Agnes 2017) was reportedly signed by the then President Ram Nath Kovind. The disputed *Triple Talaq* ordinance has been reissued with approval from the cabinet as well. The Rajya Sabha is now debating the *Talaq-e-Biddat* Prohibition Bill, which was approved by the Lok Sabha. A man serving time in prison for divorcing his wife, according to Opposition parties and local authorities, is "*legally impossible*." According to the government, Muslim women are treated fairly and equally (Soman, 2016)

The Muslim Women (Protection of Rights on Marriage) Ordinance, 2019, states that immediate *Triple Talaq* divorces are invalid, illegal, and subject to a three-year prison sentence for the husband. The Rajya Sabha was considering an earlier measure to alter the prior ordinance, which was published in September 2018. A new ordinance was released because the previous one failed to receive parliamentary approval.

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The woman upon whom *Talaq* is pronounced will have to receive an allowance from her husband, and she retains custody of her children.

Clauses 5 and 6 of the Bill say,

" A married Muslim woman upon whom *Talaq* is pronounced, shall be entitled to receive from her husband such amount of subsistence allowance for her and dependent children," and "shall be entitled to custody of her minor children in the event of pronouncement of *Talaq* by her husband."

The Law Minister, Mr. Ravi Shankar Prasad, in the statement of objects and reasons attached to the Bill has said the law will,

"help in ensuring the larger Constitutional goals of gender justice and gender equality of married Muslim women and help sub serve their fundamental rights of non-discrimination and empowerment."

The Bill's usage of the term "*sustenance allowance*" just makes matters worse. Today, a married woman is legally entitled to an equal share of the family's assets and the right to live in the home (matrimonial residence) without fear of abuse.

Feminists all over India and abroad are hailing the move to grant a Muslim woman right over her children as a welcome initiative since Muslim Personal Law has so far been in the news for all the wrong reasons and suspected of denying Muslim women the right over the custody of their children beyond a certain age. This is a fallacy. In almost all custody battles, courts are bound by one principle alone which is the best interest of the child – especially if he/she is a minor and in most cases the courts decide that the best interest of the child lies with the mother. A Muslim couple is governed by the Guardians and Wards Act of 1890. In any case, when the marriage is intact, where is the question of deciding custody? The very words "*sustenance allowance*" and "*child custody*" convey that the marriage has been dissolved after the utterance of the words *Talaq* thrice, a position which is contrary to the Supreme Court verdict.

As has been believed since the beginning of time, the Supreme Court's decision to declare *Triple Talaq* invalid essentially means that the pronouncement of a *Triple Talaq* in one go is treated as a single *Talaq* as such, but the man would still have the opportunity to retract it or pronounce it again during the *iddat* period. Nothing else is different. Given the situation, it is absurd to hold someone criminally responsible for an action that has no corresponding legal repercussions.

Even if it were decided as a matter of policy that some type of deterrent was necessary, it could have been accomplished without using criminal responsibility. Comparing this to other crimes is pointless because there is always a penalty associated with them, but thanks to the Supreme Court's ruling, there is no penalty associated with saying the word "*Talaq*" three times in a row.

Good public policy dictates that criminal law should not intrude on citizens' private affairs unless there is a compelling reason, such physical assault. There are numerous domestic abuse grounds that can lead to divorce, but they almost never warrant legal action.

The Reality:

According to Census 2011 data on Indians' marital status, among all divorced women the percentage of Muslim women is 23.3 percent and 68 percent among Hindus, respectively. Census 2011 also reveals that 5.5 out of every 1,000 Hindu couples are likely to split up, including instances when wives are left behind/ deserted by their husbands. As a result, there are 7.3 legal divorces and separations for every 1,000 women among Hindus. This highlights the fact that the divorce and separation rates among Hindus are significantly higher than those among Muslims. Just 5.63 out of every thousand Muslim women were separated or abandoned as per the 2011 census, and *Triple Talaq* and easy divorce were both factors responsible for the same. (Qasmi, 2017).

The contentious discussions around the *Triple Talaq* problem present the stereotyped image of a Muslim woman who has been wronged, abandoned by her husband, and who needs protectionist measures. The fact is that women per se in India, in both cultures Hindus and Muslims, face this issue on a regular basis. This fact has largely gone unnoticed. It has been implied that Muslim women are the only ones who experience domestic abuse and desertion. She seems to have that particular status, distinguishing herself from all of her other sisters who are also victims of spousal abuse, due to her projection as a victim of an antiquated system, her alienation from her faith and the society she belongs to and the burden of restrictive personal rules. (Agnes, 2018)

An Insight on Talaq under Muslim Law

The two types of divorce recognized by Muslim law are judicial and extrajudicial. The latter includes the husband's declaration of divorce, his wife's divorce initiative, and divorce by consent of both parties. An uncontested divorce may be classified as *Talaq al-Sunna*, or "authorized," if it is carried out in accordance with the guidelines [set by the Prophet], or *Talaq al-Bid'at*, or "new" or "unapproved." Although reconciliation between the spouses is conceivable, "approved" divorce implies that the husband must wait three months after the first (single) use of the word *Talaq*. When a divorce is "unapproved," the marriage is deemed to have been irrevocably dissolved as soon as the spouse used the "Triple Talaq" procedure and there is no hope of reconciliation...

When the word "*Talaq*" is uttered for the last and final third time at the end of *iddat* it becomes final, though even without the third time, *Talaq* becomes final when *iddat* expires. The only difference between utterances of *Talaq* once and three times is that the couple is free to remarry in case of the latter but not in case of the former. The triple instantaneous *Talaq* is – or was – essentially the word "*Talaq*" uttered three times but said at one sitting instead of over three months. So, essentially the only difference was that the husband would have denied himself the right to take it back or indeed to remarry the ex-wife after *iddat*. For the woman there was no real difference so long as the husband's obligation of the *iddat* period was observed, as they must.

With the advancement of new technology in recent years, there have been several transformations in the Indian tradition under discussion. Traditional behaviours are not leveled by technological advancement; rather, it encourages their continuation or even abuse, as in the example of the Muslim "divorce formula," a warped version of modernization. In accordance with Sharia law, husbands must say the word "*Talaq*" in front of witnesses or at the very least in the presence of a wife.

At the same time, there are many instances of males sending their partners texts that read "*Talaq, Talaq, Talaq*" or similar messages through messenger apps like WhatsApp, Skype, etc. So, during the past ten years (2007–2017), the Muslim Movement of India has documented numerous examples of such a "high-tech" divorce, as a result of which women with children were abruptly found shown the door.

According to writer, scholar and international gender issues Asma Barlas, when Muslims assert that divorce under Islam is easy and offers many "privileges" for males, they frequently either don't comprehend or disregard the teachings of the Qur'an. According to Barlas, if men took this matter seriously, going through a divorce would be one of their toughest tests. (Barlas 2013)

Thus, there is no evidence against *Talaq* in and of itself or the entire Islamic system of matrimony and divorce, as stated by Justice Rohinton Nariman (one of the five judges of the bench on *Triple Talaq*) as "astonishingly modern". The learned judge clearly had in mind that "contrary to the widely believed fact, Islam provides for a woman's right to seek *Talaq* by delegation, *Khula* or dissolution of marriage, *fask* or annulment, *mubaraat* or dissolution by

mutual consent. Besides for the marriage itself the woman has a right to *meher* or consideration to give her consent. The *nikahnama* (marriage contract) is integral to the wedding ceremony and is signed by witnesses in addition to the parties." (SC Judgment, 2017)

Thus, there is no evidence against *Talaq* in and of itself or the entire Islamic system of matrimony and divorce, as stated by Justice Rohinton Nariman (one of the five judges of the bench on *Triple Talaq*)

"Ironically the present legislation is titled the Muslim Women (Protection of Rights on Marriage) Bill 2017. The real intent is clearly to chip away at Personal Laws to bring in the Uniform Civil Code. Under the same circumstances, the punishment to a Hindu male is only one year, so it smacks of a communal agenda in the guise of gender justice. Also, what about the rights of the woman and her maintenance and that of her family during the three-year period?" says Salman Khurshid, special counsel to the Supreme Court on the *Triple Talaq* case.

Is there a rationale for a new law?

"The conceptualization of intersectionality works best where we can better acknowledge and ground the difference among us and negotiate the means by which these differences will find expression in constructing group politics." (Kimberley, 1991)

Mass media has long been a propaganda tool with its heavy "reliance on market forces, internalized assumptions, and self-censorship, [...] without significant over coercion." It is said to "manufacture consent" by a process of repeatedly presenting particular topics in a specific way. As a result, the media contributes to racial stereotypes and beliefs being established in society. (Herman and Chomsky, 1988)

The arguments are "apparently naturalized representations of events and situations [...] which have racist premises and propositions inscribed in them as a set of unquestioned assumptions" (Hall, 2003). The minds of the public are thus, in Hall's own words, "impregnated with unconscious racism" towards Muslims and Islam.

There is a belief that the reality of a woman's religion and culture must be disregarded in order to advance women's emancipation. Though she resides inside the two and must construct her identity between those two realities of her religion and culture, doing so would reduce the fight for her rights to a myth. Women must therefore learn to define themselves and fight for their rights while living in the religious and cultural cocoon that serves as their environment.

Flavia Agnes, human rights' lawyer is of the opinion that

"Demonizing Muslim men has been an important political plank for the Modi government. The *Triple Talaq* Bill fits in perfectly with it. The Muslim Personal law Board has risen up in arms against the Bill calling it an infringement of the personal laws of Muslims, a liberty granted to them under the Constitution of India. It is ironic that a government which pledges support to the concept of a Uniform Civil Code, instead of strengthening an existing law which secures the rights of Muslim women, is proposing to place them under a special statute meant only for Muslim women in order to gain political mileage." (Agnes, 2018)

The Bill is ostensibly in support of women's rights and gender equality, and as such, it cannot be contested on the grounds that it violates the human rights of Muslim men, even if on closer inspection, that is precisely what the Bill is about..

Due to the fact that Muslim women themselves requested it, it has been made to appear as though the Bill represents their interests. Some Muslim women, like Shayara Bano, Ishrat Jahan, Aafreen, Farah Faiz, Zakia Soman, Noor Jehan, and members of their organization, the Bharatiya Muslim Mahila Andolan, have undoubtedly welcomed this Bill (BMMA). Jahan recently joined BJP among them. Rashtrawadi Muslim Mahila Sangh, which is linked with the RSS, is presided over by Faiz, an intervener in the *Triple Talaq* case. Bano recently received assistance from the UP Finance Minister and earlier in Pune from BJP leaders, despite the fact that she is engaged in a judicial struggle to obtain custody of her children. These have evolved into symbols for the governing part.

The co-founders of BMMA – Zakia Soman and Noorjehan Safia Niaz in their letter to the Prime Minister in December 2015, had requested the codification of Muslim family law. They had identified instant *Triple Talaq* and polygamy as issues requiring most urgent attention outweighing worries about poverty, illiteracy, and marginalization. They had requested a new law in order to assist these ladies rather than utilizing current legal procedures. The claim made at the time was that women are too poor to approach the court. How will the same women navigate the complex criminal justice system now? (Soman and Niaz, 2015)

Rationale of the clerics:

Under the same circumstances, the punishment to a Hindu male is only one year, so it smacks of a communal agenda in the guise of gender justice. Also, what about the rights of the woman and her maintenance and that of her family during the three-year period?

Dr. Kalbe Sadiq, senior Shia cleric and Vice President of the All India Muslim Personal Law Board, stated:

"Triple Talaq is non-existent among the Shia community. There are very clear guidelines and procedures laid down for divorce under Shia Islamic Laws. The issue is not relevant to the Shia sect of Muslims." Says Flavia Agnes, Human Rights' lawyer:

"The Triple Talaq Bill fits in perfectly with it. The Muslim Personal law Board has risen up in arms against the Bill calling it an infringement of the personal laws of Muslims, a liberty granted to them under the Constitution of India."

It is ironic that a government which pledges support to the concept of a Uniform Civil Code, instead of strengthening an existing law which secures the rights of Muslim women, is proposing to place them under a special statute meant only for Muslim women in order to gain political mileage.

Detrimental Impact of Introducing 'Criminality'

Since the Supreme Court's ruling, saying "*Talaq*" three times does not end a marriage, but saying it will result in criminal proceedings being brought against the husband. A furious husband will either announce *Talaq* in the prescribed form during a 90-day period or, as Hindu husbands do, simply desert her, leaving her high and dry.

The Protection of Women from Domestic Violence Act was passed in 2005 to safeguard all women's rights and give them the ability to assert their rights even when a marriage is still in existence. Women of all religions are included by this law. A Uniform Civil Law applies here. Under this statute, there is already a well-oiled machine in place.

Ironically, a government that publicly supports the idea of a Unified Civil Code is seeking to include Muslim women under a separate statute intended specifically for Muslim women. This was done in order to advance its political interests, rather than enhancing an existing legislation that protects their rights. During the Lok Sabha debates, this statute was not brought up. The very idea that strict laws will serve as a deterrent has serious flaws. In instances of dowry killings, rape, or child sex abuse, it has not been successful. In what ways

will it serve as a deterrence in *Triple Talaq* situations? What demand will follow if the spouses are released on bond after their initial detention and the trials drag on for years—immediate justice by public flogging?

According to Flavia Agnes, the accounts of the exploitation and prejudice of Gudiya (1999) and Imrana (2005) are given more credence than the agency of those Muslim women who have fought for justice in the courts. Muslim women's '*backwardness*' always finds a cultural equivalent, but not an educational or economic one. There aren't many analogies made in light of their marginalization. Muslim women's diverse experiences, like those of women of other religions, are influenced by their class, geography, and sect. (Agnes, 2016)

One of the most famous cases cited are that of Gudiya who was married to Arif in 1999, some ten days before her husband was called on sapper duty to Kargil. After the war Arif failed to return and was declared a deserter. However it was later disclosed that he had been taken a prisoner of war by the Pakistani authorities and was actually in Pakistan. By the time he could return back to his native village after 6 years, Gudiya had been remarried by her relatives to Taufiq in 2003 and carrying the latter's child. When the story was picked up by the media and Gudiya questioned, she averred that she wanted to live with her first husband Arif. Islamic scholars worked to annul her 2nd marriage as she had not taken divorce from Arif. Gudiya and Arif were finally reunited at the behest of Islamic scholars and the village council. Tariq approached the court to get Gudiya back but the council ruled in favour of Arif, and Gudiya was made to live with Arif. Arif accepted her on condition that when the baby was old enough, Gudiya would send him back to Tariq. However Gudiya developed anaemia and suffered a miscarriage. She also developed septicemia and 15 months after returning to Arif succumbed to her ailments at the Army research and Referral Hospital in Delhi. Gudiya passed away in December 2006. A famous film on her life, *Ek Guidiya ki Kahani* has documented her story (Times of India online, 2006). The film maker Prabhakar Shukla has gone on record saying:

"Gudiya died due to excessive mental trauma that led to multiple organ failure . Her death is the most tragic part of the entire episode and the film questions why it happened to her." (Kumar, 2006).

Regarding the *Talaq* conundrum, the two incidents mentioned above are frequently discussed. The proposed law's addition of the "*criminality*" dimension to interpersonal interactions would be harmful to Muslim women since it opens the door for further manipulation. The unintended consequence of these rules could be an increase in Muslim women's reliance on Jamaat or Sharia Courts if the civil court processes become more complex due to the "*criminality*" component. (Agnes, 2017)

The Sharia court was established as a valid arbitrator, mediator, negotiator, and conciliator of family and civil disputes and was not at odds with the secular judiciary in India's family law system in 2014 when the Supreme Court recognized these religious adjudication bodies as "alternative dispute resolution" (ADR) forums (Chakrabarty and Ghosh, 2017). Is criminalizing the "*utterance*" of words that have been declared void by the law a good way to ensure gender justice? A strong gap between the procedural difficulties of civil law and local systems for justice may be further exacerbated by this strict Bill.

Survey results on Muslim women's opinions of Personal Law reforms in Maharashtra were stunning. According to the Bharatiya Muslim Mahila Andolan (BMMA), one of the petitioners in the Supreme Court challenging *Triple Talaq* restriction on the improper use of immediate *Triple Talaq* was requested by more than 90 per cent of those polled. Their study, *Seeking Justice Within Family: A National Study on Muslim Women's Views on Reforms in Muslim Personal Law*, revealed the socio-economic vulnerability of the women who spoke out against *Talaq*.

Another crucial aspect is that it draws attention to the internalized collective struggle of women and the creation of a gender-inclusive understanding of Islam among the oppressed. Muslim women did not speak up for change in the 1985 Shah Bano case as a group seeking justice. In many regions of India in 2017, their opinions have become more formally arranged. They can be identified by the current administration as both resisters and negotiators; this transformation must be addressed. (Sur, 2018)

Furthermore, despite the fact that it was obvious that the woman had experienced open cruelty, including dowry demands and abandonment, the PIL makes no reference of the Protection of Women from Domestic Violence Act, 2005. The aforementioned act contains a number of provisions that make it easier to administer justice, especially in light of the particulars and circumstances of this case. (Tiwari, 2017)

It is significant to note that the Muslim Personal Law Board's defensive stances and misunderstanding of the progressive legal advancements available to women of all religions, including Muslims, have contributed to the perception in the community that we are fighting against "them." As usual, such a division will be harmful to women since it eliminates the practical reality of women from the battle between the oppressed and the civilized. It is unknown whether enforcing criminal responsibility and outlawing *Triple Talaq* can solve their issues.

Even when the subject of their rights is brought up, it is impossible to deny that the elevated voices pose as messiahs who will free these women from the oppressive, dictatorial, and stereotyped limitations of their society. However, do the Muslim women themselves seek that as a substitute? Thus, the entire topic of "*women's rights*" is distorted to suit various political objectives. Instead of finding answers that are in line with their religious and societal demands, it proposes solutions that force individuals to rebel against the culture around them rather than resolving the dispute amicably.

The Hindutva authorities are out to denigrate Islam in order to portray a marginalized group while ignoring their own persecution of Muslim women. On the other hand, the Ulema of All India Muslim Personal Law Board are intended to safeguard Muslim patriarchy and keep its dominance among the predominantly uneducated population of Indian Muslims.

The Muslim community, like all communities, is not gender-based; women, the helpless victims of *Triple Talaq*, and the violent men who pronounce *Triple Talaq* are all a member of the same composite group that is being driven more and further into a survival-or-suffering situation. They are politically voiceless. They haven't experienced economic growth. They have a ghettoized life on the fringes of society. (Tiwari, 2017)

Instances brought to light before the media seem to intertwine Muslim identity with gender subjugation and repression. As such the petition has brought Muslim women to a crossroad where their rights can only be assured through a confrontation with their religious identity. Taking cue from Third Wave Feminism the identity of Muslim women must be understood at the intersection of gender and religion.

The question remains, however, as to whether outlawing *Triple Talaq* would truly help Muslim women's circumstances in any way. The Muslim lady would only be pitted against her close family and society as a result. It has to be seen if the lady, who most likely already leads a subordinate life in society, is willing to engage in this conflict. Thus, it is necessary to comprehend how the Muslim woman's subjectivity is produced within the societal norms that she must adhere to. Since she must exist within the same social framework, we cannot separate her identity from it. She cannot be separated from her Muslim identity because it is an integral part of her identity and an intrinsic part of who she is.

The only positive to come out of this entire argument is the maturation of Indian Muslim women who have been thrust to the centrestage and are no longer content to watch helplessly as others write their futures. In a male-dominated culture that is rife with racists and hypocrites, this doubly disenfranchised minority inside a minority is finally making an effort to assert itself and find its place.

With excerpts from interviews with and writings by:

- Mr. Salman Khurshid Special Counsel for the Supreme Court on the Triple Talaq Bill
- Ms. Flavia Agnes Noted Women's Right lawyer
- Islamic Scholar Late Dr. Kalbe Sadiq

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Social Media Addiction as a Mental Health Concern among Adolescents and Young Adults

Shadab Ahmad Quadri*

ABSTRACT

Research in social media has discovered a connection between social media use and mental health conditions like sadness, stress and anxiety. Excessive use of social media is reported to have exacerbated issues with mental health. Anxiety and depression are conceptualized as two significant mental health outcomes. Spending time on social media can have a favourable impact on the area of mental health; on the other hand it could also have adverse effects too. Since current research is largely cross-sectional in nature it doesn't use analytical methods to look at how people change over time. Recently, a very popular habit of scrolling has entered the disorder diasporas since the American Psychological Association (APA) already has some predefined guidelines for the same. Knowing the key concern areas and identifying the immediate causes of mental health situations invoked by social media may be helpful in designing dedicated therapeutic measures for those affected by it. This paper is aimed at identifying how social media affects the mental health of individuals, with a special emphasis on anxiety and depression among the individuals exposed to social media.

Keywords: Social Media, Mental Health, Anxiety, Depression, Scrolling

Background:

The human species is a sociable animal. To prosper in life, we require the company of others, and the quality of our relationships has a significant bearing on both our mental health and enjoyment. Social interaction with others has been shown to reduce stress, anxiety, and depression, improve self-esteem, bring comfort and joy, prevent loneliness, and even lengthen life. On the contrary, a lack of solid social ties can seriously jeopardize your mental and emotional well-being. There has been a significant rise in cases concerning young people getting affected by depression and suicidal thoughts. Mostly it is people who spend multiple hours a day using screens, and more specifically girls. But many of the pressures teenagers feel from social media are actually consistent with developmentally normal concerns around social standing and self-expression. Social media can certainly exacerbate

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these anxieties, but for parents to truly help their children cope, they should avoid making a blanket condemnation. Parents should adapt a facilitating approach towards children ensuring a healthy communication all along the years of their transition from adolescence to adulthood. Behavioural researchers have identified various disorders related to social media use, which include mild disorders such as nomophobia and severe disorders including suicidal tendencies. This paper examines the vulnerabilities of social media use and corresponding mental health situations.

Social Media: Concept and Ideas

Social Media is termed as a collective comprising of different forms of electronic communication such as websites for microblogging and social networking. Social media enables the users to create online communities for sharing information, ideas, personal messages, and videos (Merriam Webster Dictionary, 2016). Social media is one of the types of new media that makes the interpersonal communication easier, interesting and economical. Social media makes use of the internet to function as a social bridge between people, communities and groups. Social media initially served as a way to connect with friends and family, but it swiftly evolved into a tool for many more purposes, including education and entertainment. Facebook, Instagram, Twitter, and YouTube are just a few of the many platforms and programmes that are classified as Social Media as they allow users to share content, connect with others online, and build communities. Almost 60% of the world's population, or more than 4.7 billion people, use social media. Digital technology known as social media facilitates the sharing of information, multimedia, and material among online communities and networks.

Social Media: Types and Forms:

There are many various types of social media, such as video sharing, social gaming, business networking sites, virtual worlds, review websites, and others. A number of social media tools are used by people to connect with possible employers, find people globally who share their interests, and express their opinions on social networks. Social media is a tool that politicians and governments use to communicate with citizens and constituents. Social networking is an essential tool for companies. Companies use the platform to find customers, engage with them, advertise their goods, track consumer trends, and offer customer service or support. Organizations can focus on marketing strategies and market research thanks to social media's ability to collect data. Social Media such as WhatsApp Business and Instagram have aided in the promotion of goods and services by making it possible to offer potential clients targeted, timely, and exclusive deals and coupons.

People are getting benefitted through social media-connected loyalty programmes. This could also help in establishing, developing and maintaining the client relationships, making it an essential medium for relationship management. Different types of social media exist depending upon the requirements of the users and new innovations are being done so as to fulfill the requirements of the situation and behaviour.

Social Media: Boon or Bane?

According to a Pew Research Center survey from 2019, social media use is associated with having more friends and a more diversified personal network, more specifically in the emerging nations (Silver, Huang & Taylor, 2019). These platforms allow users to interact, discover niche communities, and get real-time information access to hundreds of social networking websites around the world. Due to social media's ability to connect more individuals with one another online, the world appears to be more open and interconnected. Yet, social media may also be used to spread lies, misinformation, and detrimental psychological effects. A recent study conducted at Pew Research Center has categorically mentioned that, 'those who use social media have more friends and more diverse personal networks, especially in emerging nations' (Silver, Huang & Taylor, 2019).

Social media has changed our lives in many ways and it has become inevitable to stay aloof from the communication transformations the world is witnessing at present. An estimate tells that the social media now has more than 4.7 billion members globally. Whether or not each platform appeals to you personally, it provides a channel for connecting customers and companies across disparate communities or interests. From the perspective of business marketing, it offers a crucial means to advertise to a sizable audience, target clients, and eventually motivate them to make a purchase through digital channels. Companies are also using social media marketing to target their customers, generate a fan base of devoted followers, and develop a brand culture. It is estimated that more than 200 million small companies reportedly have used Facebook's platform for marketing.

With hundreds of social media sites globally, these platforms offer users the ability to access information in real time, to connect, and find niche communities. On one hand, social media has helped many individuals find common ground with others online, making the world seem more interconnected and within reach. Yet on the other hand, social media is prone to spreading disinformation, creating polarization, and causing harmful psychological effects.

Social Media Addiction: Disorder of Digital Age

It has been observed that excessive social media use causes substantial psychological impairment in people of all ages, including severe sadness, anxiety, and sleep deprivation. It is evident through research literature that social networking platforms can become addictive, especially for young people. A 2017 study found that over the course of a year, a greater proportion of users acquired Facebook Addiction Disorder (FAD). FAD was more likely to occur in people with narcissistic personalities or other detrimental mental health factors (Brailovskaia & Margraf, 2017). Unchecked internet usage and social media addiction may seem less harmful than addiction to drugs or gambling but they are quite related. Like any other addiction, social media addiction can still have detrimental, long-lasting repercussions on mental health. According to a 2017 study of teenagers published in Plos One, 4.5 percent of young adults struggled with social media addiction (Marchant et. al. 2017).

A research study in United Kingdom has revealed that young people, particularly girls, were more prone to depression and low self-esteem due to online harassment and sleep problems brought on by prolonged media use. The data also indicated a cyclical relationship between depression and social media use. Particularly, sad teenagers often turn to social media to cheer themselves up only to discover that negative posts filled with hatred or aimless comparisons worsen their despair (Kelly, Zilanawala, Booker, & Sacker, 2018).

A research study at University of Pennsylvania concluded that restricting daily social media use to 30 minutes dramatically reduces feelings of fear of missing out (FOMO), sadness, loneliness, and difficulties falling asleep (Hunt, Marx, Lipson & Young, 2018). Yet, if you want to improve your mental health, you don't have to drastically cut back on your social media usage. The same study found that you can raise your mood and level of concentration by just paying more attention to how you use social media. Even while aiming for 30 minutes a day might not be realistic. An article that appeared in June 2019 issue of New York Times article featured a newlywed couple who almost divorced after their honeymoon. Less time was spent with her husband and more time was spent planning the vacation and posting selfies.

Several specialists have noted an increase in youngsters' insomnia, loneliness, anxiety, and reliance, which has been linked to the introduction of the first iPhone ten years ago. According to one study, 48 percent of teenagers who use electronic devices for five hours per day had at least one suicide risk factor, compared to 33 percent of those who use them for at least two hours per day. All of us have heard accounts about teenagers who become

overwhelmed with emotions as a result of the continuous contact and comparisons that social media encourages.

The Addiction Binary: Use v/s Abuse

Griffiths (2013) has found that social media addiction also has the same characteristics as substance abuse addictions. He has explained that there are six core components which characterize addictive behavior. These include salience, mood modification, conflict, tolerance, relapse and withdrawal symptoms. Social networking sites can become the most compulsive activity for some people, which results in preoccupation or salience. It has been noticed that the sites' activities produce happy feelings, but more time is needed to keep getting the same gratifying results.

Griffiths (2013) has also claimed that these people experience withdrawal when they stop using social media, which causes them to relapse. Researchers have also put on record that social media overuse may also become an addiction if it results in, neglect of personal life, escapism, tolerance, concealing the addictive behaviour, mental preoccupation and mood modifying experiences.

Mental Health Concerns

Social Media Addiction has affected people physically and psychologically through the addictive behaviour it instills and because of the impact it has on the brain. A recent research study at Harvard University found that self-disclosure on social networking sites activates the same region of the brain as using addictive drugs. Decisions and feelings are influenced by the reward region of the brain and its chemical communication pathways. Dopamine levels increase when someone engages in rewarding behaviour or consumes an addictive substance because dopamine-producing neurons in the brain are engaged. Consequently, the brain experiences a reward and tends to link the substance or action to a beneficial reinforcement (Drushel, 2010).

Social media use, poor mental health, and low self-esteem clearly have links, according to research. Social media sites have their advantages, but overusing them can lead to a feeling of loneliness and unhappiness. These unfavourable emotional responses are brought on by the comparison of material possessions and lifestyles that these websites promote as well as the social obligation to share goods with others. Users see curated content on Facebook and Instagram, which consists of posts and adverts that are expressly created to appeal to people depending on their interests. Users might experience happiness or inspiration as a result of seeing other people post about their fantastic careers, wonderful partners, or lovely homes. But, some people could view these images and experience jealousy, depression, or even suicidal thoughts since their own lives are not as ideal as those they see on Facebook or Instagram.

When people use social networking sites as a significant coping strategy to deal with stress, loneliness, or despair, social media use becomes problematic. These users receive ongoing benefits from social media use that they do not receive in real life, leading them to partake in the activity more frequently. This constant use eventually causes numerous interpersonal issues, including the neglect of real-life relationships, obligations from work or school, and physical health, all of which can compound someone's bad moods. As a result, people increase their social networking activity as a means of coping with dysphoric mood states. The degree of psychological dependence on social media rises when users of social networks continue this cycle of using social media to lift unfavourable moods.

Causes and Remedies

There are several factors that might cause social media addiction and needless to say that it is an addiction of similar magnitude than that of substance abuse. Many variables contribute to social networking addiction, claims a report published in the International

Journal of Environmental Research and Public Health. These elements include a smartphone addiction, a fear of missing out (FOMO), nomophobia, and pre-existing mental health issues (Kuss & Griffiths, 2017). According to a paper presented in the International Journal of Environmental Research and Public Health, several factors contribute to social networking addiction. These factors include a Fear of Missing Out (FOMO), Smartphone addiction, Nomophobia, and Pre-existing mental health problems.

Fear of Missing Out (FOMO)

The anxiety that one would miss out on a wonderful event that others are having is known as fear of missing out (FOMO). According to the study, increased Facebook involvement is correlated with higher levels of FOMO. FOMO can also indicate harmful online behaviour.

Smartphone Addiction

According to the study, it is debatable if smartphone users are more dependent on their devices than alcoholics are on booze. Mobile phone users are particularly fond of using social media apps; for instance, around 75% of Facebook users visit the website through their phones.

Nomophobia

Nomophobia is fundamentally a fear of being disconnected, and research has associated it to problematic Internet use, according to the study. Addiction to social media and dread of public places are closely related. The fear of living without a phone is known as nomophobia.

Pre-existing Mental Health Problems

Those who already have mental health problems are frequently more prone to develop a social media addiction. For instance, a Texas University study demonstrates that people who already display symptoms of generalised anxiety disorder frequently turn to social media in an effort to reduce their worry but end up feeling much more nervous as a result.

Excessive anxiety about social media, an insatiable want to access or use social media, and spending so much time and energy on social media that it interferes with other important elements of one's life are all signs of social media addiction. Social media checking and browsing have become more commonplace during the last ten years. The situation might well meddle with the sanity of individuals in coming times because of the media overload and actual human tendencies to encode, store and retrieve information. Psychologists have been working on approaches to check this media overload and developing remedial measures for individuals of all ages who use social media.

Despite the fact that most users of social media do not engage in dangerous behaviour, a small percentage of users acquire an addiction to social networking sites and engage in compulsive or excessive use of them. Studies have also shown that the steady stream of likes, shares, and retweets from these sites triggers the same kind of physiological response in the brain's reward centre as cocaine. Social media interaction has been compared by neuroscientists to the internal administration of dopamine. Clearly, the human brain is being directly impacted by the information overload invoked by social media, the options have overgrown the requirements and hence it becomes imperative to put a check on what to use and how?

Conclusion

Frequent social network users tend to think that other users are happier and more successful than they are, even if they don't know those individuals very well in real life. Social media encourages a culture where individuals compare their imperfect, filtered, and edited online personas to their realistic offline selves, which can be harmful to one's mental health and sense of self. Social media is often used as a source of immediate gratification,

being used as a pacifier during unpleasant experiences; it does emerge as an intervention. Going by the principles of classical conditioning social media also tends to reduce the reaction time of individuals as they frequently deal with prompt issues and prompt gratification. This ultimately affects the stimulus-response equilibrium of people.

Excessive social media use can increase the chance of acquiring mental health conditions including anxiety and depression in addition to making users unhappy and generally unhappy with their lives. Continuous comparison to others can result in feelings of inadequacy or a demand for order and perfection, which frequently presents as social anxiety disorder. This can be very well seen in how people use social media: when they receive a notification, such a like or a mention, their brain releases a burst of dopamine and sends it along reward pathways, making them feel happy. For comparatively small inputs, social media offers an unending supply of instant rewards in the shape of other people's attention. Through this positive reinforcement, the brain rewires itself, making people crave likes, retweets, and emoticon reactions.

The brain's reward regions are most active when people are talking about themselves, which contributes to social media addiction in another way. An estimate tells that people talk about themselves between 30 and 40% of the time in non-virtual settings; yet, since social media is all about showcasing one's life and achievements, people talk about themselves an astounding 80% of the time there. Any individual who posts a picture online may receive supportive comments from others, which prompts the brain to produce dopamine, rewarding the action and sustaining the social media use as an enduring habit. In absence of the anticipated responses on the subsequent posts of individuals, they develop anxiety. The recurrence of such anxieties might result in depression that is largely invisible and is diagnosed in strategic manner. Therefore keeping an effective check on social media use might protect people from new breed of anxieties and depressions.

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Influence of temperature on the efficacy of imidacloprid against Red Cotton Stainer *Dysdercus koenigii* (Fabricius)

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ABSTRACT

In the present work, the insecticidal efficacy of topically applied sublethal concentrations (0.008%, 0.006%, 0.004%, 0.002%, and 0.001%) of imidacloprid on 24 hrs. old 4th instar nymphs of red cotton stainer (*Dysdercus koenigii*) at three different temperatures i.e., $30 \pm 1^\circ\text{C}$, $25 \pm 1^\circ\text{C}$ and $20 \pm 1^\circ\text{C}$ with constant relative humidity (60-70%) and photoperiod regime (14L:10D hrs.) were studied in the laboratory. The percentage of initial nymphal mortality within 24-hour, total nymphal mortality up to adult emergence and malformation of the treated nymphs increased linearly with increasing sublethal concentrations and shows positive correlation at all the three respective temperature and photoperiod. On the other hand, the fecundity and fertility of the adult female emerging from the treated nymphs decreased linearly with increasing sublethal concentrations and showed negative correlation. The toxicity in term of knockdown effect within 24-hour as well as residual effect up to adult emergence was comparatively higher at $30 \pm 1^\circ\text{C}$ as compared to the $25 \pm 1^\circ\text{C}$ and $20 \pm 1^\circ\text{C}$ temperature, whereas deformities in wings as well as twisting of legs was more at $20 \pm 1^\circ\text{C}$ temperature as compared to $25 \pm 1^\circ\text{C}$ and $30 \pm 1^\circ\text{C}$ temperature. Similarly, reduction in average egg production and average egg hatching were more pronounced at $20 \pm 1^\circ\text{C}$ as compared to the $25 \pm 1^\circ\text{C}$ and $30 \pm 1^\circ\text{C}$ temperature and photoperiod.

Keywords: Imidacloprid, *Dysdercus koenigii*, temperature, mortality, malformation, fertility, fecundity,

INTRODUCTION

Climate change is recognized as one of the most serious global challenges in the twenty first century (Bulkeley, 2013). It is mainly produced by anthropogenic activities which resulted significant risks to natural systems (National Research Council, 2011) that affect human health in many ways, including livelihood and food security (Ampadu et al., 2018; Antwi-Agyei et al., 2014). Climate variables such as change in temperature, change in rain fall, relative humidity could directly influence the action of insecticides use in insect pest management. The influence of temperature on the toxicity of insecticides has been documented by several workers like Reichenbach and Collins (1984), Alexandrescu (1986),

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Grafius (1986), Turnbull and Harris (1986), Morytz, et al. (1997), Cho, et al. (1999), Rahman, et al. (1999), Amarasekare and Edelson (2004), Musser and Shelton (2005). In some case the effectiveness of an insecticide may increase but in others it may decrease or may remain constant with changes in temperature. Several workers like Coats et al., (1989), Valles et al., (1998), Hodjati and Curtis (1999), Hardwood et al., (2009) have shown a decrease in insecticides toxicity with increasing in temperature, while, other have reported a positive correlation between temperature and insecticides toxicity. For example, alphasmethrin and deltamethrin produced higher mortality in nymphs of clear-winged (*Camnula pellucida*) and two-striped (*Melanoplus bivittatus*) grasshoppers at higher temperatures (Johnson, 1990). The effectiveness of insecticides at different temperature also depends upon insect species. Li et al. (2006) observed a positive correlation between temperature and deltamethrin toxicity in armyworm and tobacco budworm but a negative correlation in cabbage looper. Increasing in temperatures are generally known to enhance the toxicity of pesticides as well (Lydy et al., 1999). Boina et al. (2009) studied the influence of posttreatment temperature (range, 17-37°C) on the toxicity of selected organophosphate (chlorpyrifos and dimethoate), carbamate (carbaryl), avermectin (abamectin), pyrethroid (bifenthrin, zeta-cypermethrin, fenpropathrin, and lambda-cyhalothrin), and neonicotinoid (acetamiprid, imidacloprid, and thiamethoxam) insecticides against adult of *Diaphorina citri* Kuwayama (Hemiptera: Psyllidae) and observed that all the tested organophosphates, carbamate, avermectin and neonicotinoids showed a positive temperature correlation within the 17-37°C range, however with the exception of bifenthrin, all pyrethroids tested exhibited a negative correlation over the temperature range tested. Wadleigh et al. (1991) tested 10 pyrethroids on male german cockroaches *Blattella germanica* and observed that at LC50, the toxicity was negatively related with temperature. Thus, in the present investigation, the influence of temperature on the efficacy of imidacloprid against Red Cotton Stainer *Dysdercus koenigii* (Fabricius) have been studied under laboratory conditions at three different temperatures.

The red cotton stainer, *Dysdercus koenigii* (Fabricius), has emerged as an important major insect pest of cotton (*Gossypium hirsutum*) Linnaeus (Malvales: Malvaceae) worldwide from the last few years (Shah, 2014). This bug is found in southern Asia has become a major threat to cotton in India and Pakistan (Shahid et al., 2017). It is polyphagous nature it is found on number of crops but cotton is the most preferred host. Both adults and nymphs suck the sap from the emerging bolls and damage the lint quality by staining thus indirectly reducing the yield (Khan and Qamar 2012; Jaleel et al. 2014).

Imidacloprid, a neonicotinoid insecticide, is widely sprayed either alone or mixed with other insecticides against large number of insect pest. It was introduced in 1992 for the control of sucking pests. It is also used as foliar application and for seed treatment. It has a broad safety margin in mammals because of its lower affinity to the nicotinic receptors of vertebrates than those of insects.

MATERIAL AND METHODS

Adults of *D. koenigii* were obtained from the culture maintained at section of Entomology, Department of Zoology, Aligarh Muslim University, Aligarh. These were then reared in the laboratory in glass jars containing moist soil and were fed on cotton seeds (soaked overnight in water). The cultures were maintained at three temperatures viz. $30 \pm 1^\circ\text{C}$, $25 \pm 1^\circ\text{C}$ and $20 \pm 1^\circ\text{C}$ in different B.O.D incubators whereas the relative humidity and photoperiod regime were kept constant in each incubator (60-70% R.H and 14:10 hrs, L:D photo period). Preliminary studies were conducted to find out the LD₅₀ value at each temperature. Based on LD₅₀ value, five serially diluted concentrations viz., 0.008, 0.006, 0.004, 0.002 and 0.001 percent of insecticides were considered as the sublethal concentrations. For each temperature, one hundred newly moulted 24 hrs old 4th instar nymphs in four equal replicates were treated topically individually with 1µl sublethal concentrations of

imidacloprid with 26-gauge needle attached to a tuberculin syringe fitted into a manually operated applicator. A control group having the same number of nymphs was exposed to acetone only and regarded as control-I. Another control group having the same number of untreated nymphs was also maintained to compare acetone exposed insects and regarded Control-II. The effects were observed on mortality, malformation, fecundity, and fertility by using five sub lethal concentrations of insecticide at different temperature.

RESULTS AND DISCUSSION

In the present investigation the topical application of sublethal concentration of imidacloprid (viz., 0.008, 0.006, 0.004, 0.002, and 0.001%) on 24 hrs. old 4th instar nymphs of *Dysdercus koenigii* at three different temperatures (viz., $30 \pm 1^\circ\text{C}$, $25 \pm 1^\circ\text{C}$ and $20 \pm 1^\circ\text{C}$) caused immediate mortality within 24 hrs. and successive mortality up to adult emergence. This initial mortality within 24 hours as well as mortality up to adult emergence increased with increasing sublethal concentrations at both the temperature and photoperiod. The regression between concentration strength and nymphal mortality within 24 hours at $30 \pm 1^\circ\text{C}$ ($Y=3908.5x+18.38$, $R^2=0.958$, Fig.01), at $25 \pm 1^\circ\text{C}$ ($Y=2914.6x+13.15$, $R^2=0.977$, Fig.01) and at $20 \pm 1^\circ\text{C}$ ($Y = 3024.4x + 6.097$, $R^2 = 0.990$, Fig.01) yield a positive correlation. The initial nymphal loss within 24 hours after the topical application of highest selected sublethal concentration (i.e. 0.008%) at $30 \pm 1^\circ\text{C}$ was 31% which was 07% and 14% more as compared to $25 \pm 1^\circ\text{C}$ and $20 \pm 1^\circ\text{C}$ temperature respectively. However, the topical application of lowest sublethal concentration (i.e., 0.001) at $30 \pm 1^\circ\text{C}$, $25 \pm 1^\circ\text{C}$ and $20 \pm 1^\circ\text{C}$ temperature resulted 09, 08 and 04% nymphal loss respectively (Fig. 01). Similarly, the mortality up to adult emergence at aforesaid temperatures ($Y = 6052.x + 18.98R^2 = 0.730$, Fig.02; $Y = 4526.x + 17.15$, $R^2 = 0.648$, Fig.02; and $Y = 4631.x + 10.12$, $R^2 = 0.839$, Fig.02) also yield positive correlation coefficient with increase in concentration. The total nymphal loss up to adult emergence following the topical application of the highest selected sublethal concentration (0.008%) at temperature $30 \pm 1^\circ\text{C}$ temperature was 47%, whereas the total nymphal death up to adult emergence at $25 \pm 1^\circ\text{C}$ and $20 \pm 1^\circ\text{C}$ temperature was 40 and 32% respectively (Fig. 02). These results are like those reported by Eger et al. (1998) in which the mortality of *Franklinella* species showed concentration dependent response. Toews and Subramanyum (2003) also reported the mortality of *Trilobium castaneum* that increased with increasing dosage of insecticide. Similar trend in mortality was also recorded by Pruthi and Jerath (1960) where the toxicity of endrin against *Dysdercus cingulatus* and *Chrotogonus trachypterus* adults at different temperature was accelerated with rise in temperature. Agarwal and Tilak (2006) studied the efficacy of imidacloprid gel bait (2.15%) up to 8 weeks against German cockroach and reported that there was 96.8 to 98.8% reduction in the population as compared to control. Pruthi and Jerath (1960) also determined the effectiveness of endrin against *Dysdercus cingulatus* and *Chrotogonus trachypterus* adults at different temperature and found that the toxicity is accelerated with rise in temperature. Uddin and Ara (2006) studied the toxicity of six insecticide on *Trilobium castaneum* (Herbst) at the temperatures of 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30 and 32°C and observed that there was a marked decrease in the effectiveness of all insecticide tested with a lowering of temperature. The order of toxicity of insecticide was chlorpyrifos > lambda-cyhalothrin > Malathion > cypermethrin > carbosulfan > dicofol. Ming and Qiang (2002) studied the selective toxicity of six different insecticides against *Myzus persicae* and recoded the order of toxicity as imidacloprid + SV1 > imidacloprid > endosulfan > methomyl > fanvalerate > dimethoate. Ateyyat et. al. (2009) compared the toxicity of aqueous extracts of nine plants with imidacloprid against sweet potato whitefly, *Bemissia tabaci* and found to killed 71% of early-stage nymphs, which was not significantly different from mortality caused by imidacloprid. Khowaja et. al. (1995) reported that the topical application of 10, 08, and 06 ppm of temik (aldicar) to the 4th instar nymphs of *Dysdercus cingulatus* caused 50, 41, and 27% more nymphal loss than that of control 2% respectively. The initial mortality following the topical application of higher sublethal

concentrations (i.e., 80 and 60 ppm) of cythion on 4th and 5th instar nymphs of *D. Cingulatus* was very high within 24 hrs., however, the subsequent mortalities up to adult emergence were insignificant. The total nymphal loss and survival duration of the treated insects were directly proportional and increased linearly with the increase in concentration, whereas the fecundity & fertility of the adults were inversely proportional and decreased linearly with increase in concentrations (Khowaja et al. 2001 and Khowaja and Qamar, 2005).

Many factors such as crowding (Kawada 1989; Matsumura 1996), host plant quality (Lees 1966; Lu and Chen 1993), photoperiod (Jokson 1966; Uddin and Baqui 1993), temperature (Liu and Wu 1994; Jokson 1966), hormones (Zera and Tobe 1990; Fairbairn 1994) and seasonal changes (Muraji et al., 1989) could affect morphogenesis and resulted in wings or leg deformities. In the present investigation, the effect of imidacloprid on malformation was dose as well as temperature dependent. The regression between concentration strength and percentage of malformed adults at $30 \pm 1^\circ\text{C}$ ($Y = 3084.2x + 4.705$, $R^2 = 0.901$, Fig.03), at $25 \pm 1^\circ\text{C}$ ($Y = 1852.6x + 1.849$, $R^2 = 0.951$, Fig.03) and at $20 \pm 1^\circ\text{C}$ temperature ($Y = 2147.4x + 4.150$, $R^2 = 0.871$, Fig.03) yield a positive correlation. Higher percentage (i.e., 23%) of malformed adults was recorded at $20 \pm 1^\circ\text{C}$ temperature, while the malformation at $25 \pm 1^\circ\text{C}$ and $30 \pm 1^\circ\text{C}$ temperature was 13 and 17% respectively (Fig. 03). Tiwari et al. (2006) noted that the topical application of neem-based insecticides on *Dysdercus koenigii* caused ecdysial stasis and development of adultoids and imagoes with varied degree of deformities. Topical application of azadiractin through contact method evoked various specific and non-specific effects during the course of development in various stages of red cotton bugs (Koul, 1984). RD-9 Replin at higher concentration prolonged the nymphal period and affected the emergence of adults of *Dysdercus koenigii* (Gupta et al., 1997). Khowaja et al. (1995) reported that the topical application of temik (aldicarb) to the 4th and 5th instar nymphs of *D. Cingulatus* at 10, 08, and 06 ppm dose produced 7.1, 6.3, 4.8% and 9.6, 8.2, 7.0% adults with malformed wings respectively. Fakhari et al. (2011) studied the comparative toxicity of conventional (imidacloprid) and non-conventional (multineem) insecticides on the biology of *Dysdercus koenigii* and observed that the percentage of malformed adults having folded, twisted wing were very highest (55.38%) in case of imidacloprid treatment as compared to multilineem treatment. The topical application of 0.004% monocrotophos on the 4th instar nymphs of *D. koenigii* resulted 30.13% malformation in emerged adults (Fakhari et al., 2011).

The percentage of egg laying, and egg hatched of the female emerged from the 4th instar treated with different sublethal concentrations of imidacloprid were also adversely affected at all tested temperature. The regression between percentage of egg laid and concentrations strength at $30 \pm 1^\circ\text{C}$ ($Y = -7412.5x + 87.44$, $R^2 = 0.868$, Fig.04), $25 \pm 1^\circ\text{C}$ ($Y = -6690.9x + 90.98$, $R^2 = 0.925$, Fig.04), and $20 \pm 1^\circ\text{C}$ ($Y = -4843.7x + 93.35$, $R^2 = 0.896$, Fig.04) showed negative correlation coefficient. The females emerged from the survived 4th instar treated nymphs treated with 0.008% of imidacloprid at $20 \pm 1^\circ\text{C}$ temperature laid lesser number of eggs as compared to at $25 \pm 1^\circ\text{C}$ and $30 \pm 1^\circ\text{C}$ temperature. Following the topical application of 0.008, 0.006, 0.004, 0.002 and 0.001% imidacloprid/4th instar nymphs at $20 \pm 1^\circ\text{C}$ temperature, the egg production of the females emerged from the survived treated nymphs was reduced by 77.9, 71.3, 52.8, 39.4 and 28.2% respectively as compared to control (5.1%), however the topical application of the same concentrations at $25 \pm 1^\circ\text{C}$ and $30 \pm 1^\circ\text{C}$ temperature resulted 69.5, 66.6, 51.7, 39.9, 25.8% and 64.1, 60.1, 52.4, 37.3, 22.8% reduction in egg production of the survived females. Reduced fecundity of *D. koenigii* affected with sublethal concentrations of imidacloprid is consistent with previous studies investigating other hemipterous insects. The fecundities of two aphid species (*Myzus persicae* and *M. nicotiana* Blackman), two green leafhopper species (*Nephotettix virescens*, Distant and *N. cincticeps* Uhler) and a brown planthopper species (*Nilaparvata lugens* Stal) were reduced by more than 50 % after feeding on plants/leaves treated with sublethal concentrations of

imidacloprid (Divine et al., 1996; Widiarta et al., 2001; Bao et al., 2009). Similarly, Lashkari et al. (2007) reported that the oviposition rate, longevity and growth of cabbage aphid, *Brevicoryne brassicae* L., were negatively affected by sublethal concentration of imidacloprid. Nishi and Takahashi (2002) observed that the average numbers of egg laid per ovipositing female of *Amphibolous venator* increased with increasing temperature (i.e., 25°C, 27.5°C, 30°C 32.5°C and 35°C/ 60-70%RH and 16L-8D of photo regime), however differences were not significant. RH 5849, an analogue of halofenozide, was shown to inhibit ovariole development in Lepidoptera and some Coleoptera (Wing et al., 1988). Monthean and Potter (1992) found that feeding on foliage treated with RH 5849 (1,2-dibenzoyl-1-tertbutylhydrazine) reduce the fecundity of Japanese beetles by 66-74%, but did not reduce the percentage of hatch. Khowaja et al. (1993) reported that the topical application of 2500 ppm, 5000 ppm and 10,000 ppm cythion/larva of *Spodoptera litura* resulted in 10.75, 13.32, and 18.23% reduction in egg production respectively. Aller and Ramsay (1988) also observed that ingestion of RH 5849 by newly emerged adults of several phytophagous beetle species prevented oviposition due to the absence of developing oocytes, whereas, the ingestion of RH 5849 by older female caused cessation of oviposition due to the resorption of the oocytes. Destruction of egg chamber after treatment with tepa, metapa, apholate, hempa, methlmethane sulphonate and hydroxy urea has been reported by Morgan and La Brecque, (1964); Morgan, (1967); Kissam et al., (1967). The effects on division of oogonia in the germarium, the inhibition of growth of oocytes and trophocytes, degeneration of follicular epithelium and the resorption of contents of egg chamber has been reported by Rezabova and Landa, (1967); Landa and Matol, (1971); Khowaja et al. (2001) and Khowaja and Qamar, (2005). The application of 06, 04, and 02 µg of 22, 25-dideoxyecdysone to the 4th instar nymphs of *Dysdercus cingulatus* reduced the egg production of the emerged females by 30.9, 18.5, and 11.0% respectively as compared to control, however, the application of the corresponding doses of 2,22,25 trideoxy-5βhydroxyecdysone decrease the fecundity by 27.6, 21.4, and 15.4% respectively as compared to control (Khowaja et al., 1996). The fecundities of two aphid species (*Myzus persicae* and *M. nicotiana* Blackman), two green leafhopper species (*Nephotettix virescens*, Distant and *N. cincticeps* Uhler) and a brown planthopper species (*Nilaparvata lugens* Stal) were reduced by more than 50 % after feeding on plants/leaves treated with sublethal concentrations of imidacloprid (Divine et al., 1996; Widiarta et al. 2001; Bao et al., 2009). Similarly, Lashkari et al. (2007) reported that the oviposition rate, longevity and growth of cabbage aphid, *Brevicoryne brassicae* L., were negatively affected by sublethal concentration of imidacloprid. Boina et al. (2009) also observed that the fecundity and fertility of the Asian citrus psyllid, *Diaphorina citri*, were reduced significantly following the long-term exposure of imidacloprid through systemic method. Nishi and Takahashi (2002) observed that the average numbers of egg laid per ovipositing female of *Amphibolous venator* increased with increasing temperature (i.e., 25°C, 27.5°C, 30°C 32.5°C and 35°C with constant 60-70%RH and 16L-8D of photo regime), however the differences were not significant.

Similarly, the percentage of egg hatching of the effected female emerged from the survived treated 4th instar nymphs also reduced linearly ($Y = -8779.4x + 85.34$, $R^2 = 0.884$, Fig.05; $Y = -10915.0x + 77.67$, $R^2 = 0.818$, Fig.05; $Y = -7618.9x + 44.12$, $R^2 = 0.336$, Fig.05 at 30 ± 1°C, 25 ± 1°C and 20 ± 1°C temperature respectively) yielded a negative correlation coefficient. The hatching of the eggs laid by the affected females at 20 ± 1°C temperature emerged following the topical application of 0.008, 0.006, 0.004, 0.002 and 0.001% imidacloprid on 4th instar nymphs dropped by 65.8, 50.2, 51.9, 42.9, and 36.9% respectively, however the hatching of the eggs at 25 ± 1°C and 30 ± 1°C temperature following the application of same concentrations was reduced by 38.4, 35.5, 28.0, 17.4, 17.8% and 39.6, 30.1, 21.3, 15.3, 13.1% respectively as compared to control (Fig. 05). Boina et al. (2009) also observed that the fecundity and fertility of the Asian citrus psyllid, *Diaphorina citri*, were reduced significantly following the long term exposure of imidacloprid through systemic

method. The topical application of various sublethal concentrations of monocrotophos to 4th and 5th instar nymphs of *D. cingulatus* resulted in linear fall in egg production and egg hatching and showed a negative correlation with the increasing concentrations (Khowaja et al., 1994; Khowaja and Qamar, 2002). Likewise, the average fertility of the eggs laid by the affected females of *D. Cingulatus*, after the topical application of higher selected doses (06, 04, 02 µg of 22, 25-dideoxyecdysone) on 4th instar nymphs, decreased by 35.3, 30.1, and 26.0% respectively as compared to control, however, with corresponding dose of 2,22,25trideoxy-5βhydroxyecdysone, the hatchability of the eggs was dropped by 29.2, 20.3, and 13.8% respectively as compared to control (Khowaja et al., 1996). Inhibition in fecundity and fertility after the application of natural ecdysones or their analogues have also been reported by Jalaja et al. (1976), Ahmad & Khan (1985), Ahmad (1983), and Khan et al. (1990). Wright et. al. (1971) observed that β-ecdysone prevented lipid synthesis which is necessary for vitellogenesis. On the contrary, Zeng and Wang (2010) reported that the exposure of sublethal dose of imidacloprid to *Tetranychus cinnabarinus* led to a significant increase in the hatch rate of eggs. James and Price (2002) also reported that the two spotted spider mites, *Tetranychus urticae*, either directly exposed to spray formulations or fed on discs cut from a systemically treated bean plant produced 10-26% more eggs during the 1st 12day of adult life and 19-23% more during adult hood compared with a water only treatment.

ANALYTICAL FIGURES:

Fig. 01: Fitted linear regression line showing initial mortality following topical application of sublethal concentrations of Imidacloprid at three different temperatures.

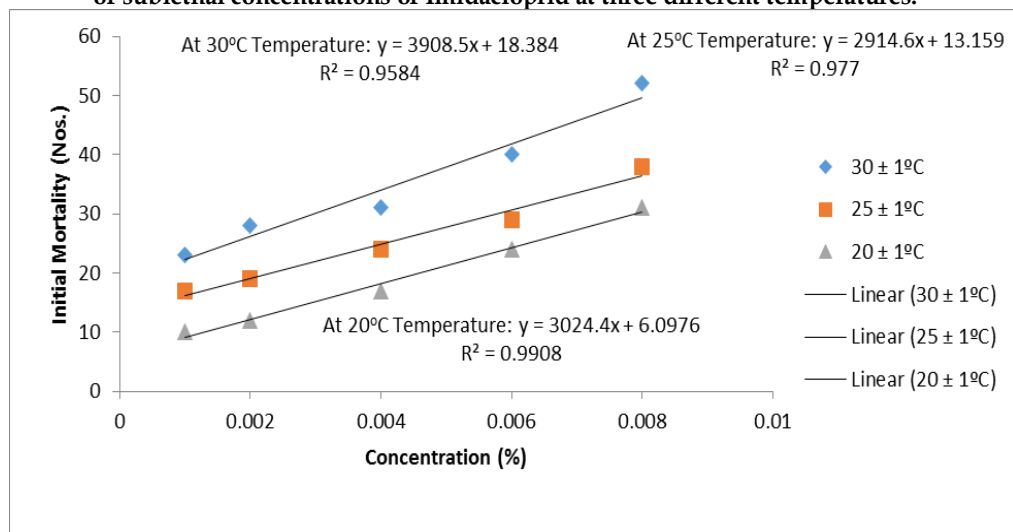


Fig. 02: Fitted linear regression line showing total mortality up to adult emergence following topical application of sublethal concentrations of Imidacloprid at three different temperatures.

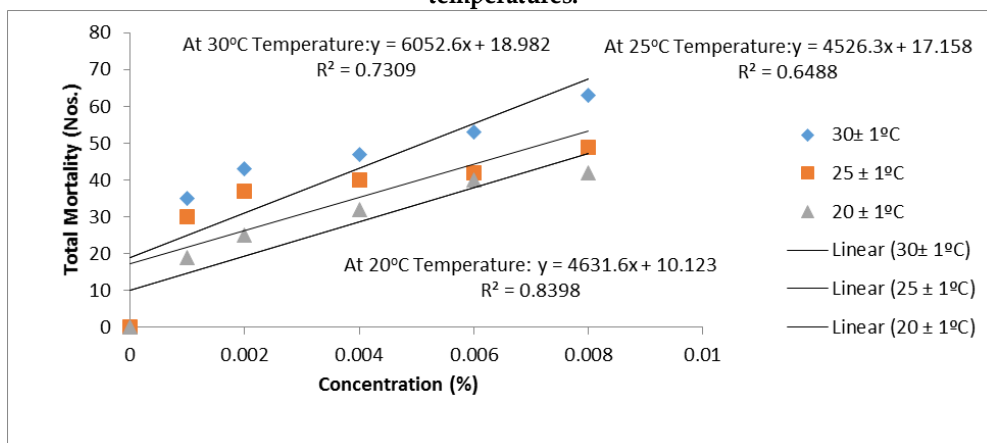


Fig. 03: Fitted linear regression line showing malformation following topical application of sublethal concentrations of Imidacloprid at three different temperatures.

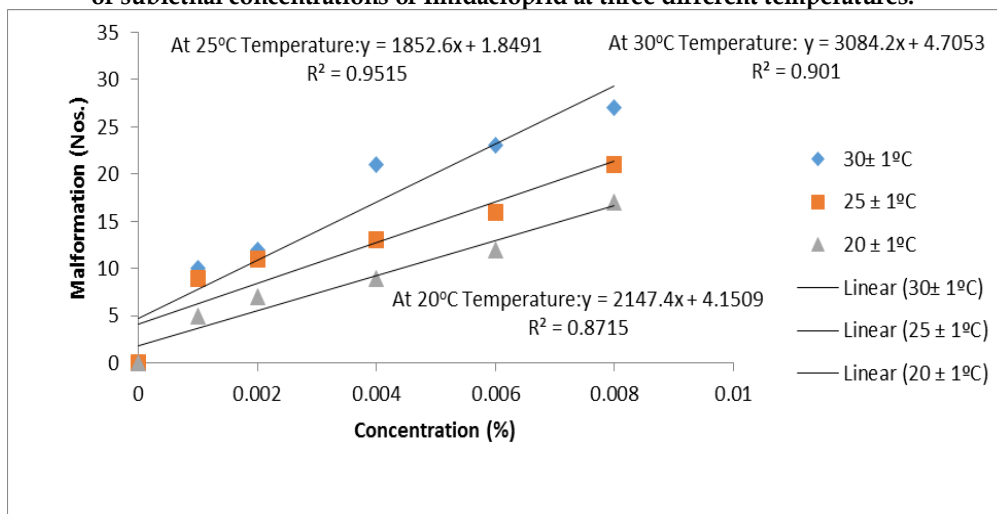


Fig. 04: Fitted linear regression line showing percentage of egg laid following topical application of sublethal concentrations of Imidacloprid at three different temperatures.

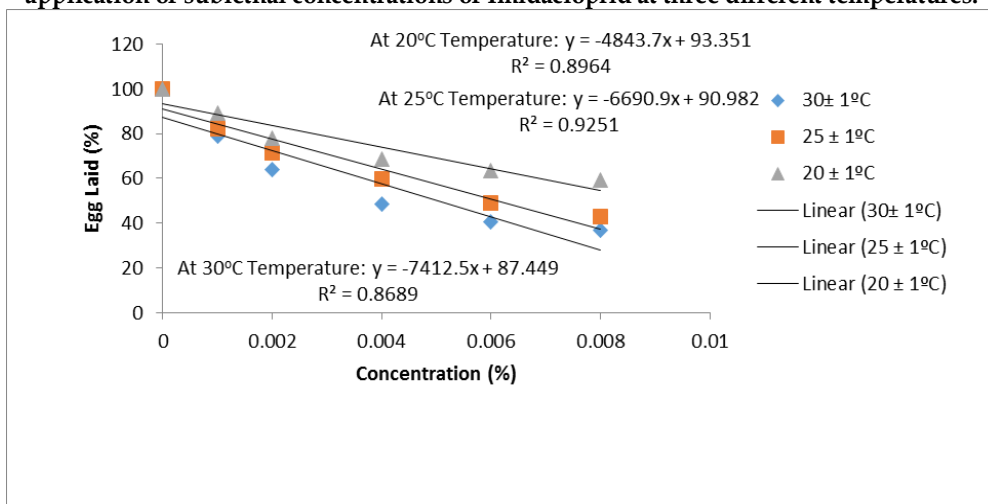
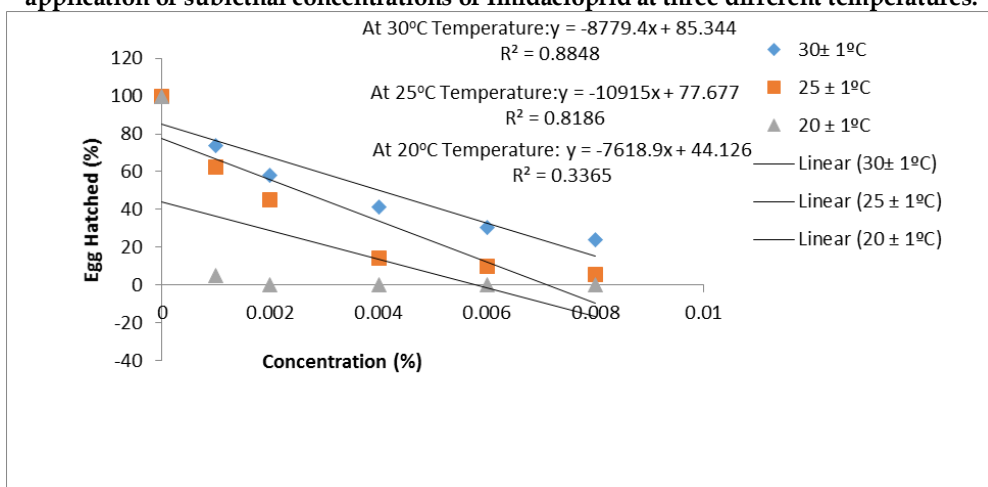


Fig. 05: Fitted linear regression line showing percentage of egg hatched following topical application of sublethal concentrations of Imidacloprid at three different temperatures.



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Seismic Activities and Animal Behaviour: Making the case for Geopsychology

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ABSTRACT

Our understanding of psychological occurrences with respect to the environments we inhabit is greatly affected by a multidisciplinary approach that looks at the spatial organization, geographic representation, and underlying mechanisms of natural events. Growing evidence has supported the idea that the behaviour of species have changed as a result of global warming. The vast information available to us at present has come from researches on a very small number of species which includes plants, birds, and insects. Therefore such information cannot be taken as true representative of any phenomenon that has been observed with respect to any specific species. It is a tedious task to streamline how species are intertwined with natural phenomena, how their mutual interactions affect each other's behaviour and how deeply they impact each other's functioning. This paper situates animal behaviour amidst natural phenomena and tends to make the case for prospective researches concerning animals and their behaviour.

Keywords: Psychology, Seismology, Plants, Birds, Insects

Exordium

Psychology is the study of the mind and behaviour, which manifests as activities that can be precisely or objectively assessed. Often, head gestures mean the lateral movement of the head from side to side, it would not necessarily mean the same always, also it would never be ascertained if the head was shaken or not, even after taking assistance from some witnesses. Due to the fact that there is a propensity for subjectivity, studying the mind is not as simple, whether human or non-human. The situation gets difficult with the realization that it is unavoidable as the prime areas of study for the mind are perception, sensation, memory, and thought. Therefore it could be said of humans that occurrence of behaviour is also in question as gestures would always carry different meanings for different observers. Studies in animal behaviour have frequently made the assumption that all members of a species behave in same way. On contrary, geographic variation in behaviour shows that there is substantial variety within species across a wide range of taxonomies. The use of animals, especially primates, has been crucial in psychological development research. Harlow's research on the emotional growth and maternal deprivation in rhesus monkeys is a

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well-known example (Harlow et al., 1965; Harlow & Suomi, 1971). These tests would have been impractical and exceedingly unethical to do on newborn infants. Needless to mention that human cloning has been a very controversial research subject, although science has taken a grand leap as it developed a cloned sheep. Such researches could be proved path-breaking research interventions in multiple disciplines. It is possible that subsequent development-related research would have been different without these studies; nevertheless, it is unclear if such observational research actually benefited from being conducted on primates.

This paper attempts to examine the proposition that if the human brain is similar to several animals that are used in lieu of humans for neuropsychological researches, what are the odds that their behaviours might have considerable concurrence in between them? The paper also investigates behaviour of animals with respect to seismic activity, in order to ascertain what exactly is true of popular belief that animals are seemingly predictive of natural hazards.

Animal Behaviour: Legends, Folklore, Beliefs and Practices

The Greek historian Thucydides first made mention of odd animal behaviour before a natural disaster in 373 BC, when he wrote about rats, dogs, snakes, and weasels fleeing the city of Helike in the days before a devastating earthquake. History is dotted with other reports. Oxen, lambs, dogs, and geese allegedly began emitting alarm calls just minutes before the Naples earthquake in 1805, while horses are rumoured to have bolted in fear before the San Francisco earthquake in 1906. Ancient writings have a significant mention of Helike, a strategic town on the verge of the coast, and Boura, a town in the interior, both being destroyed and drowned in the Gulf of Corinth (Greece) in 373 B.C. as retribution for a serious crime committed in Poseidon's shrine. Notwithstanding various exaggerations, this story has been accepted as a description of a real occurrence, and the tsunami and earthquake that occurred in 373 B.C. are listed in the same catalogue (Kaplan, 2007).

The opening sections of this essay demonstrate how the vulnerability of the ancient polis of Helike, owing to its topography, prevents local natural dangers from causing its complete destruction. Systematic geoarchaeological investigations support this hypothesis since they uncover largely undisturbed archaeological layers that predate and follow 373 B.C. and show no evidence of a tsunami. Recent archaeological digs have unearthed, among other things, the remains of Helike's coinage as well as the Poseidon shrine at Helike and the harbour of Boura, which were thought to have been lost decades earlier (Kaplan, 2007). This information enables a supervised learning-style approach to ancient literature about the disappearance of Helike. It was discovered that the myth of Helike's complete loss first originated in local traditions, hearsay, and faked or altered old documents several centuries after the actual ancient Greek sources did not mention any tragedy involving Helike. Because of the rapid burial of ancient Greek remains under sediments in a young delta and because of Helike's prominent location in the sea route between Rome and the eastern Mediterranean, the ancient legend became significant because it explained the collapse of the town state of Helike and it fit ancient religious ideas in a tectonically active region (Kaplan, 2007).

According to Japanese folklore, an enormous underground catfish known as Namazu is to blame for earthquakes. The monster is thought to reside beneath Japanese islands and is well-protected by the shrine of the god Takemikazuchi, which is situated in Kashima. Some think that a stone is used by God to restrict this enormous catfish, and that Namazu trembles and generates strong earthquakes as soon as the guard is let go. The 16th century's folktales and legends refer to Namazu in terms of earthquakes, and they are also shown in antique paintings. From the late 17th century, there has been debate on the connection between fish and earthquakes. There had been a significant earthquake in 1855, immediately before the quake an eel fisherman was reported to have spotted unusually active catfish in a river, which he believed as a predictor of earthquake. Afterwards, an account of a journalist

claiming that catfishes can naturally anticipate earthquakes was revealed. Many other similar examples leave human beings surprised and awe-inspired.

Animal Behaviour and Seismic Activities

For centuries, people have linked strange animal behaviours, such as dogs barking incessantly, cows ceasing to give milk, and toads leaping from ponds, to earthquake events. An association between animal behaviour and earthquake activity has been made by scientists. German researchers videotaped red wood ants living along seismic lines in a 2013 study, and they found that they changed their routine behaviour before earthquakes by being more active at night and less active during the day (Berberich, Berberich, Berberich, Grumpe, Wöhler & Schreiber, 2013). Nevertheless, an analysis of 180 prior studies published in the *Journal of the Seismological Society of America* in 2018 revealed that the bulk of such attempts have been relied on anecdotal evidence and isolated occurrences.

Japanese seismologists, Shinkishi Hatai and Noboru Abe have shown that catfish housed in aquariums indicated increased agitation several hours before earthquakes happened and were able to predict quakes with an accuracy of 80% in the 1930s (Hatai & Abe, 1932). Catfishes are still used as an SOS sign for earthquakes in Japan today. Catfishes are visible in images of Japan's emergency earthquake preparations. For instance, the Japan Meteorological Agency's Earthquake Early Warning (EEW) emblem uses catfish images on early warning-issuing equipment. A catfish serves as the emblem for the well-known earthquake early warning smartphone application Yurekuru Call.

Martin Wikelski along with his team from the Max Planck Institute of Animal Behavior in Germany conducted one of the most significant studies on how animals may forecast calamities five years ago (Curry, 2018). The study featured bio-logging, the technique of documenting animal movement patterns, on a farm in central Italy's Marches, an earthquake-prone zone, which included cows, sheep, and dogs. Between October 2016 and April 2017, each animal wore a collar with a chip, which provided information about its movements to a central computer every few minutes (Wikelski & Tertitski, 2016).

Several snakes emerged from their hibernation burrows despite the frigid weather in the weeks leading up to the magnitude 7.3 earthquake that rocked the Chinese city of Haicheng on February 4, 1975. The actions of the reptiles, together with other instances, led authorities to order an evacuation of the city hours before the powerful earthquake. Contrary to what is thought in the natural sciences, it is frequently held that odd animal behaviour that borders on abnormality could be an earthquake precursor. Proponents of earthquake prediction using animals claim that animals can detect and react abnormally to small changes in environmental and physicochemical variables related to the earthquake preparation process. Seismology, however, offers very little observable proof that physical properties change before earthquakes.

A tsunami that was caused by a 9.1 magnitude underwater earthquake off the coast of Indonesia in 2004 destroyed coastal settlements around the Indian Ocean and claimed the lives of at least 225,000 people from a dozen different nations. A large portion of the high death toll was brought on by the fact that many towns were not given any notice. Tidal and seismic sensors, two locally installed early warning systems, were unable to issue a clear notice. Due to maintenance concerns, many sensors were inoperable, and many coastal regions lacked tsunami siren warning systems (Fletcher et. al., 2010). Consequently upon the haphazard communication which took place, many text messages intended for mobile devices in danger zones either did not reach them or were not read. Yet, some creatures appeared to detect oncoming danger and make an effort to evacuate in the minutes and hours before surging walls of water up to 9 metres or almost 30 feet high broke through coasts. Elephants reportedly fled to higher ground, flamingos reportedly left low-lying

nesting grounds, and dogs reportedly refused to go outside. Locals in the Thai coastal town of Bang Koey claimed that just before the tsunami hit, a herd of buffalo on the beach suddenly perked their ears, peered out to sea, and stampeded to the top of a nearby hill (Sheldrake, 2005).

In the immediate aftermath of the earthquake and prior to the tsunami, survivors also described seeing animals, such as cows, goats, cats, and birds, moving purposefully inland, according to Irina Rafliana, a researcher at the German Development Institute in Bonn who was formerly a member of an advisory group for the United Nations International Strategy for Disaster Risk (UNISDR). Many of those who survived fled with or just after these animals in order to evade a strange situation that had occurred. There are many similar examples concerning the seismic research fieldwork around other disasters, such as the 2010 Mentawai Islands tsunami that was caused by an undersea earthquake near Sumatra and claimed approximately 500 lives (Vahanvati & Rafliana, 2019). But, in this instance as well, certain animals, including elephants, were said to have responded as if they had some type of advance knowledge of the incident. A few days ago, two days before Tonga's volcanic explosion in January, a recently released turtle did an abrupt U-turn. Several locations that are frequently affected by natural catastrophes lack early warning systems. The World Meteorological Organization discovered in 2017 that the governments of almost 100 nations still don't have early warning systems for the natural disasters to which they are presumed as highly vulnerable (Basher, 2006). Nonetheless, these reports of animal behaviour before to disasters have led some scientists to seriously consider the hypothesis that animals may have innate systems that warn them of impending natural disasters. It begs the intriguing question of whether animals could act as human beings' inbuilt early warning systems.

Grant, Raulin & Freund (2015) have reported similar findings in South America. They used motion-activated cameras to biologically monitor animal movement patterns over a period that encompassed the magnitude 7.0 Contamana earthquake in 2011. Grant, Raulin & Freund (2015) have also reported that "the number of animals captured on the video traps started to fall about 23 days before the earthquake, with the decrease intensifying eight days prior to the earthquake. No animal movements were reported on days 10, 6, 5, 3, 2, and 1 before to the earthquake, as well as on the day of the earthquake, which is exceedingly unusual. Grant also discovered important proof of what might be causing the local animal behaviour changes, in the form of a series of powerful disturbances in local atmospheric electric charges every two to four minutes, beginning two weeks before to the earthquake. Just eight days before to the Contamana earthquake, a particularly large variation was detected, beginning at the same time as the second stage of the animals' disappearance from view.

Satellites had noticed a rise in carbon monoxide levels over a 100 square kilometers area centred on what turned out to be the quake's epicentre days before the 7.7 magnitude Gujarat earthquake in India in 2001 (Singh, Kumar, Zlotnicki & Kafatos, 2010). Scientists have hypothesized that as an earthquake's pressure increases, the buildup of tension in rocks may cause carbon monoxide gas to be driven out of the earth. As many animals have highly evolved sensory systems that can interpret a variety of natural signals that may be essential to their survival, it stands to reason that some animals would be able to detect any earthquake precursors. Low frequency waves could be detected, ionized air could be felt via sensations in fur or feathers, and unpleasant compounds could be sniffed out (Ganguly, 2011). These results raise the interesting question of whether humans may genuinely forecast earthquakes through animal observations and so be able to warn people of their impending arrival, given how challenging it is to predict earthquakes. Moreover, before earthquakes, the water bodies might cause some harmful compounds to manifest, as they are interconnected with different layers of earth from crust to core through mantle. They can also start oxidation reactions that produce the bleaching agent hydrogen peroxide if they come into contact with

water. Other undesirable chemicals, like ozone, could be produced as a result of chemical reactions between the charge carriers and the organic stuff in the soil.

Ethology and Seismology: Building Bridges

Considering the fact that animals have a tendency to predict and sense natural hazards much before human do, it becomes intriguing to understand as to what exactly goes on in the minds of animals when they get aroused and start migrating or indulge in any of the peculiar behaviour. It is quite suggestive that if dedicated neuropsychological researches are done on animal behaviour, they might unearth an efficient plan to safeguard humans against natural disasters. Eventually there would be a minimized rate of casualties, lesser financial burdens and an enduring sense of security would prevail. The fact that nonhuman animals have evolved is one of the reasons why they are examined in psychology. The animals most frequently used in psychology research are mice, rats, and monkeys, as they have ancestors who are related to humans. Each species has its own adaptations that allow it to inhabit a certain ecological niche, but due to shared ancestry, human and nonhuman anatomical and functional processes—like those of the brain and memory are strikingly similar. Also, the exact control made possible by animal studies allows us to comprehend fundamental processes better such as living environments, experimental conditions, etc.

Researchers who work with nonhuman subjects are aware that their research may result in damages, which can range from relatively modest such as taking a blood sample to more significant such as neurosurgery. By ensuring, for instance, that the animals' psychological wellbeing is optimized, the research community tries to lessen some of the negative effects. In fact, there is a large body of psychological research that focuses on animal welfare and identifying best practices to house and care for animals in captivity. Nonetheless, there will still be some harms, and one must morally balance those harms with any potential benefits, for both people and the animals themselves, from the research. The possible dangers to humans of not conducting the research must also be taken into account, which is crucial. Without animal research, for instance, viable cures for human disorders like Alzheimer's disease may still be discovered, but it will undoubtedly take decades longer, and in the meantime, millions more people will suffer.

Animals in the lab: Science, Morality, Ethics and Law

Animal models for psychological study without a neurological focus are rather uncommon in labs across the world. Because of this, many psychologists can draw the conclusion that using animals in research doesn't affect them. Scientists have been engaging in research focussing on human beings with the help of animals in their laboratories. There are a wide variety of animals that are used for experimental purpose; these include rats, mice, rabbits, primates and guinea pigs. The use of animals is essential for biomedical research for a number of reasons; primarily they are preferred due to the fact that it is ethically incorrect to experiment with a thriving human life in laboratory for research purposes. Animals and humans share a lot of biological similarities. In fact, mice and humans share more than 98% of our DNA. Animal models may be examined over the course of their entire lives and multiple generations because they have shorter life cycles than humans, which is a crucial component in understanding how a disease develops and how it interacts with a complete, living biological system (Diamond, 2014). Cancer, diabetes, heart disease, and other illnesses that affect humans can also affect animals.

Given the continual advancement of non-invasive methodologies and technologies, many individuals question the continued use of animal experimentation in psychology and neuroscience research. It is easy to dismiss the underlying biological research that underpins many areas of psychology and will be used to further those subjects in the future. Summing this up, it could be well said that animal model is advantageous in psychological researches.

In the past, many scientific experiments have used animals. Matter of factly, psychology has benefited much from the study of nonhuman animals and continues to do so today. Animal studies are frequently not mentioned in descriptions of studies. Rarely is the fundamental animal research that made the human trials possible discussed when those studies are presented. Last but not least, details about the ethical and legal frameworks in which animal research is carried out are presented only briefly or not at all. These are significant concerns that need for deeper comprehension and more extensive debate.

Through numerous models of animal study, the anatomy and physiology of humans and other animals have been widely examined. Significant researchers in sensation and perception such as Hubel, Wiesel, Lettvin, Jacobs, Newsome, Sperry, Bekesy, DeValois, Melzack, and others used animal subjects in their groundbreaking work (Pavlov, 1932). The study of the various animal behaviours is under the purview of several scientific disciplines including behavioural and neurosciences. These studies can be conducted virtually everywhere, but of all the prospective sites, small islands or large farms could be the most suited space for such researches due to their isolated population and favourable field circumstances for up-close examination of the creatures. Islands are used as natural field laboratories for these investigations, whether they are looking at birds, wild mammals, or domestic animals. The development of new medications and the safety testing of other products sometimes involve the use of animal experimentation. The animals used in many of these trials suffer from pain or have other negative effects on their quality of life. If it is immoral to make animals suffer, then performing experiments on them creates significant moral dilemmas (Gray, 1980).

Researchers that use animals in experiments are well aware of this moral dilemma and agree that procedures should be as humane as feasible. They also concur that it is improper to utilize animals for research when non-animal approaches may yield significant data that are just as reliable. There are many different ethical opinions regarding the use of animals in research. It is generally accepted that using laboratory animals may be important in some circumstances to make advances for people, animals, or the environment. The widespread consensus is that animals have a moral standing and that how we treat them should strictly be guided by ethical principles. Guidelines for Research Ethics in Science and Technology (2016) have a clear mention that respect for animals' intrinsic value must be assured. Since animals are sentient beings with the ability to feel pain, their interests must be taken into account. The way we treat animals, even when they are used for study, reflects our attitudes and shapes how we behave morally.

Epilogue

Animals appear to be aware of environmental threats other than earthquakes in advance. Birds are receiving more attention since it appears that they can recognise other looming natural disasters. Scientists while monitoring golden-winged warblers in the United States in 2014 had recorded an astonishing illustration of what is referred to as an evacuation migration. Despite having travelled 5,000 kilometres far off South America, the birds took off from their breeding area in the Cumberland Mountains of eastern Tennessee and flew 700 kilometres south. Surprisingly, a terrible swarm of over 80 tornadoes attacked the area shortly after the birds had fled, killing 35 people and causing over one billion dollars in damage. It looked obvious that the birds had somehow sensed the twisters approaching from a distance of more than 400 kilometres. In order to understand how, the first thing to consider is infrasound, a low frequency background noise that is present throughout nature but is perceptible only to human beings. Migratory birds very well indicate a subtle climate change. Whether it is flocks of wildebeests or prides of lions, packs of jackals or shoals of fishes, all of them engage in a behaviour that has been beyond human comprehensions. The

emergent need is to identify the elements that genuinely contribute to the behavioural contrasts, new discourses and associated methodological issues must be established.

Animal studies have played a significant role in improving knowledge of and developing treatments for neurological and psychological illnesses, in addition to social psychology. Animal research serves as the foundation for behavioural therapy. For instance, the study of animal behaviour and the groundbreaking work of animal researchers like Pavlov, Skinner, and Thorndike led to the development of aversion treatment, desensitization and extinction therapy, token economies, and systematic reinforcement. Without the use of animal models and experiments, biological therapies such as psychosurgery, antipsychotics, and antidepressants would not have been created. Physical and chemical changes in the environment make sensory apparatus of animals aroused and hence they indulge in unusual behaviour.

Many different types of approaching natural disasters might be difficult to predict, even with modern technologies. For instance, when an earthquake occurs, the earth-juddering shocks are only detected by seismic sensors as jolted squiggles. In such times, animals might prove very effective and helpful due to the fact that they have a heightened sense of prediction of natural disasters. This would eventually benefit human beings with their preparedness towards combat with challenging situations posed before them by nature.

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Speech Recognition: An Integrated Approach

Sehba Masood*

ABSTRACT

The main aim of the proposed study is to combine speech recognition, sentiment analysis, and emotion detection into an integrated platform. This innovative web application-based system is designed to enhance user interaction through advanced AI technologies. The primary function of the proposed system is to accurately transcribe spoken language into text using Google Cloud Speech-to-Text, the application ensures precise and efficient transcription of audio data. Additionally, the system analyzes the underlying emotions conveyed through spoken words. Bidirectional LSTM networks were chosen due to their proficiency in modeling long-term dependencies and context within sequential data. This feature provides users with valuable insights into the emotional nuances of the transcribed text.

Keywords: Speech Recognition, audio, sentiment analysis, emotion detection, NLP, LSTM networks.

1. INTRODUCTION

Speech Recognition technology enables the user to operate the electronic device through spoken word rather than using different devices like keyboard. To make the use of the device through speech easy the speech recognition systems convert spoken words and phrases into machine-readable format. Speech recognition technology was designed to accelerate method of typing and was originally developed for physically or mentally challenged people who find typing difficult, tedious, or even impossible and this helps them to work by speaking. The domain of speech recognition is a fast-growing research area with broad practical application in marketing, banking, healthcare, language learning and so on. Some of the existing systems which use speech recognition are Apple Siri, Google Assistant, Microsoft Cortana and Amazon Alexa. Currently, the research in speech recognition is being carried out with various technologies like deep learning, Natural Language Processing (NLP), IOT etc.

Although speech recognition technology has made significant progress in recent years, it still faces critical challenges in accurately transcribing spoken language and understanding

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the underlying emotional and sentiment context. Variations in accents, background noise, and complex linguistic nuances often lead to errors and misinterpretations. Additionally, current systems lack the ability to fully grasp and respond to the emotional tone of conversations, which is essential for applications such as customer service, virtual assistants, and mental health support. This paper proposes an Integrated Speech Recognition approach to address these challenges.

The main goal of the proposed system is to identify WHO is speaking, WHAT was spoken and HOW it is spoken. It aims to redefine user interactions with technology by seamlessly integrating speech recognition, sentiment analysis, and emotion detection functionalities. A key feature of this system is its ability to transcribe audio inputs into text before conducting emotion and sentiment analysis.

Major Contributions

The major contributions of the study are mentioned below:

- Convert spoken language into text for input.
- Determine the sentiment (positive, negative, or neutral) expressed in the speech using Deep Learning model.
- Recognize emotions (e.g., happiness, sadness) conveyed in the speech.
- Provide visual feedback on sentiment and emotion analysis results.

2. RELATED WORK

To develop an advanced Speech Recognition Assistant, understanding the evolution and advancements in speech transcription, sentiment analysis, and emotion detection technologies is essential. This literature survey delves into the historical development, working principles, and advantages and disadvantages of these technologies, providing a foundation for their integration into a cohesive system.

The journey of speech transcription technology began with simple rule-based systems in the early 20th century. The introduction of Hidden Markov Models (HMMs) in the 1970s marked a significant advancement, enabling better handling of time-sequenced data.

The real breakthrough in speech transcription came with the advent of deep learning techniques, mainly Recurrent Neural Networks (RNNs) and Long Short-Term Memory (LSTM) networks. Hannun et al. in 2014 introduced Deep Speech, a deep learning-based approach using RNNs that significantly improved transcription accuracy. However, it still faced challenges with accents and background noise. Amodei et al. in 2016 further improved performance with Deep Speech 2, leveraging larger datasets and advanced training techniques.

Google's Deep Speech, utilizing RNNs, set new benchmarks by achieving high accuracy even in noisy environments. The integration of Google Cloud Speech-to-Text in modern applications leverages these advancements, providing robust real-time transcription capabilities. Despite its high accuracy, speech transcription still faces challenges with accents, dialects, and homophones.

Sentiment analysis has emerged from rule-based systems to refined machine learning models. Initial methods lacked context understanding, leading to limitations in detecting subtleties in language. Machine learning techniques, such as Convolutional Neural Networks (CNNs) and Recurrent Neural Networks (RNNs), improved sentiment classification accuracy. Socher et al. in 2013 introduced a recursive deep model capturing compositional effects in language, although requiring large, annotated datasets and facing challenges in detecting sarcasm and irony.

Emotion detection has seen advancements through deep learning, Bidirectional Long Short-term memory (LSTM) networks, and transformer models like BERT. Felbo et al. in 2017 introduced DeepMojī, leveraging transfer learning for accurate emotion detection, albeit demanding extensive training data. Poria et al. 2017 proposed a multimodal approach integrating text, audio, and visual data, enhancing emotion detection effectiveness but increasing computational costs. These sophisticated models developed using tools like TensorFlow and Keras, face challenges in distinguishing closely related emotions and understanding subtle emotional expressions.

Table 1. Comparative analysis of previous work

Reference	Technique Used	Contribution	Limitation
Hannun et al. (2014)	Deep Speech (RNN)	Significant improvement in transcription accuracy with deep RNNs	Struggles with accents and background noise
Amodei et al. (2016)	Deep Speech 2 (Bidirectional LSTM-RNN)	Enhanced performance using larger datasets and advanced training techniques	Computationally intensive and requires substantial data for training
Socher et al. (2013)	Recursive Deep Model	Improved sentiment prediction by capturing compositional effects	Requires large annotated datasets and may struggle with sarcasm and irony
Felbo et al. (2017)	DeepMojī (Transfer Learning)	High accuracy in emotion detection using transfer learning	Computationally intensive and requires extensive training data

In this study, following research gaps have been identified:

- **Accuracy in Diverse Conditions:**

Modern speech recognition systems, while improved, still face challenges with different accents, dialects, and background noise. These issues can lead to errors in transcription, making the systems less reliable in real-world scenarios. Misunderstandings caused by complex speech patterns and similar-sounding words can also occur, further complicating effective communication.

- **Lack of Emotional and Sentiment Analysis:**

Most current systems focus solely on transcribing speech to text without analyzing the emotional tone or sentiment behind the words. This gap means they can't respond appropriately to the speaker's emotional state. For example, in customer service, recognizing whether a customer is frustrated or happy could significantly enhance the interaction and response.

This paper aims to fill the identified research gaps by proposing an Integrated Speech Recognition System capable of accurately transcribing speech while simultaneously analyzing sentiment and detecting emotions.

3. THE PROPOSED SYSTEM

The proposed system presents a ground-breaking approach by integrating speech-to-text conversion, sentiment analysis, and emotion detection into a unified platform. Users have the flexibility to either upload their voice for automatic transcription or input text directly. Once the text is obtained, the system seamlessly conducts sentiment analysis to evaluate the emotional context, followed by sophisticated emotion detection algorithms to identify nuanced emotions expressed within the text. By consolidating these functionalities, the proposed system streamlines the user experience, eliminating the need for multiple tools and

providing a comprehensive solution for understanding and analyzing spoken and written communication.

The proposed system offers the following functionalities accessible to individual users who interact with the system:

- **Speech-to-Text Conversion:** Users can upload audio files or speak directly into the system, which then converts their spoken words into written text.
- **Text Input:** Users can input text directly into the system for sentiment analysis and emotion detection.
- **Sentiment Analysis:** The system analyses the text input by users to determine the sentiment expressed, such as positive, negative, or neutral.
- **Emotion Detection:** Emotion detection algorithms identify and analyze the emotions conveyed in the text, providing insights into the emotional tone of the communication.
- **Data Visualization:** Users may have access to visualizations or graphical representations of sentiment and emotion analysis results to aid in understanding and interpretation.

3.1 Dataset

A dataset for emotion detection and sentiment analysis was obtained from Kaggle. The dataset "*tweet_emotion.csv*" contains 40,000 entries and consists of four columns:

- 1) **tweet_id:** An integer representing the unique identifier for each tweet.
- 2) **Sentiment:** A categorical variable representing the sentiment expressed in the tweet. Possible sentiments include "empty", "sadness", "enthusiasm", "neutral", worry, etc.
- 3) **Author:** A string representing the username of the tweet's author.
- 4) **Content:** A string containing the text of the tweet.

The dataset can be used for tasks such as sentiment analysis, natural language processing, and emotion detection in text. This dataset contained uncleaned text samples sourced from twitter platform. The dataset served as the foundation for training the models for emotion detection and sentiment analysis.

The critical component of this study is Natural Language Processing (NLP), allowing the system to fathom and interpret human language. Following the dataset acquisition, extensive preprocessing operations were performed to clean and standardize the text data. These operations included text normalization, tokenization, and removal of stop-words, punctuation, and special characters. Tokenization breaks down the text into smaller, which are then converted into numerical representations. Additionally, techniques like stemming or lemmatization were applied to ensure consistency and uniformity in the dataset. Feature extraction techniques, capture the semantic meaning of words, allowing the model to fathom context and sentiment/emotion. The preprocessing phase was essential to prepare the data for effective training of the model and to enhance the accuracy and reliability of the emotion detection and sentiment analysis algorithms.

3.2 Modelling Architecture for Deep Learning Model

The deep learning model architecture for sentiment analysis and emotion detection was carefully crafted to achieve optimal performance. Bidirectional LSTM networks were chosen for their ability to capture past and future context and long-term dependencies in sequential data effectively. Bidirectional Long Short-Term Memory (BiLSTM) is an advanced version of the Recurrent Neural Network (RNN) which employs two independent LSTM layers: 1) Forward LSTM that processes the sequence from the first element to the last, and 2)

Backward LSTM that processes the exact same sequence in reverse, for retaining information across longer sequences. The architecture includes multiple layers of LSTM units with dropout regularization to prevent overfitting. This model was trained on the pre-processed text data to classify sentiments and detect emotions accurately. Additionally, visualizations were created to provide insights into the detected emotions and sentiment analysis results.

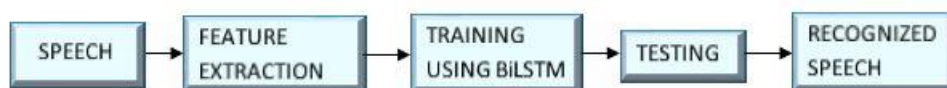


Figure 1: Speech Recognition System

For the successful implementation of the proposed System, the following input requirements were essential:

Audio Data Input:

- **Format:** The system should accept audio inputs in various standard formats such as WAV.
- **Sampling Rate:** The audio input should have a sampling rate of at least 16 kHz for optimal performance.
- **Channel:** Mono or stereo channels, with mono being preferable for better speech recognition accuracy.
- **Duration:** The system should handle audio inputs ranging from short clips (a few seconds) to longer recordings (up to few minutes).

Language Support:

- **Languages:** Initially, the system will support English. Additional language support may be added based on demand.
- **Accents and Dialects:** The system should recognize and accurately transcribe various accents and dialects within the supported languages.

Environment Considerations:

- **Noise Levels:** The system should be capable of handling background noise up to a certain threshold. However, extremely noisy environments may require additional noise-cancellation hardware.
- **Microphone Quality:** A good-quality microphone is recommended to ensure clear audio input. Built-in laptop microphones or external USB microphones are preferable.

User Interface Input:

- **Text Input:** The interface should allow users to input text manually for cases where audio input is not feasible.

The web application is designed to be intuitive and user-friendly. Users can input text, record or upload audio files directly through the interface. The submitted text or audio is processed, and the extracted features are fed into the machine learning model. The model's predictions are then displayed to the user.

4. EXPERIMENTAL RESULTS AND DISCUSSION

The proposed system has been evaluated on Kaggle Notebook which operates as a fully interactive and cloud based Jupyter environment. Following Python Libraries and Modules for preprocessing, feature engineering, and model training has been utilized for implementation:

SpeechRecognition: Python library for speech recognition functionality.

Scikit-learn: Machine learning library for sentiment analysis and machine learning tasks.

NLTK (Natural Language Toolkit): Python library for natural language processing tasks.

TensorFlow: TensorFlow for building deep learning model architectures

The Google Speech-to-Text API was integrated for speech recognition functionality. The coding process involved writing scripts for preprocessing of data, model training, and integration of various components into a cohesive system. Extensive testing and debugging were conducted to ensure smooth integration and proper functioning of the speech recognition system. VSCode has been used for developing the user interface. Flask has been utilized for integrating the machine learning model into the web application.

4.1 Evaluation Metrics

This study has evaluated the system's performance in transcribing speech to text, detecting sentiment, and identifying emotions, and analyze its effectiveness in providing accurate and meaningful insights. The metrics used for evaluation, to assess the performance of the system, include:

- **Precision:** Precision measures the proportion of correctly identified sentiments and emotions out of the total detections. It indicates the accuracy of the system in generating true positive detections.

$$\text{Precision} = \frac{\text{True Positive}}{\text{True Positive} + \text{False Positive}}$$

- **Recall:** Recall measures the proportion of correctly identified sentiments and emotions out of the actual instances present in the speech data. It reflects the system's ability to detect true positive instances.

$$\text{Recall} = \frac{\text{True Positive}}{\text{True Positive} + \text{False Negative}}$$

- **Accuracy:** Accuracy measures the overall correctness of the system's transcriptions and detections, considering both true positive and true negative instances. It provides an overall assessment of the system's performance.

$$\text{Accuracy} = \frac{\text{True Positive} + \text{True Negative}}{\text{True Positive} + \text{True Negative} + \text{False Positive} + \text{False Negative}}$$

- **F1 Score:** The F1 Score is the harmonic mean of precision and recall, providing a single metric that balances both accuracy and completeness in the detection of sentiments and emotions.

$$\text{F1 Score} = 2 * \frac{\text{Precision} * \text{Recall}}{\text{Precision} + \text{Recall}}$$

Table 2. Performance Metrics of proposed Speech Recognition System

Accuracy	Precision	Recall	F1 Score
0.85	0.87	0.84	0.85

These results show the performance of the proposed Speech Recognition System on *tweet_emotion.csv* dataset, highlighting their accuracy, precision, recall and F1-score values. Accuracy value of 0.85 means that model correctly predicts about 85% of spoken words or commands. Precision score of 0.87 indicates that 87% of words or intents identified by the

model are correct. Recall value of 0.84 indicates that the model successfully identifies or transcribe 84% of all actual words or commands. F1 Score of 0.85 is the indicator of good performance of the system. The strong performance across multiple metrics demonstrates the effectiveness of this model in accurately transcribing speech to text, detecting sentiments and identifying emotions.

- **Emotion Detection:** The model distinguishes between the emotions based on the patterns it has learned during training, such as specific words, phrases, and context that are indicative of each emotion label (Neutral, Happy, Sad, Love, Anger). When the model processes an input text, it outputs a probability distribution over these five emotion labels using the SoftMax activation function. The label with the highest probability is selected as the predicted emotion. This probabilistic approach allows the model to account for the nuances and complexities of human language, making it capable of accurately detecting and classifying emotions based on the textual input.

- **Sentiment Analysis:** The model maps detected emotions to corresponding sentiments. Emotions are categorized into positive, negative, or neutral sentiments based on predefined groups. Positive sentiments include emotions like 'Happy' and 'Love,' while negative sentiments cover 'Sad' and 'Anger.' Neutral sentiment corresponds to the 'Neutral' emotion. This categorization is implemented using a function that takes the predicted emotion as input and returns the corresponding sentiment. By classifying emotions into broader sentiment categories, the system provides a more generalized understanding of the emotional tone of the text.

The following histograms represent the distribution of detected sentiments and emotions, providing a clear visual overview of the system's performance.

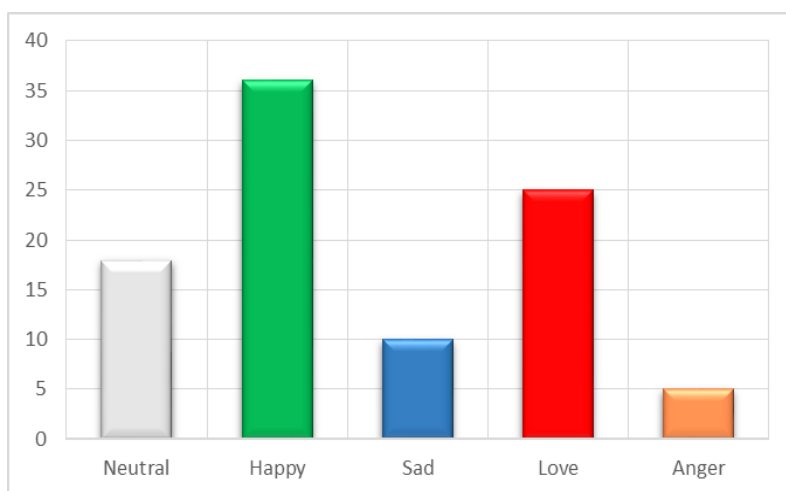


Figure 2. Histogram representing the distribution of detected emotions

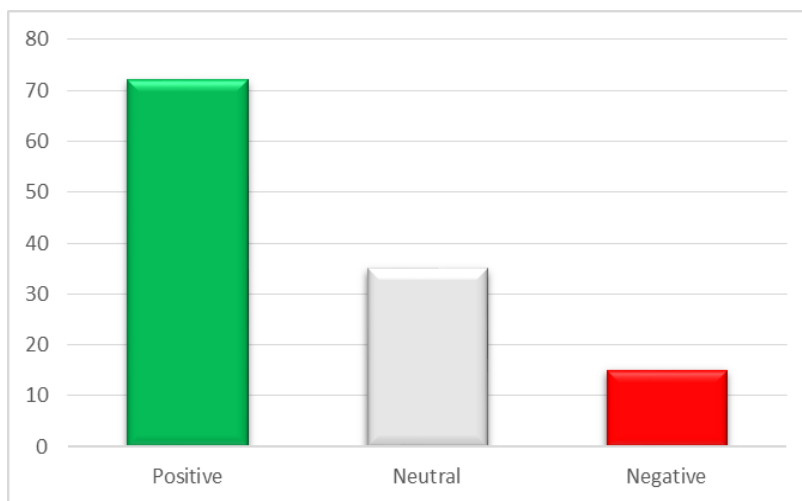


Figure 3. Histogram representing the distribution of detected sentiments

5. LIMITATIONS AND FUTURE SCOPE

Limitations:

While the system supports various accents and dialects, it may struggle with highly uncommon or very strong accents, leading to reduced transcription accuracy. Performance can be affected by high levels of background noise, which can interfere with speech recognition and sentiment analysis. The system may have difficulty understanding complex or context-dependent expressions, potentially leading to inaccurate sentiment or emotion detection. Emotion detection can sometimes be ambiguous, especially in cases where the context is neutral or mixed with multiple emotions. Initially, the system primarily supports English, with limited capabilities for other languages. Expanding language support requires additional development and training.

Future Scope:

To further enhance the capabilities of this system, several future extensions have been proposed. Develop advanced models and training techniques to better handle a wider range of accents and dialects, improving transcription accuracy. Implement more sophisticated noise reduction algorithms to minimize the impact of background noise on speech recognition and analysis. Integrate additional data sources such as facial expressions and body language to provide a more comprehensive analysis of emotions and sentiments. Extend support to multiple languages and dialects by training models on diverse linguistic datasets, making the system more accessible globally. Improve the system's ability to understand and analyze context-dependent speech by incorporating context-aware natural language processing techniques. Enhance integration capabilities with other applications and platforms, such as customer relationship management (CRM) systems, educational tools, and healthcare management systems. Develop advanced analytics and reporting features that provide deeper insights into sentiment trends, emotional patterns, and overall communication effectiveness implement machine learning models that continuously learn and adapt based on user interactions and feedback, ensuring the system remains up to date with evolving speech patterns and expressions. Create mobile applications for both iOS and Android platforms, allowing users to access the system's features on-the-go.

6. CONCLUSION

The Integrated Speech Recognition System offers several advantages and special features that set it apart from other similar systems. The proposed system utilizes advanced speech recognition technology, to provide highly accurate transcriptions even in diverse and noisy environments. It is capable of real-time speech-to-text conversion and sentiment analysis, ensuring immediate feedback and insights. It employs sophisticated Bi-LSTM networks to analyze sentiments (positive, negative, neutral) and detect a wide range of emotions (happiness, sadness, anger, etc.) from speech data. This system displays results with clear visualizations, including emotion detection templates, sentiment types, and histograms, to facilitate easy interpretation of data. Its intuitive and easy-to-use interface allows users to effortlessly record, upload, and analyze speech data. It is suitable for a wide range of applications across various industries, such as customer service, healthcare, education, business meetings, media, legal, and market research.

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Web-based resources:

1. <https://app.diagrams.net/>
2. <https://codebasics.io/>
3. <https://monkeylearn.com/>
4. <https://stackoverflow.com/>
5. <https://www.analyticsvidhya.com/>
6. <https://www.geeksforgeeks.org/>
7. <https://www.kaggle.com/>
8. <https://www.kaggle.com/datasets/pashupatigupta/emotion-detection-from-text/>
9. <https://www.techtarget.com/>
