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DISCRETE INFINITY

By John Lindsey Adams

In my short tenure as a Member, I have developed an affinity for the pre-text – the pre-story, if you will, in papers presented. How is it that the Member arrived at a topic for development and presentation? My journey, hastened by my wife's repeated questioning regarding my topic, took me, first, to the future. I had fully intended to write about future technology. When I came home to practice law, Dan Thomas was one of the first attorneys to have a fax machine. Since 1988, we can now see the demise of the fax in lieu of scanning technology. We all remember our first cell phone, approximately the weight of a brick. Now the majority of us in this room can search the internet from our phone. However, we do receive email notices from Sandy Cavanah. Medical records are being stored electronically. Within a few years, those files will be stored on a microprocessor implanted just under our skin. Our records will be totally transportable. Even more, the debit and credit cards that each of us are sitting on will be accessible in the same form. Instead of swiping a card, you will simply waive your hand under a scanner. More? Envision if you will the ultimate self-check out at Kroger. A cart that knows who you are when grab the push bar. As you pick up your merchandise and place it in the basket, the item is added to the total. As you leave the store, you will be asked to complete your purchase and will have never seen a clerk as the price is automatically charged to you. It's actually haunting, don't you think? Is it too impersonal or too personal?

How is that we arrived at this point that so much information is so readily available? I reversed directions in time. I left the Electronic Age, dating back to 1940, leaving microprocessors, magnetic tape and vacuum tubes behind. It seemed that the Electromechanical Age, dating from 1840 to 1940 was but a pit stop on the way to present technology with its' batteries, telegraphs and telephones. The Mechanical Age, 1450 to 1840, included the first "Information Explosion" with the Gutenberg Press. Blaise Pascal invented the first computing machine. At this time, "computers" were those persons who worked with numbers. Not far enough, albeit interesting. The first calculator – the Abacus. We are now in the Premechanical Age. Closer. The first numbering systems are attributed to the Hindus around 100 to 200 AD. The Phoenicians create symbols around 2000 BC. The Egyptians write on papyrus about 2600 BC. Around 3000 BC the Sumerians in Mesopotamia create Cuneiform. It was the Sumerians who also devised the first pen to scratch symbols on clay. We are closer. In fact, stop now and consider that for numbers or symbols to be created, they too are historical. It is simply a matter of man having come to a point that he wanted to keep words. I have to go farther back in time to complete this journey. At this juncture, language has developed to such an extent that it is both accepted and well used. My journey takes us back a point in time that can only be based in theory. The origin of speech is both intensely debated and controversial. Speech leaves no material trace, making it, therefore, archaeologically invisible. In 1866, the Linguistic

Society of Paris went so far as to ban debates on this subject because there could be no authoritative answers to these questions. Since however, a growing number of professional linguists, archaeologists, psychologists, anthropologists and others have attempted to develop theories with new methods for what is considered the “hardest problem in science”. Great choice for a topic, Lindsey.

No other species has developed speech, as we both use and define it. No doubt, other animals communicate, and much can be learned from their methods of social communication. No other animal uses its’ tongue and lips for such purposes. When an ape, for instance, produces a vocal sound, it deactivates its’ highly flexible tongue because it is no longer eating. It cannot perform both tasks simultaneously. While apes most closely resemble us in physical form, their vocal communications, along with all other animals, are both mandatory and therefore, necessarily, reliable. Per Professor Tore Jansen, the general principle of communication for all other species is one specific call for one specific message. Think of it in terms of an ape call that a jaguar is approaching. By design, if deception were a part of this equation, there wouldn’t be too many apes left. The natural response, if these sounds were deceptive, would be to ultimately ignore them. The ape who cried wolf. When a cat purrs, it is content. We can trust that it is happy because it can’t fake that sound. We have all seen or read of apes learning sign language. The one thing that you will never see in nature, however, from any other creature is a question.

In 1861, historical linguist Max Muller published a list of speculative theories on the origins of spoken language. The Bow-wow, or cuckoo theory, saw early words as imitations of the cries of beasts and birds. The Pooh-pooh theory saw the first words as emotional interjections and exclamations triggered by pain, pleasure, surprise and so on. The Ding-dong theory suggested that all things have a vibrating natural resonance, echoed somehow by man in his earliest words. The Yo-he-ho theory saw language emerging out of a collective rhythmic labor. The Ta-ta theory was not in Muller's list, having been proposed by Sir Richard Paget, but proposed that humans earliest words were based in tongue movements that mimicked manual gestures, rendering them audible.

More recently, the "Continuity Theory" holds that language developed gradually, over time. The "Discontinuity Theory" is diametrically opposed, proposing that language is unique to humans and cannot be compared to any other animal because human languages are the most highly developed and most flexible systems for communication. It also stands for the proposition that because it is unique to us, that it appeared fairly suddenly in the course of evolution.

There seems little debate that some form of communication would have existed as recently as approximately two million years ago, concurrent with the first use and development of rudimentary tools. The debate rages on when you turn to the extent the use and abilities. Language is defined as having a fully developed syntax (rules and

principles that govern sentence structure), a tense, aspect and auxiliary verbs (He HAD given his all. “Given” is main verb, while HAD provides tense.), and a closed class vocabulary (You can’t make up words.). All seem to agree that some proto-language would have been employed. Some scholars assume that development of primitive language-like systems as early as *Homo habilis*, while others place the development of symbolic communication only with *Homo erectus* (1.8 million years ago) or *Homo heidelbergensis* (.6 million years ago), and the development of language proper with *Homo sapiens* less than 200,000 years ago. Johanna Nichols, linguist at the University of California, Berkley argues that vocal language must have begun diversifying in our species at least 100,000 years ago. She bases this claim, in part, on a comparative analysis of the development of known languages.

Regardless of how you arrive at this point, the seminal moment in time would have been the change that was needed to develop the cognitive ability to construct and process recursive data structures in the mind. This is known as “discrete infinity”, or $N+1$. N is a fixed number. Primates and other animals can be trained to repeat a process up to N , but only in the Machiavellian/Pavlovian state of receiving a reward for a process. What separates us is the capacity to recognize the concept of “beyond” – $N+1$. By default, in creating, recognizing and knowing $N+1$, we have created, accept and know a past – $N-1$. This is the creation of concept, the birth of imagination. Concepts are “displaced references” or topics outside of our currently

perceptible situation. The development of modern behavior in Homo sapiens, not shared by our predecessor, Homo neanderthalensis, is dated some 70,000 to 50,000 years ago. It is based upon more sophisticated tools (i.e. built out of more than one material) and sortable into different categories (projectile points, engraving tools, knives and other piercing tools). This period of time is also associated with archaeological finds of the first art. Trinkets probably associated with a tribe and cave paintings not unlike those found in Lascaux, France. This is often taken as proof of the presence of fully developed language, specifically, the ability to teach the process to offspring. Professor Tore Jansen notes that human speech builds on the principle of combining a restricted number of sounds into an unlimited number of messages. In a typical language, there are something like thirty or forty definitive speech sounds. Khoisian speech may have as many as over one hundred.

This, gentlemen, is a seminal moment in time. With an ability to distinguish both the past AND future, as well as create thoughts out of place, this was the dawn of the age of the storyteller. Indulge me, if you will, and imagine the fire hauntingly lighting the cave. All are gathered around for warmth, eating and socializing. In that surreal atmosphere, as opposed to pointing at food and demanding it, one man begins to recount the day's events. Maybe a hunt. Maybe telling of prey that they tracked. Possibly even a more dire tale of a hunter who died in the course of the hunt or saved the life of another. You see, it's not the teller, it's the effect of his words on the

minds of the listeners. I don't think that our present sensation of reading a good book or seeing a wonderful movie even compares, but it is as close as we can come. These first listeners were witnessing and participating in magic. Visions created from the nothingness that is words. Remember that one of the keys to proto language, across species, is reliability. There was no original necessity in these words that made thoughts dance in their mind's eye. Sounds became words. Roughly honed words had been strung together to create sentences and these rudimentary sentences tapped the emotional core of the listeners.

Imagine the power of the original storytellers. These men ruled a domain that was ephemeral, but it gave them the ability to control the lives of the listeners. At the end of the day, all came to him addicted to what he had unleashed in their minds, craving more. These storytellers discovered that they could tap their own imagination and embellish the stories. They could dominate their listeners and force them, with only air, to do their bidding. They could make them cry. They could frighten them. These men (and women) could explain the unexplainable. They could, and did, create deities, some of whom required sacrifice. The storyteller could communicate with his gods and issue mandates. Storytelling has been used in every conceivable way to influence, motivate and dominate people. Both positive and negative, storytelling is one of the most powerful of human capabilities, and so it would remain, even after we began to record history, but certainly, as well, today.

Storytelling would remain the sole method of preserving and passing wisdom, knowledge and culture through generation after generation. With storytelling came cultural and societal bonding. The roots of psychology, lecture style teaching and religion lie in storytelling.

Some historic evidence of early storytelling comes from ancient Mesopotamia. Stories of Gilgamesh, a Sumerian king who reportedly lived in about 3000 BC. In Mesopotamian mythology, Gilgamesh is a demigod of superhuman strength who built the city walls of Uruk to defend his people from external threats and he travelled to meet sage Utnapishtim, who had survived the Great Deluge. He is usually described as two thirds god and one third man. Stories of Gilgamesh were passed down by word of mouth and likely were subject to revision through many versions until the story was printed on clay and fired in about 700 BC. These stories were also reported to be carved on stone pillars where all could read them. One of the oldest surviving records of storytelling was written on the Westcar Papyrus of the Egyptians. We are told that the three sons of Cheops, the great Pyramid builder, entertained their father with stories. This is generally placed between 2000 and 1300 BC. One son told tales of magic, another the deeds of Cheops forefathers and the third a contemporary tale. Though the Greeks claim Aesop, it is believed that he originally came from Egypt or some other area of North Africa. Aesop was a slave, obviously now known for his stories and fables. While he lived about 550 BC, his stories were not written until

around 300-250 BC. The same patterns are evident in China and India. Storytelling was one of the many arts of the Yu, the entertainers at the feudal courts, during the Zhou Dynasty (1122-256 BC). One source describes the Pingtan performers as depending on their mouths to eat. In these times, the stories could take months to tell, not unlike serial movies or television shows. Homer told his stories in 1200 BC that would later become the Iliad and the Odyssey 500 years later.

Families settled to farm, farms grew to hamlets, villages, towns and the last to the first cities. With the rise of these populated areas came more storytellers. Griot, Raconteur, Bard, Jongleur, Skop, Spinner – even Rabbi. Named by a thousand words, storytellers have shaped our societies and the way we think for all recorded history. Interestingly, the Dark Ages in Europe were not shared by the rest of the world. The Middle East was experiencing a brilliant renaissance equivalent to any history; and China and India were experiencing stable, growing cultures punctuated by periods of war and some of the same plagues that devastated Europe. In this time, storytelling would mature and change, shaping cultures while being shaped by culture at the same time. As Professor Tori Jansen states in the preface to his work, *The History of Language*, Oxford Textbooks in Linguistics, Oxford Press, 2012, “...languages are contingent on history...”, so too are stories. During this period of time in Europe, the Catholic Church developed “mystery plays”, drawing on the ancient Greek tradition of live theater. This was a dramatic method for telling the stories of the

Church. Understand that, even at this point, most common people could not read, nor could they understand the Latin in which most services were conducted. This is more important than first impression provides. Stories spread across a wide territory tend to morph and reflect the societies that moved them, as well as those where they come to be told. By this method, “mystery plays” ensured that the same story was told in the same way to all peoples. While illiteracy was common in Europe, at this time it was quickly becoming uncommon in the Near East. The teachers and leaders of Islam encouraged all to learn to read. It is the legacy of the Middle Ages that the story matured in form, both oral and then written. This time and place will see the likes of Shakespeare who will weave ancient stories into new tales that will be shared with common and noble people alike. Quetzalcoatl was a savior figure to the Aztecs and others in that South American region. Per their legends, preserved in story and art, he created man by descending to the underworld and gathering the bones of the ancient dead. By anointing them with his blood, he created the Aztecs. He was depicted as a red-haired, bearded man and a patron of goldsmiths. When he left the Aztecs by sailing across the eastern ocean, he told them that he would return in a one reed year. Ironically, when Cortez, a red haired man with a beard arrives from the eastern ocean, demanding gold... Cortez and contingent of less than a hundred conquered a great civilization. The power of stories.

Earlier references to forced homogeneity of stories, bring us as this juncture in time to just shy of the mentioned Gutenberg Press. We see at this time in history the birth of a movement toward efforts at global literacy. It by no means signals the demise of the value of the story, but it does shift. We will tap these recesses again at the close of the 19th Century with Guglielmo Marconi's radio and its' progeny. Where the modality changes with the written word, two things remain constant: 1. Leaders through time to the present have been great storytellers, or surrounded themselves with great storytellers, and 2. The world remains full of willing listeners.

As a post-script, the development of language brought us here. Professor Tory Jansen also notes that two thousand years ago English did not exist. Linguists will tell you that it will not always be spoken. Most languages move in the course of about ten thousand years. They are used for a time and then lost. There is no means to determine or know how many languages have been lost to time, especially before the advent of the written word. Just as there is a scientific search for a single proto language, from which all other languages derived, so is there a push toward a global language for an ever evolving global society. No matter the language, proto, present or future, there will now always be storytellers because we have tapped this resource, this discrete infinity – our imaginations. Until that moment in time around a fire occurred, words were in fact – cheap. If it didn't feed you or protect you, it wasn't worth saying OR hearing.

By no means am I suggesting that we tear up the furniture, light a fire in the center of the room and all sit around it naked for the presentation of our papers. I am, however, suggesting that we each, as a Member of this esteemed Society, even as human beings, have a responsibility to this art. We are responsible for perpetuation of the spoken word. In that we write our papers, we create the possibility that those who follow will benefit from our efforts, but recall that words are more than simply air flowing across vocal chords. All that is physical will ultimately be lost. Paper will decay. The cartilage in our bodies will not fossilize. More importantly, the words that we speak are nothing more than air. The effort and information that gives them value and creates thought is the gift we give to the listener and to posterity. Before there were digitalized texts and pictures, before there were newspapers and magazines, before there was pen, ink and paper, before there was papyrus or stone tablets – there were only words. I do not dispute or disparage the technology that we have or that follows us. I believe it to be both beneficial and constructive, another part of our learning process. Notably, however, it is the words that have persisted. Words made leaders out of ordinary men in a cave around a fire. That one man who realized the potential of weaving a story from the same fabric of air and vibrations that kept you alive. We may never be able to appreciate the depth of emotion when the mind of that first listener was opened. Imagination being born. The power of the spoken word was penultimate at that very moment, but would never be lost to time. Every historic figure that follows would be made by words that formed stories, either his

own or the words of others used to describe him or his acts and deeds. Words and stories opened our minds and, therefore our futures. As human society, words and stories have bound us together and torn us apart. Sticks and stones may break our bones, but it is words that make us human.