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Reflections of animal behaviour: through the *Ice Age* movies

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ABSTRACT

Ice Age, a series of animation films produced by 20th Century Fox studios, deals with the adventure of Manny: the mammoth, Diego: the sabre-toothed tiger, and Sid: the ground sloth that lived in the ice age. The current study concerns these now-extinct animals, as shown in the first three films of the series, representing mainly Pleistocene-era species. Moreover, the behaviour of animals that can be learnt from these films or their deviation from reality is also highlighted in this study.

KEYWORDS: Ice Age, Prehistoric animals, behaviour

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1. INTRODUCTION

Ice age refers to the period when wide-ranging ice sheets covered both the hemispheres of the earth. Briefly, it can be defined as the period when the temperature of the earth's surface was continuously lower than normal (5-10 degree lower than modern day world) for a very long period resulting in spreading of glaciers. The low temperature did not allow the ice to melt even during summer and this caused the snow to accumulate and spread far. Five major ice ages, namely Huronian, Cryogenian, Andean-Saharan, Karoo Ice Age, and Quaternary has been recognized.^{1,2} To the common people, the Pleistocene (2,588,000 to 11,700 years ago) of the Quaternary period is often referred to as Ice Age. The climate did not remain uniformly cold, rather "glacial" periods alternated with "interglacials" or slightly warmer periods.³

1.1 Life forms during Pleistocene Ice age

The vegetation during the Ice age was scant and mainly consisted of scattered conifers, some broadleaf trees, grasses, a few shrubs, herbs and orchids.⁴

The La Brea Tar Pits in Los Angeles is a hotspot regarding the animal life in Pleistocene as it is a storehouse of a large number of fossils.⁵ The animals found during the Ice age included mammals such as woolly mammoth, sabre-toothed cats (*Smilodon*), giant ground sloths (*Megatherium*), mastodons, etc, birds capable of flight (geese, eagle etc.) and flightless ones too (ostrich, rhea etc.); reptiles included lizards, turtles, crocodiles etc. A dinosaur like bird, Titanis, was also found during this period. Most importantly, humans emerged during this epoch.

This period also saw mass extinction (late Pleistocene to early Holocene) resulting in the loss of greater than three-fourths of the megafauna. Several hypotheses were put forward for the large scale extinction including climate change, hunting practices of the emerging and rapidly spreading *Homo sapiens* or extraterritorial connections. The animals that were wiped out included woolly mammoths, sabre-toothed tigers, woolly rhinoceros, mastodons etc. Neanderthals, a close cousin of the *Homo sapiens*, also faced extinction during this period.

1.2 Ice Age- the franchise

Ice Age, a series of animation films made by Blue Sky Studios owned by 20th Century Fox, is about the friendship between Manfred, alias Manny, a woolly mammoth; Diego, a sabre-toothed carnivore; and Sid, a loquacious sloth. Concurrent with this primary plot of friendship runs the subplot of the antics of Scrat, the squirrel, whose relentless running after acorns leads to epochal disasters like the creation of the continents. Five films have been released in the series thus far, namely *Ice Age* (2002), *Ice Age: The Meltdown* (2006), *Ice Age: Dawn of the Dinosaurs* (2009), *Ice Age: Continental Drift* (2012), and *Ice Age: Collision Course* (2016). The sixth instalment, *Ice Age:*

The Kidnapping expected in 2019. The present study is limited to the study of animals and their behaviours and idiosyncrasies as shown in the first three movies.

1.2.1 Ice age (2002)

The first film of the series is directed by Chris Wedge and co-directed by Carlos Saldanha from a story by Michael J. Wilson that begins with a south-bound migration of mammals to escape the upcoming ice age. Sid, left behind by his family in the process, meets Manny who travels in the opposite direction, and decides to follow him. In course of their journey, Manny and Sid rescue a baby which was taken by its mother into a suicidal leap in a desperate bid for life when a group of sabre-toothed tigers attacked their camp. Manny and Sid decide to search out its father and return the baby. But their mission is problematised when, Diego, one of the tigers that attacked the humans, stakes claim over the baby. The three form an uncomfortable association and Diego joins the journey. We are also introduced to Scrat whom we see busy protecting his acorn.

1.2.2 Ice Age: The Meltdown (2006)

In this second instalment, directed by Carlos Saldanha and Mike Thurmeier, Manny, Sid, and Diego discover that the Expansive valley they are living in, is surrounded by walls of ice that are precariously protecting them from a massive body of water that could flood the valley and drown them all. On being tipped about the presence of a boat at the other end of the valley, but with the meagre deadline of three days to reach it, they set out on the near-impossible adventure. Manny internally suffers from the apprehension of being the last mammoth alive. Along the way, they meet Ellie, a female mammoth who confuses herself as a possum. Alongside the journey, Scrat continues his personal adventure with his precious acorn.

1.2.3 Ice Age: Dawn of the Dinosaurs (2009)

Manny and Ellie are expecting their first child, while Diego and Sid move out of the herd and part ways in this third film which is directed by Carlos Saldanha. Sid wishes for a family of his own and steals three giant eggs belonging to a dinosaur which leads him to a strange underground world from where his herd must rescue him. While searching for Sid they meet Buck, a one-eyed weasel who guides them through the underground world. Scrat falls in love and is married to Scratte, another squirrel, but in the end his love for the acorn wins over his love for his wife.

2. THE CHARACTERS AND THEIR BEHAVIOUR

2.1 The protagonists of the film - their real-life Pleistocene parallels

Manny, a woolly mammoth, represents the *Mammuthus primigenius*, an extinct species that lived during the Pleistocene epoch. These mammoths 10-12 feet in length, weighed 6-8 tons, had

long curved tusks and a fur covered body with unusually small ears and tails. These features point that they were well adapted to the cold climate during ice age. Being the ancestors of modern elephants, they obviously shared the same feeding habit and many other similarities with modern elephants, but the largest of them probably generally outweighed elephants.⁶ Mammoths were spread over a large area including the cold Siberia and Alaska while elephants have always been restricted to warmer areas of Africa and Eurasia. Also, tusks of mammoths were typically longer in proportion to body size and more noticeably twisted and curved than the tusks of elephants.⁷

Diego, the sabre-toothed cat/tiger, belongs to the species called *Smilodon* that existed in America in the Pleistocene period. The name “sabre toothed” was because of the presence of large upper canines which were visible even with the mouth closed. They were very different from the tigers we see today and, with a muscular body, resembled the bear instead. The *Smilodon* species, equipped with shorter and much more powerful limbs, brought down the prey usually with their powerful forelegs and then used the sabre teeth to kill it. Unlike the modern day cats, they could not run very fast and instead relied on their powerful forelegs for killing the prey. They were probably social creatures living in packs (as shown in the first film) very much like the modern day lions.⁸ They were carnivores who fed on mammoth, sloths, rhinos etc.

Sid seems to represent either the *Megatherium* or the *Megalonyx*, both species of the ground sloth found during Pleistocene. *Megatherium* is the largest known ground sloth having a stout skeleton with a large pelvic girdle, a broad muscular tail along with powerful hind legs to support the body weight and enable bipedal locomotion, and claws which were used in obtaining food. Sid is more likely a representative of the *Megalonyx*, a comparatively medium sized ground sloth was about 9.8ft long and weighed about a ton.⁹ It was similar to *Megatherium* in other features except size, like having a blunt snout, peg like teeth, massive jaw, claws in forelegs, powerful hind legs and tail with plantigrade hind limbs. As their name suggests and unlike the two-toed modern day sloths, they lived on the ground instead of trees.

Scrat, a fictional character, has recently found a relative in the fossil of a sabre-toothed squirrel obtained from Río Negro of Argentina. The mouse sized animals had super long fangs (approx. 5 mm), large eyes, long snout and a fox-like tail. The animal was named *Cronopio dentiaceutus* after the fictional characters in the stories of Argentine writer Julio Cortázar, and due to the presence of sharp, acute teeth respectively.¹⁰ The similarity with Scrat was probably superficial because unlike Scrat who loved nuts, they fed on insects, grubs, other kinds of invertebrates and small vertebrates. The use of the sabre tooth is unknown but it was definitely not used to kill prey as the size of the skull did not support it.

2.2 Animals and their behaviour - Movie and reality

Right from the beginning, the *Ice Age* movies highlight behaviour peculiar to squirrels through Scrat, the sabre-toothed squirrel's obsessive habit of storing nuts. As projected, squirrels usually feeds on seeds and nuts but may also feed on insects and even small vertebrates.¹¹ Another peculiarity of Scrat, namely of his striking agility in climbing steep heights with the acorn strongly held in his hand, as shown in the films, is true to the trait of this species as they are known to have sturdy claws for grasping (holding on to the nut for life as shown) and climbing (climbing steep slopes of ice with nut).¹² Scrat's track, without any direct bearing upon the main plot, is mostly an embellishment aimed at humouring the audience through Scrat's risible antics, in his desperate try to hold on to the nut even at the cost of the breakup of the ice dams, going underwater and even risking its own life.

At the end of *Ice Age – The Meltdown*, instead of being grateful to Sid for saving his life, is livid on being forcibly isolated from the giant acorn he was about to take hold of the heaven of nuts in his trance. Though Scrat is shown to be a red squirrel, it is not known whether burying of nuts were an indication for “larder hoarding” habit of the red squirrels or he is rather like the gray squirrels tending to forget their hiding place after burying.¹³ The movie may be indirectly indicating the latter behaviour. Sid's love for nut gets a bit dented in *The Dawn of Dinosaurs* as he falls for a red flying squirrel, but in the end his love of nut wins and he ditches his wife for the same.

Sid, the sloth, is referred to as the overgrown weasel by the rhinos for its giant size (as seen during the Pleistocene). Sloths are named after the cardinal sin of sloth because they are characterised by lethargy and are slowness in their activity.¹⁴ Sloth in Sid is evident as he is blissfully asleep while other animals are busy migrating, leading his so-called family to abandon him two years in a row. Sid's supineness is even more unmistakable when we find him “too lazy to hold a grudge” against Diego when he learns that the tiger is truly regretful of his behaviour of leading them to danger in the first film. (The laziness sloths are notorious for gets a remarkably vivid depiction in another Disney animation blockbuster, *Zootopia* (2016) as well, where everything the sloth does, including talking, is rendered in an acutely slow motion). The languorous nature of Sid is due to its metabolic adaptations for conserving energy. However, Sid's strikingly uncharacteristic briskness in the face of danger, as manifested in his escape with food (melon) for the crying baby, when cornered by the dodos, and in saving the baby from the group of sabre-toothed cats (though pre-planned), is another fact that conforms to the reality of the unexpected bursts of speed sloths are capable of during emergency flights from predators.¹⁵ Other notable traits of sloths that find correct manifestations in Sid include their strong body and their ability to swim.

Apart from the species represented by the main characters, the films also feature some other species. Dogs (more akin to wolves) keep a watch over humans and alert them of any danger just as watchdogs of the modern world.¹⁶ They are seen to alert their human companion twice, first during the attack of the tigers and second when Manny comes to return the child. They are also trained to hunt as they chase the tigers when the latter attack men. Their strong olfactory sense¹⁷ is indicated when they are made to sniff the necklace tied around the baby, once, soon after the baby Pinky is lost and again, long after, during their travel through the snow to the glacier pass in their attempt to find Pinky.

The flightless Dodo, ironically conspicuous for its extinct status, also makes a brief appearance in the film. The film remains faithful to facts by basing the Dodo's physical features on the generally established concept of a fat and gauche bird.¹⁸ The film rightly shows the bird, found in the coastal areas of Mauritius in reality, to be a ground dweller. Abundance of food along with absence of predators may be the probable reasons of the inability of the bird to fly. Its food comprised mainly of fruits (shown here to store a melon for the upcoming ice age), nuts, seeds and roots.¹⁸ The birds' "greedy" appetite is well depicted in the film when they do not want to spare a single melon for the hungry baby. All researchers do not agree with the birds so called "greedy" nature and believe that the weight of the birds fluctuated in the wild; images that are found are of overfed or overstuffed specimens.

Among the animals migrating towards the boat were dung beetles carrying dung while migrating. Dung beetles, belonging to species Scarabaeoidea, are so named as they feed on dung and hence carry dung heavier than themselves, on their backs.¹⁹ Most beetles search for dung using their acute olfactory sense. There are three types of dung beetles –rollers, tunnelers and dwellers. Rollers roll dung into round balls, tunnelers bury the dung wherever they find it and the dwellers simply live in manure. They play a remarkable role in agriculture and forest ecosystems, as they improve soil structure and nutrient recycling, help in the dispersal of seeds, if present, and protect cattle from pests by removing their dung.^{20,21}

Ellie's friends Crash and Eddie are possums. Possum or opossum, a marsupial endemic to the Americas, are solitary, nomadic, nocturnal animals that sleep during the day in hidden and dark places.²² They fake sick or dead animals ("play possum") when threatened. "Playing possum", is not done consciously, it is an involuntary action that the animals possess to save themselves from danger. The indications include drawing of the lips backwardly, baring of teeth, foaming around the mouth, closing of the eyes and secretion of a putrid liquid from the anal glands. The body becomes stiff and anyone touching them will feel that they have been dead for quite some time; consciousness is usually gained with the twitching of the ears.²³ When Crash and Eddie see a hawk

(Meltdown) and dinosaur (Dawn of the Dinosaurs) they play dead to save themselves because, as Ellie (a mammoth who thinks herself as a possum) points out, “To a possum bravery is just dumb”, indicating that their adaptability to danger is to play dead rather than confront danger. But when the possums in the film are shown hanging from the trees by their tails when sleeping, it becomes a deviation from reality. Tails are used for support in climbing and though small possums can dangle by their tails for a fraction of a minute, it is not possible for them to hang for long, lest even sleep, as their tail is too weak to support the weight of their body.²⁴

Buck, the temporary addition to the herd in the third film, is a weasel, a mammal of the genus *Mustela*, family Mustelidae. They are small, nocturnal predators, with long and slender bodies and short legs.²⁵ Buck is a skilled climber and runner reflecting the true character of weasels. Weasels are on a constant run and spend their time hunting and eating as their bodies are unable to store fat; this is reflected in Buck’s slender body, speaking with great speed, fast movements and restlessness on screen.

2.3 Ecological and Behavioural Aspects in the film

2.3.1 Migration

The movie starts with migration of animals. All the animals, (dinosaur-like creatures, woolly rhinos, giant armadillos etc.) of the area are shown hurriedly migrating south. Migration is a two-way movement of a population on a seasonal basis.²⁶ Migration may occur due to the changes in the climate of the area, for scarcity of food or for mating reasons.²⁷ In the film, all the animals are migrating (except Manfred who is going the opposite way and Sid who is left out by his so called family) along with their families to escape the change in weather due to the incoming ice age which is why “... the things are getting chiller”. While migrating, the giant armadillo predicts that ice age will be an “evolutionary breakthrough”, which it indeed turned out to be in reality.

2.3.2 Global Warming

Global warming is defined as an increase in the average temperature of the surface of the earth.²⁸ The emission of huge quantities of greenhouse gases and other air pollutants mainly from vehicles and industries trap the solar radiations reflected from the surface of the earth and cause increase in the temperature of the earth’s atmosphere. This increased temperature causes the melting of glaciers, rising of sea levels resulting in drowning of low lying areas.

Global warming also finds a mention in the *Ice Age* movies, specially the second film revolves around it as can be understood from the name itself *Ice Age – The Meltdown*. At the end of the first movie, Sid is very much upset with the cold ice age and wants “global warming”. After 20,000 years ice melts and Scrat is shown floating in the sea within an ice cube along with his

cherished nut. In the beginning of the second film, a large but fragile (sounds of water could be heard) ice wall is seen which collapses where Scrat is trying to bury the nut, letting streams of water flow out with great force. Different animals, unable to gauge the significance of the phenomenon, is seen basking in this warmth after the ice age as they engage in water sports in the melting ice and some elephant like creatures even mention “global warming” is killing him. In the film, global warming is depicted as the end of ice age though in reality the phenomenon is caused due to increased emission of green house gases. Whatever the cause, the outcome in the film is similar to reality, i.e. occurrence of flood due to rise in sea level, thereby, to avoid drowning; the animals had to migrate to a boat higher up the valley.

2.3.3 Herbivory and body size

Mammoths and rhinos are herbivores yet they have a large body. Sid says Manny the mammoth is probably “stressed” so it eats much otherwise it “is hard to get fat on a vegan diet”. Sid comments on the fact that a mammoth eats vegetarian food but then too it is fat. Also, the giant rhinos say that they mean to kill Sid but not eat him as they were herbivores by nature. The fossil record and Earth’s living biodiversity is littered with massive herbivores.²⁹ Herbivores feed on plants which contains cellulose as one of its main components. As it is not easy to digest cellulose, animals need suitable digestive organs to digest the same. Some dedicated herbivores have ruminant stomachs (may contain up to four compartments) involving regurgitation and chewing to ferment their food ahead of digestion. The large size of some herbivores may be to provide room for the appropriate digestive organs. Also, bigger size ensures an elongated digestive system providing the animal with increased time for breakdown and digestion of cellulose.

2.3.4 Carnivory – Predator prey relationship and motivation

Diego, sabre- toothed tiger is carnivorous and chases deer in *The Dawn of Dinosaurs* highlighting the predator - prey relationship. It is also shown to prey on humans in the first film (though mainly shown as revenge but weather conditions are harsh indicating shortage of food and humans as easy prey). A predator is an organism that feeds on another organism whereas prey is the organism fed on by the predator.²⁸ The sabre toothed cats uses stealth to draw the humans away from the child thus paving a clear path for Diego to attack the baby. Stealth, speed, camouflage etc. are employed by the predator to catch its prey. They also have good ocular, olfactory or auditory sense in locating the prey. Diego’s excellent tracking capabilities earn him the name of “uber tracker” from Manny. The prey in turn too evolves the above characteristics to avoid being eaten.³⁰ The possums, Crash and Eddie, play dead on seeing a dinosaur and hawk, their predators thus using both stealth and camouflage. Therefore, predator-prey relationship can be considered as a perfect

example of co-evolution. The faster a sabre-toothed tiger is, more is its chance to catch a deer and as fast a deer is, the more is its chance to escape the tiger. Both the animals become faster in the course of evolution without changing the predator-prey relationship. This may be the reason that the modern-day cats are faster than sabre-toothed tigers and use their speed to catch prey instead of their powerful forelegs and large canines which has undergone modification in the course of evolution.

Plants can also be carnivorous in their feeding habit. Such plants as Venus flytrap, pitcher plant are shown in the third movie. Though in reality the plants are actually insectivorous here the Venus flytrap is shown to trap tiger and mammoth nonetheless pointing to their non-vegetarian diet. These plants secrete a juice after trapping the insect for digesting the same as shown in the film.³¹

Predator does not attack prey just on seeing them but does so only when it is hungry. Even herbivores feed on plants only when they are hungry. Hunger is the sole factor that motivates organisms to search for food and attack/feed prey/plants after sighting them. Motivation is the factor that forces an animal to behave in a goal-oriented way. It involves internal as well as external stimuli for the animal to behave in a particular way.³² The brain senses a change in the animal's internal state (feel of hunger or thirst), which leads to a build-up of drive for the animal to perform the appropriate behaviour. The drive gives rise to appetitive and consummatory behaviour including a search for suitable external stimuli (attacking the prey or finding water source) and satisfying the internal stimuli (by eating the prey or drinking water).

2.3.5 Scavenging Behaviour

A vulture, in *Ice Age – The Meltdown*, is seen warning the animals that the flood is real and then says “The more of you die, the better I eat”. Another group of vultures, en route to the migratory pathway, sings “Food, glorious food” indicating that it is a scavenging bird of prey feeding on carrion and may kill sick or dying animals.³³ In the film, they see a huge number of animals migrating towards the boat to save themselves, but the journey is tough tiring the animals and the vultures are rejoicing at their imminent death as it means food in plenty for them. They eat till their crops bulge and then sit quietly, half-sleepy and digest their food. The acid present in their stomach is extremely acidic and helps them in digesting the rotten bodies infected with bacteria and other microorganisms that would have been fatal for others.³⁴

2.3.6 Herding behaviour

A herd is a social grouping of certain animals of the same species, formed naturally (in case of wild animals) or artificially by human involvement (in case of domestic animals).²⁶ The herd in *Ice Age* is referred to as “weirdest herd” by Sid and “Do we look like a normal herd to you?” by Diego

because it is composed of different animals like mammoth (Manny and Ellie), sabre-toothed tiger (Diego), sloth (Sid) and possums (Crash and Eddie) whereas in reality herd members must belong to the same species. Another temporary addition to the herd was the weasel Buck (Buckminster). Manny's craving of a family and his sorrow on being isolated from his parents reflects the fact that mammoths/elephants live in a herd. Sid wants respect from his friends by saying "I made this herd, so you need to start treating me with some respect". Diego pays a fitting tribute to Sid by saying "His herd needs him. He is the gooey, sticky stuff that holds us together. He made this herd and we would be nothing without him".

Animals tend to form herds as they offer improved foraging and reproductive opportunities as the members divide the work among themselves. The weird herd of the film had different food habits so in terms of foraging the formation of herd was not advantageous but Sid and Diego did help Manny in finding Ellie and during the birth of their daughter. That the herd provides companionship was mainly depicted in the film when Sid and Diego helped Manny forget his loneliness. Manny and Sid also help Diego to become a better individual. A herd also offers more protection against predators, as the probability of detecting the predator increases with increasing members. This altruism, in which an animal alerts another at an expense of his own, is well depicted in the film where Manny saves Sid from being killed by the rhino.^{28,35} Crash and Eddie are protected by Ellie. In a herd a member tries to help the other members by giving alarm calls/signs in danger. They have fellow feelings and try to save a member when it is hurt or sick. They surround it offering it food and protection but if it too fragile to move on they resume their journey. The sick member, if fit and living may later join the herd. Here Manny saves Diego from being drowned in the lava (when asked by Diego why he did it Manny answers "That's what you do in a herd....Look out for each other") which Diego returns by saving Manny from other tigers when they corner him (when asked by Manny why he risked his life he answered "That's what you do in a herd"). In the process, Diego is hurt and urges Manny and Sid to move on with the child which they finally do. Diego later joins the herd when he is fit which many members of the herd do too. Manny and Diego saves Sid from jumping off the Eviscerator and also travels to the world of dinosaurs to save him after he was carried to the other world by the dinosaur mother whose eggs he had stolen.

A herd, however, consists of cheats too. Diego, at first, is the cheat who included himself in the herd under the false pretext of leading Manny and his team to Half peak to return the baby to his family but his real motive was to have them cornered so that they can kill the baby and satiate their revenge; in addition, survive the harsh winter on mammoth meat. In the herd when cheats are caught, the member is made an outcast. In the movie Manny and Sid give the same threat to Diego

by saying “You are out of the herd” before Diego saves Manny to prove his loyalty to the others in the herd.

2.3.7 Beaver Dam

In *Ice Age - The Meltdown*, a special area is designated for babies enjoying water sports in the melting ice. In one such sport a baby beaver gets its dam broken. Also a little into the movie, a mother and baby beaver, though fearful of the breakage of ice wall/dam, could not understand how dams can be made of ice which is quite different from the dams of the beavers. Beavers built dams using a variety of materials like mud, grass, parts of plants and even rocks so that a small pond is created within the shallow water body to protect the beavers from predators. The entrance is kept underwater to prevent it from getting blocked during the winter months.³⁶ Beaver dams not only protect beavers but also help control flood downstream, increase biodiversity and cleanse water. Therefore, it is hard for the beavers to believe that breaking of the ice dam will be the cause of their drowning.

2.3.8 Mudbath

Sloths and rhinos seem to enjoy mud bath in the film. In reality, rhinos cover themselves in mud to keep off the heat though in the film it is shown that they are enjoying a hot bubbling mud bath to keep off the cold. Whatever may be the reason, the process is known as wallowing. Except thermoregulation and providing a sunscreen as mentioned, wallowing is done for other reasons some of them being removal of ectoparasites, social cohesion (Sid shown to be enjoying with his species until rhinos come up), play in young animals (young’ of elephant- like animal playing in mud when the family is readying themselves for migration at the beginning of the first film), skin maintenance, camouflage etc.³⁷

2.3.9 Courtship Behaviour

The courtship behaviour of Mannie/Ellie and Scrat/Scratte is seen here. The courtship behaviour of a species consists of a series of displays that is fixed and falls under Fixed Action Pattern or FAP, defined as the sequence of behavioural acts that is initiated by a sign stimulus, cannot be changed in midway, and once initiated it is usually carried to completion.^{26,32} The sequence of events is the same every time an animal performs it and for every other member of the species. Usually males of a species perform the courtship behaviour in the presence of females. Male elephants fan their ears, rub their bodies against the female and hold their trunk. The females tend to run and males follow. This is true in the case of Manny who follows Ellie. He initially dislikes Ellie and follows her only to save his species (as he thinks he and Ellie are the last woolly mammoths on earth and it is their duty to save the species from extinction) especially when Sid says

“brink of extinction is a bad time to be picky”, but in the end he falls for her. They are also seen to wrap their trunks though here they are shown to do so when trying to save themselves and Diego from falling. Elephants mate for life. This attribute is reflected when Manny says to Sid “If you find a mate in life you should be loyal”. The courtship behaviour of Scrat and Scratte is shown here though unlike reality here the female displays courtship behaviour that too in want of a nut.

2.3.10 Parental Care

Parental care²⁶ is well underlined in the *Dawn of Dinosaurs*. Sid falls into an ice tunnel to find three huge eggs which he names Eggbert, Shelly and Yoko (identifying eggs and its components). He identifies his loneliness with the yet to be born animals lying abandoned there in the cold harsh weather; “Oh poor guys! I know what’s it like to feel abandoned.....Don’t worry, you are not alone anymore”. He claims to have the qualities of a parent “I’m responsible, loving, nurturing” and realizes “being parents is a lot more work” when he takes care of the eggs and later the young dinosaurs. The mother dinosaur gets furious on losing her eggs. She gets angry on Sid for stealing them but when she realizes that Sid had no intentions of harming her babies and that he was really looking after them, she even saves Sid from the dangerous dinosaur Rudy. Manny cares for the yet to be born Peaches that he has already built a playground for the little one. His care for Ellie (telling her to be careful so that the child is not hurt) drives her to the point of irritation and compels her to say “The baby is fine. It’s the freaked out daddy I’m worried about”.

2.3.11 Imprinting

Dinosaur babies, after hatching from the eggs find Sid as the first moving object, identify him as their mother and starts following him. They repeat his action of scratching his back and even sleep like him. This process of following the first moving object sighted after hatching and staying close to it is known as imprinting.³² Usually the mother is the first moving objects seen by the young and it follows her as seen in ducks and hens. It a phase-sensitive learning, that is, occurring at a particular stage in life, in which a young animal acquires several behavioural characteristics from its parent during a critical period (13-16 hrs after hatching) and once imprinted, it cannot be reversed.

2.3.12 Instinctive Behaviour

Instinctive behaviour is a pattern of behaviour that is inborn and frequently occurs in response to a specific environmental stimulus. It is a characteristic behaviour of a species meaning all members of the species will perform the particular behaviour in the same manner anywhere in the world without previous knowledge of the same. It is a knowledge the animal is born with and hence does not require leaning or practising and appears spontaneously at the first instance of its

need.³² Sid himself being a vegetarian teaches the young dinosaurs, which in reality are carnivores, to eat vegetables. Hence, their attempt at eating other young animals in the playground built by Manny for Peaches, which Sid dismisses as typical kids' play, is, in reality, their instinctive behaviour. Even when their real mother gives them a piece of meat, Sid says "I raised them vegetarian" and receives a jolt when they eat the same and throw the bone at him.

2.4 Developmental and Evolutionary Aspects as shown in the film

2.4.1 Developmental Aspects

The developmental stages of an unknown animal are indicated as Sid comes across fossils of identical animals in increasing size. In the third film, the initiation of life is indicated as Sid watches a new life (embryo) inside the egg as sunrays fall on them. He names the eggs –Egbert (egg), Shelly (shell), Yoko (yolk) – after the whole egg or their parts. The process of metamorphosis, i.e. the biological process in which an animal undergoes an abrupt change in their body structure when developing from larva to adult, also gets mention in the form of the transformation of the caterpillar into butterfly as Buck shoos away the giant butterfly without fear because he was acquainted with it when it was a caterpillar. The fact that some animals such as mammoths/elephants does not lay eggs but directly gives birth to the young after the females carry them in their womb is also nicely depicted in the third film.

2.4.2 Survival of the fittest

Darwin's theory of survival of the fittest is given due recognition when Sid says that "survival of the fittest...I don't think so" while pushing the tiger into a small hole in the cave during his attempt at saving the baby. Indirectly he stresses on the fact that fitness is determined not only by size or physical strength but by adaptability to the different situations. Here he uses his mind and gets better of the situation indicating he was the fitter one among the two, thereby underpinning the fact that sometimes prey do get better of the predator.

2.4.3 Extinction

Extinction is defined as the termination of a species from the earth, after the last living specimen of the species has died. It is a natural process where 1-5 species are disappearing every year not being able to adapt to environmental changes or not being able to compete with a more adapted species in a changed environment. Of all species that have ever lived, greater than 99% are believed to be extinct.³⁸ Sometimes, mass extinction occurs as a result of some natural calamities, when the extinction rate is much higher than the normal background rate.³⁹ The films mainly deal with animals (mammoth, sabre toothed tigers, giant ground sloths, dodo, etc.) subjected to

extinction during the Pleistocene, so the topic is brought up different times, sometimes directly and sometimes indirectly. In the first movie, young of elephantine or rhino like creatures were playing “extinction” while their parents were readying themselves for migration. The extinction of the dodos is mentioned twice very subtly when they lose their last female Taikwandodo in retrieving the melon and when storing food as “subarctic temperature will force us underground for a billion billion years”. Sid also says “brink of extinction is a bad time to be picky” to Manny when his first impression of Ellie is not favourable. However big or strong an animal may be, it has to succumb to the whims of nature and give way to newer species. The pride has been reflected in Manny in his reference to the Stonehenge as “modern architecture” which won’t last long (ironically the architecture still exists while mammoths have become extinct) when saying “Mammoths can’t go extinct. They are the biggest creatures on Earth” to the anteater when enquired about Manny’s family. When a small bird points out to Manny “What about the dinosaurs”, it underlines the simple fact that size and strength do not guarantee survival and one should not be proud of it. “Survival of the fittest” does not depend on size.

2.4.4 Fossils

Sid when he gets separated in a snow cave en route to returning the baby, found different animals embedded in snow-the fossils (though the word is not mentioned here). A fossil is any remains or impression of living organisms of the past, usually preserved over 10,000 years.⁴⁰ The fossils that Sid sees are intact whole animal fossils so maintained because of the extreme cold. In the third film, Manny and his team cross from their world to the world of the dinosaurs through a bridge made of giant dinosaur fossil. In the end of the movie, Buck cuts off the link between the two worlds by destroying the fossil.

2.5 “Brain and Heart” aspects as seen in the film

2.5.1 Sixth sense

In the second film, Fast Tony is seen predicting a meltdown (breaking of the ice wall leading to flood) while selling items which would help the buyers to survive under water. None believes him until the vulture says the same and Manny, Sid, and Diego see the same. Here the director very subtly underlines sixth sense of animals; whether it really exists or not. Scientists believe that animals use their existing sense organs wisely and efficiently and do not really possess so called “sixth” sense. The director efficiently reveals that Fast Tony heard about the meltdown from vulture which due to its capacity to fly has witnessed the large volume of water behind the ice wall, to avoid any controversy. But it is equally true that animals can detect a catastrophe much before the event takes place. This may be explained by the fact that unlike humans, most animals

have the capacity to sense ultrasonic (above 20,000 kHz) or infrasonic (below 20 kHz) sound waves and hence can sense something bizarre is happening, before human, whose hearing capacity ranges from 20-20000 kHz. Many mammals can sense an incoming earthquake, birds can detect unusual changes in air pressure, sharks and fish can notice unusual changes in hydrostatic pressure, and rising of groundwater can be detected by worms much earlier before the actual event, thereby enabling them to protect themselves from natural calamities like storms or flood by travelling to a safer place.⁴¹

2.5.2 Intelligence and emotions of elephants

Elephants or their mammoth ancestors are intelligent and emotional creatures as aptly shown in the film. Here, Sid highlights the mammoth's intelligence when he refers to Manny as a "shrewd guy". Sid wants to be with Manny to keep himself safe and not become a "side dish" of the rhinos and others, but points otherwise. Manny understands the underlying meaning easily and hence the remark. Like human and ape, the brain of the elephant is highly developed and have a complex structure. The convoluted neocortex is believed to responsible for the famous memory and the powerful hippocampus is responsible for emotions and emotional flashbacks that an elephant is believed to possess.^{42,43} The emotional side is reflected in Manny's loneliness and craving for family. He saves Sid and the baby, Pinky, but doesn't want to tag them along with him. He withdraws into himself when enquired about his family. He has flashbacks of his own childhood when he sees a mammoth family (father, mother and baby) among the various drawings by early man in the cave. He imagines and relates his childhood of a happy family until the parents get killed by a group of hunters. Only then does he identify himself with Pinky, her being separated from her family, and feel sad. Until then, he thought it as an added responsibility and wanted to return the baby as soon as possible and go back to his old carefree days. His emotional side is also underlined in *Ice Age – The Meltdown*, where, Manny gets frustrated when he thinks he has heard another mammoth but is not able to see it; he speaks to his own reflection in water "I guess it's just you and me now" and thereafter on seeing the female mammoth Ellie, he is overjoyed.

2.5.3 Reluctance of the aged

It is usually the young who wants to go out to the world and enjoy it. The old persons are comfortable in their familiar surroundings. Reluctance of old persons to leave their home for newer avenues is depicted by grandfather hedgehog who, when pushed by his grandchildren to go to the end of the valley to find a boat (actually the bark of an old tree trunk but which may remind us of Noah's ark) says "Well i'm not leaving. I was born in this hole and I will die in this hole". Also at

the end of the story, when the water has subsided, he did not want to leave the boat may be because he had become familiar with the boat by then.

2.5.4 Fear

Diego is afraid of water. It can be understood when the ice breaks under his feet after saving Sid from the Eviscerator and also holds on tightly to a slab of ice completely oblivious to Sid's danger and of the monstrous animals in water, until Sid bites his tail which brings him back to his senses and he jumps at the last moment. Sid says, "All animals fear...It is what separates us from, say, rocks" to Diego who does not want to come to terms with his fear of water. Sid too experiences fear from its predators (Predator prey relationship). Manny also had to overcome his fear to get close to Ellie and save his species. When Sid says "Fear is natural", Diego says "Fear is for prey" to which Sid replies "Diego, well then, you are making the water make you its prey...just jump in and trust your instincts (plays a major role in their survival).... most animals can swim as babies" but obviously leave out the fact that baby tigers cannot swim which he reveals at the end when Diego overcame its fear/prey to save Sid from drowning. Though modern cats can swim, especially tigers, and both babies and adults are good swimmers, it is not known whether sabre toothed tigers could swim. Maybe, they couldn't because of their weight.

2.5.5 Friendship and Love

Friendship and love have been given emphasis in all the three films. The members of the herd stand up for each other and help one another in danger. Manny saves Diego from falling into molten lava and Diego in turn saves Manny from the other tigers. In the second film Manny saves Sid from jumping off the tall wall of snow, the Eviscerator. Though they joke about Sid a lot, he is the "gooey" substance that keeps the herd together as fondly mentioned by Diego. Manny holds himself responsible for Sid's danger in the third film and says "...if I had been a better friend to him....we wouldn't be here". Buck is impressed by their friendship and says to Manny "Not the best husband or father but a darn good friend". Attraction for the opposite sex is also highlighted in Manny/Ellie and Scrat/Scratte which ends in true love in the former case while in the latter absence of love, rather, greater love for nut by Scrat leads to their separation.

3. CONCLUSION

The animation series *Ice Age* is more than a mere entertainment movie for kids. It gives an idea of the morphology of animals that existed on earth before human life originated. Apart from that, the films give an edutainment-oriented insight on the behaviour of animals, their intelligence and feelings, which was hitherto unknown to the layman viewer. Through its focus on these films

the paper attempted to bring back to general attention several unknown facets of myriad species of animals, including their adaptative and behavioural patterns, alongside pointing out the deviations made by the makers of the films.

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