Day 2:

Today's lecture will consist of four segment:

1. The Alphabet Effect
2. The Sixth Language
3. Understanding New Media
4. The Extended Mind
5. The Smart Book

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The Alphabet Effect

Joseph Needhan in the Grand Titration asked why did abstract science begin in Europe when the Chinese invented so much of technology. I suggested monotheism and codified law gave rise to universal law. McLuhan added the alphabet and deductive logic and together we wrote Alphabet Mother of Invention.

- The Alphabet & Phonetic Writing
- Codified Law
- Monotheism
- Abstract Science
- Deductive Logic

The above set of ideas are an autocatalytic set of ideas that emerged between 2000 and 500 BC between the Tigris Euphrates Rivers and the Aegean Sea in Mesopotamia, Israel, and Greece.

Writing begins in Sumer 3100 BCE using pictograms

By 2000 BCE a phonetic syllabary emerges in Babylonia at the same time as codified law is being formulated by Hammurabi. Weights and measures are regularized. Astronomy takes off and is practiced systematically.

In approximately 1400 BCE the first alphabet emerges in the south Sinai desert among the copper miners or Kennites of which Jethro of bible fame is the leader.

Moses lives with Jethro, returns to Egypt, goes to Mount Sinai and returns with the 10 Commandments written with the finger of God.

Greek philosophers develop a system of describing the world in a single organizing principal. Thales (water), Anaximander (apieron), Anaximenes (air), Heraclitus (fire). Science becomes abstract and philosophers are monotheistic-like.

The philosophers introduce deductive logic, which in the case of Euclid led to axiomatic geometry.

Parmenides abuses logic and sets Greek philosophy on the wrong track. He argued that nothing could change because if A changed into B then A would not-be but non-being cannot be so nothing changes. This argument made the invention of zero impossible and it killed the empirical spirit of Greek science ala Plato and Aristotle.

The Hindu invented zero using symbols to represent the numbers 1 through 9 and then a symbol they called sunya or “leave a space” so that from an abacus calculation of 5 hundreds, no tens and 3 ones they would write 503 as 5 sunya 3 or 5 (leave a space) 3 using a dot to represent sunya which with time became a circle like our current zero, 0.

The connection of the alphabet with abstract science is that the alphabet teaches the lesson of analysis, coding, decoding and classification, all essential for abstract science. The alphabet is both a communication medium and an informatic tool.

The alphabet, monotheism, law, science, logic are media that interacted with each other and co-evolved.

The Sixth Language

Language = communications + informatics

Speech, writing, math, science, computing and the Internet form an evolutionary chain of six languages.

Each language has a unique semantics and syntax.

Each arose to extend are memory when we had too many things to remember.

Each new language emerged in a response to the chaos of the information overload that the previous languages could not handle.

Writing and mathematics emerged simultaneously in Sumer circa 3000 BCE from accounting tokens used to track commercial transactions and responded to an information overload.

Writing and math began with 3 dimensional tokens used as receipts for tributes paid by farmers to priests. This led to clay envelopes and then to clay tablets.

Schools arose for the teaching of the reading, writing and arithematic. They were rectangular rooms holding 30 to 40 students. The teachers became scholars and this led to science.

And science created science-based technology and a complex industrial society. IBM used punch cards to do the 1870 USA census which eventually led to computing.

And computing to the Internet.

Is Google the 7th language or is it social media?

Understanding New Media: Extending Marshall McLuhan

The objective is to develop an understanding of digital "new media" and their impact using the ideas and methodology of Marshall McLuhan. We want to understand how the "new media" are changing our world, which includes how the "new media" are impacting the traditional or older media that McLuhan (1964) studied in Understanding Media: Extensions of Man.

I have identified the 14 characteristics of "new media" which explains their success and rapid adoption. They are:

1. two-way communication
2. ease of access to and dissemination of information
3. continuous learning
4. alignment and integration, and
5. community.

These five messages of the Internet are also characteristics shared by all of the “new media.” Since formulating these five messages of the Internet my study of the “new media” revealed that there are also nine other additional properties or messages that characterizes most “new media”. They are:

6. portability and time flexibility (time shifting), which provide their users with freedom over space and time;

7. convergence of many different media so that they can carry out more than one function at a time and combine;

8. interoperability

9. aggregation of content;

10. variety and choice to a much greater extent than the mass media that preceded them;

11. the closing of the gap between (or the convergence of) producers and consumers of media;

12. social collectivity and cooperation;

13. remix culture; and

14. the transition from products to services.

New Media's Intensification of Trends McLuhan Identified for Electric Media

Many of McLuhan's characterization of electric media have only intensified with the "new media". He wrote, "Everybody in the world has to live in the utmost proximity created by our electric involvement in one another's lives (UM, 47)."

This is truer today with our increased involvement with each other due to cell phones, email, the Web, social networks and Skype.

One of the important trends that McLuhan identified with electric information was the flip from the centralized structures of the mechanical era to the decentralized ones with electricity.

> Electricity does not centralize, but decentralizes. Electric power, equally available in the farmhouse and the Executive Suite, permits any place to be a center (ibid., p. 47).

This trend of decentralization intensified with the Internet, which itself operates on the principle of total decentralization.

In *Take Today* McLuhan and Nevitt (1972, p. 4) suggested that “at electric speeds the consumer becomes producer as the public becomes participant role player”. This observation made in the mass media era intensifies with the emergence of “new media”.

The users of “new media” are both consumers and producers. The open source movement and sites like, Blogger, Flickr, Facebook and YouTube illustrate this point. This aspect of “new media” is extremely democratizing because it allows more people to share their ideas directly with others without having to deal with a gatekeeper.

World Wide Web has contributed to a further melting away of national boundaries because knowledge and information flows unimpeded across national borders creating in McLuhan's words a "Global Village".
McLuhan saw clearly that electricity would lead to new media like the Internet and the Web as the following quote from UM indicates:

Rapidly, we approach the final phase of the extensions of man—the technological simulation of consciousness, when the creative process of knowing will be collectively and corporately extended to the whole of human society, much as we have already extended our senses and our nerves by the various media (ibid., p. 3).

Indeed with “new media” the “creative process of knowing” has become “collectively and corporately extended to the whole of human society.”

Another trend McLuhan identified with electrically transmitted information was that of the growth of interdisciplinarity,

> Departmental sovereignties have melted away as rapidly as national sovereignties under conditions of electric speed (UM, p. 47).

This trend has increased with the “new media” because of the way in which information from different disciplines are so easily linked on the Internet.

McLuhan (1964, p. 64) also made the point that electric media are extensions of our nervous system. This observation, which was intended to describe electric mass media, is even more appropriate for digital media. Because I reach for the Web, Google and Wikipedia to access information that has slipped my mind to such an extent, I regard the dynamic trio of the Web, Google and Wikipedia as an extension of my mind.

Andy Clark developed this notion of the extended mind in his book Natural Born Cyborgs. I have used the same notion of the extended mind in another context claiming language extends the brain into the human mind in my book The Extended Mind: The Emergence of Language, the Human Mind and Culture (U of Toronto Press 2007). McLuhan fervently believed that with electric media learning and the acquisition of knowledge would become the principal activities of humankind as the knowledge management movement now claims. We no longer live in the Information Age but rather the Knowledge Era as many claim.

The Extended Mind Model of Language

Speech emerged as the bifurcation from percepts to concepts and a response to the chaos associated with the information overload that resulted from the increased complexity in hominid life, which included

- Tool making and use;
- Control of fire;
- Social cooperation to maintain the hearth;
- Food sharing and altruistic behaviour;
- Group foraging and hunting;
- Mimetic communication (gesture, hand signals, body language and vocalization)

As complexity increased the percept-based brain couldn't cope—it needed concepts for abstract thought

Speech represented a bifurcation from percepts to concepts

Our first words were our first concepts

They acted as strange attractors for the percepts associated with those words

The word water unites our percepts of the water we drink, cook with, wash with, rain, melted snow, lakes, and rivers

Thought is as much silent speech as speech is vocalized thought.

Merlin Donald claims that mimetic communication was the cognitive lab in which verbal language developed and that it was intentional & representational

If it was such a good communication system why was there a need for verbal language?

It was useful for:
1. conceptualization,
2. symbolic, abstract thought,
3. planning and
4. storing information.

By allowing for thought about objects and actions not in the immediate perceptual field language permits planning

Mind = Brain + Language

Before language the brain was basically a percept processor

With language the brain becomes capable of conceptualization and hence bifurcates into the human mind.

The emergence of verbal language represents three simultaneous bifurcations:

1. the bifurcation from percepts to concepts,
2. the bifurcation from brain to mind,
3. the bifurcation from archaic Homo sapiens to full fledged human beings.

Language emerges from sequential learning and processing – it is an organism that has had to adapt itself "through natural selection to fit a particular ecological niche: the human brain." (Christiansen 1994)

Christiansen and Ellefson (2002) claim language is "a kind of beneficial parasite—a nonobligate symbiant—that confers some selective advantage onto its human hosts without whom it cannot survive."

Christiansen's hypothesis explains Chomsky's UG (Universal Grammar) and does away with the need for the hard wiring of UG and the Language Acquisition Device.

Both language and culture are symbolic. Like language, culture evolved to fit eco-niche of human brain and therefore culture acts like an organism.

The universality of human cognition gives rise to Universal Culture. Brown (1991) found over 100 cultural universals including: language, orality, music, dance, poetry, marriage, family, kinship relations, nepotism, gossip, lies, taboos, fire, humour, altruism, religion, justice system and government.

Autocatalysis is the mechanism that Kauffman (1995, p. 49) used to explain the emergence of life: “A living organism is a system of chemicals that has the capacity to catalyze its own reproduction.”

An autocatalytic set of chemicals is a group of organic molecules where the catalyst for the production (or really re-production) of each member of the set is contained within the set itself and as a result the system can, in the presence of a source of energy and the basic atoms needed to build organic compounds, become a “self-maintaining and self-reproducing metabolism”, i.e. a living organism.

A key idea in Kauffman's approach is that the members of the autocatalytic set self-organize and, hence, bootstrap themselves into existence as a set with an identity and properties different from the individual members that make up the set and hence is an emergent system.

The system is emergent because its properties cannot be predicted from, derived from or reduced to those of the components of which it is composed.

We will make use of a more generalized form of autocatalysis and suggest that any set of mechanisms or ideas that catalyze each other's existence is an autocatalytic set—an autocatalytic set of mechanisms or ideas.

In the case of language we therefore posit that language is the result of an autocatalytic process among the various components of which it is composed and like a living organism has the "capacity to catalyze its own reproduction." Language is collectively an autocatalytic whole.

We further posit that as such language is an emergent phenomenon, as its properties cannot be predicted from, derived from or reduced to those of the components of which it is composed.

If we were to describe all of the mechanisms of language we would still not be able to explain its origin because language is more than the sum of its mechanisms.

As pointed out by Tecumseh Fitch (2005, p. 194) to understand spoken language and in particular its origin and evolution on must consider all of the components that make up speech or make speech possible.

As recently stressed (in) Hauser et al. (2002a), it is unproductive to discuss ‘language as an unanalyzed whole’. Thus a critical first step in analyzing language evolution is to distinguish among its various component abilities.

The components of language without which it could not exist include the following elements:

vocal articulation, vocal imitation, phonemic generativity (the ability to combine phonemes), lexical (or word) creation, morphology, conceptual representation, comprehension, a theory of mind, joint attention, altruistic behaviour, syntax especially recursion, grammaticalization, and generativity of propositions. It should also be noted that speech also serves two functions, that of social communication, and conceptualization or a medium for abstract thought.

In order to complete the argument that the emergence of spoken language is due to the autocatalysis of its components we have to demonstrate that the components or subsystems that make up language that we have identified above catalyze each other.

We begin with **Vocal articulation**, a mechanism that we share with many non-human animals is obviously ground zero for speech.

Vocal imitation is absolutely necessary for the acquisition of language by infants and hence the reproduction of the organism of language, i.e. the transmission of language from parents and caregivers to their children and wards. Vocal imitation obviously co-evolved with phonemic articulation, as imitation could not take place until phonemic articulation emerged. But on the other hand is it possible that vocal imitation contributed to phonemic articulation.

Phonemic generativity, **lexical creation** and **conceptualization** must have co-evolved because without phonemic generativity it would not be possible to create or produce the variety of sounds needed for the extensive vocabulary that characterizes human language. The mechanism of morphology would have also contributed to the generation of lexical items.

But it was the pressure for a larger vocabulary that conceptualization generated that gave rise to phonemic and morphemic generativity and it was lexical creation that co-evolved with conceptualization, as our first concepts were our first words.

Phonemic generativity catalyzed lexical creation and conceptualization catalyzed lexical creation, which in turn catalyzed phonemic generativity. All three bootstrapped each other into existence and hence formed an autocatalytic set.

Conceptual representation and **comprehension** are linked to the symbolic and conceptual nature of language as described by Deacon (1997) and Logan (2007) respectively and must, therefore, have co-evolved.

The desire to communicate verbally has been attributed to three closely related attributes of human cognition, namely, a **theory of mind**, the sharing of **joint attention**, and the advent of **altruistic behavior**.

In order to want to engage in the **joint attention** that Tomasello suggests was essential for the emergence of language it is necessary to have a **theory of mind** (Dunbar 1998), namely the realization that other humans have a mind, desires and needs similar to one's own mind, desires and needs.

At the same time there must have developed a spirit of **altruism (**Ulbaek 1998) once a theory of mind emerged so that human conspecifics would want to enter into the cooperative behavior that is entailed in the sharing of information.

Theory of mind and joint attention catalyzes the social function of communication and cooperative behaviour and vice-versa. The mechanisms of social communication and cognition through language also form an autocatalytic subset.

A number of authors believe that a primitive **syntax** emerged at the same time as the first lexicon. Donald (1991), Levelt (1989) and Hudson (1984) support the **lexical hypothesis** that lexical items are the central focus of language and that they carry with their pronunciation, meaning, and grammatical and morphological possibilities all at once.

For Christiansen and his co-workers syntax existed at the very beginning of language because it arose from the adaptation of the capabilities of the learning and processing of sequential information that existed before the advent of language.

Although we have been able to argue that certain mechanisms responsible for speech autocatalyze each other, we have still not yet tied together all of the mechanisms into one complete autocatalytic set, which constitutes human language. Hopefully, however, we have convinced the reader of this possibility and that this modest beginning will inspire others to make connections we were unable to develop.

The SmartBook (sBook)

The sBook was first conceived at the Strategic Innovation Lab at the Ontario College of Art and Design in 2005 and is headed by the co-PIs Greg Van Alstyne and myself. It is an example of how new hybrid platforms can be created with digital media

We are proposing a platform for a new form of the book, the SmartBook or sBook, which is a combination of the printed codex book and the e-book.

The sBook combines the advantages of these two formats of the book as well as some additional features that we have designed for this new hybrid book. The platform could also be extended to journals, magazines and newspapers

We describe one possible form of an sBook, which is a codex book that has been “smart tagged” so that the book directs one’s Enabler (a notebook computer or a smart phone) to a Web site that contains the digital form of the text of the printed book.

As a result the sBook system - consisting of the codex book, the Enabler, and the Web site - is readable, searchable, networkable, updatable, smart and promotes “active reading”.

The book is very readable because the sBook still retains the codex format of ink on paper. It also retains all the advantages of the printed book such as the ability to flip easily from one page to another. The codex was considered an advance over the scroll but with the e-book we are back to scrolling.

The more things change the more they are the same.
Because the “smart tag” directs the reader to a Web site with the digital text and room for comments by readers and updates by the author, the sBook is searchable, networkable and updatable.

Certain feature of the sBook will be prototyped when Understanding New Media: Extending Marshall McLuhan is released by Hampton. I have inserted in the printed book an invitation that will direct the readers to a Web site whose URL is (www.understandingnewmedia.org) The Web site will also feature a section for reader comments and hence will function as a blog (or blook) and a social network of readers. The digital version of the book will not be available. Hampton is not ready for this step.

The final version of the sBook will be smart because it will incorporate a recommender system installed on the Enabler. It will match the reader's research and information interests with the contents of the sBook thus identifying where the reader will want to focus. Imagine a library of sBooks each equipped with RFID tags. A researcher's dream come true!

The Enabler and the Web site with the digital text would also have tools to facilitate active reading consisting of the following activities: "annotating, quoting, comparing, searching, taking notes, sharing".

The sBook system also allows a codex book to incorporate the advantages of hypertext through the Web interface. The author could indicate places in the printed text where one could jump to another part of the book or to another source of information on the sBook Web site or else where on the Web, which the reader of the codex form of the book could access with their Enabler and thereby enrich their reading experience. The text that will be hypertexted in the digital version of the book can be indicated in the printed book by using a special font to indicate where the hypertext link can be found in the digital version of the book.

The sBook is not a device it is a platform that has the potential to change:

- the operations of libraries,
- the operations of bookstores,
- the operations of publishers,
- the way in which books are kept up to date,
- the way in which the book can become the focus of a social network,
- the way active reading is pursued,
- the way knowledge is shared,
- the way elearning operates, and
- the way researchers can more efficiently find the information they need for their projects without reading the whole book.

A New Option for Authors

Printed books have been limited to text and illustrations. With the sBook the author can now add video and audio files to enrich the traditional content of a printed book. The sBook is a natural for non-fiction books. But at BookCampTO in July ago I discovered fiction writers interest in creating a new kind of art form, a novel that incorporates in the text pictorial elements, video clips and audio bites. We also found a publisher interested in publishing in this format. This is very exciting – the notion of creating a new art form on the sBook platform, a mashup of text, pictures, video and audio!!