

The Interactions of Contextualization and Abstraction Within and Between Media: A Fundamental Process of Media Ecology

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Overview

Contextual and abstract-dominant media, as related to the auditory/visual duality of media in McLuhan's term and heavy/light dichotomy in Innis's terms, are both complementary and competitive. This paper explores the processes of contextualization and abstraction as fundamental aspects within every medium. I use this thesis to explore their roles in the interactions between media. There have been relatively few attempts to understand the qualitative or quantitative aspects of media interaction, but this will be argued to be an important yet under-attended area within the study of media ecology. Each mediated process forms an anti-environment for its complement and facilitates recognition of media bias by producing a difference in the content of the other media. In this model, context can be conceptualized as a process that alters the analytical abstracting effect of media, and can be measured as the amount of variation induced in an abstract process. Similarly, abstract mediation is indicated by the convergence it brings to the sense of effort and other sensory experiences when the standardized facts are integrated. The reciprocal dominance of contextual and abstract processes over time is consistent with a destructive oscillation between ideologies that are consistent with mind-media co-evolution. The possibility that attempts to balance these two media effects will generate more beneficial human extensions is considered.

Outline

Part I: Introduction and Review of Innis's and McLuhan's Conceptions of Media

Part II: Examining the Process of Contextualization and Abstraction

Part III: Experimental Evidence for the Model

Part IV: Applying the Model to the Weighing of Evidence

Introduction: Searching for Fundamental Properties and Effects of Media

The charge of technological or media determinism is one of the most serious criticisms of a media ecological approach. The credibility of the pioneering work of both Harold Adams Innis and Herbert Marshall McLuhan suffered from this charge. In the broadcast and mass media, questions such as: Does television cause violence in our youth? Do video games make them kill? Will television and the Internet destroy literacy, a process apparently began by TV? While the developing discipline of Media Ecology has explored and revealed many important differences between the biological, psychological, social and cultural effects of various media, most of the work has created opposing dualities between pairs or types of media that may encourage this problematic way of considering their effects. Many studies have explored the difference between oral and literate societies (Ong, 1982; McLuhan, 1964; Innis, 1951) or the differences between electronic communications and writing. From this approach, one would ask commonly about the difference in attitude of people to a topic who either get their information mainly or exclusively from the newspaper **or** the television, or consider students'

performance in relation to the time they spend reading versus the time spent on screen i.e. TV/Internet. These explorations conceive of the media as competitive separate entities that highlight strong differences between media, and have tried to isolate the effects of single media. However, much less research has been done on the question of how media have such profound effects, and whether there are common underlying mechanisms of seemingly disparate media. Discovering and exploring such fundamental processes can enhance our understanding of our media ecology, and help us predict and then test the effects of various technologies on people living in particular cultures. As well, we understand little of the potential for interaction between such media. Because we live in such a media-saturated environment, it is certain that most people interact with multiple forms of media, and their interactions are important to the overall effect of technology, culture and modern communications. For these reasons, it is important to continue to look for underlying fundamental properties that media share that help explain their pervasive effects, and help predict media interactions. This paper represents an attempt to discover some fundamental aspects of media. We will begin this process with a review of two prominent approaches to media that offer a beginning point for this study.

Innis's Theory of Heavy (Temporally-Biased) and Light (Spatially-Biased) Media and Their Relationship to Abstraction and Contextualization

Harold Innis, a professor of political economy at the University of Toronto in the 1940's and 50's had developed one of the first systematic approaches to media and the inherent bias of all communications. His writings provided McLuhan with many concepts that he later expanded in his famously cryptic and aphoristic style. Innis's explorations of the

context of economic development was in direct conflict with the price and market theories of his era. (Innis, 1995). For the vast majority of economists, the extracting of any resource, the production of goods or any material interchange could be reduced to a price, a common form of valuation separated from any socio-political, ecological or temporal consideration. The monetary system could theoretically be applied to any material entity or service and therefore transform any thing and every action into a uniform quantity that could be exchanged with any other product and service, continuing in an infinite sequence, as long as the object or action could have a universal value outside of its personal setting, history and society.

However, Innis's study of the development of the staple economy of colonies, such as the Fur Trade, revealed the means of obtaining resources, the medium of transportation, and the method of financing had a profound effect of upon the colony that was excluded from the economic and social functions of the Empire. Innis concluded that the uniform system of pricing was only part of the story, and totally ignored or marginalized the environmental and social costs of the resource industries upon the colony. As the Empire attempted to minimize the time needed to obtain resources and profit, this led to a spatial expansion of the industry under distant control. He termed this effect the Centralizing or Spatially-Biased tendency of economic processes that he would later apply to communications media. In effect, the Empire and its colony, however distant and distinct physically, would share a common single uniform organization based on the European model (as if they shared one continuous environment and culture).

In contrast, Innis found that some industries, such as Fishing, required that the ships follow the fish into various regions, thus they did not evolve into spatially-bound processes and retained some of their traditions and schedules that were attuned to weather and natural cycles. Innis termed these methods Decentralized or Temporally-Biased. The fleets of fishing boats and the small fishing villages of the coast remained somewhat autonomous from the distant Empire, and were synchronized more with local tides, weather, seasons, and traditions.

Heavy and Light Media: Extending the Theory of Temporal and Spatial Bias

Once Harold Innis discovered this crucial pattern of spatially biased and temporally biased economic processes as important but overlooked factors affecting both Empires and colonies, he began to explore communications media for similar patterns. Innis began his study of temporally biased media in ancient Egypt and he surveyed the history of Western communications from a media ecology point of view. Here, along the Nile he found the prototypical time-biased medium: hieroglyphics. Lasting for thousands of years, they provided stability and symbolized the eternal concerns of the religion centered around the continuity of life through mummification and pyramid construction that provided the afterlife, a form of rebirth over time. However, the massive size of the stone basis of hieroglyphics limited the territory that could be administered, as did the association of the religion with natural forces (e.g. flooding of the Nile). Innis recognized that the heavy nature of the hieroglyphic medium that provided it with its physical stability, also made learning and producing the hieroglyphics and the rate of cultural change slow: in effect the chief cultural ideas became 'heavy' (Stamps, 1995). The

localization of the religion to temples, and the enduring power of the priests tended to decentralize power in Egypt, and provided a balance to the Pharaonic system and its military power. Innis considered the use of Papyrus by the Roman Empire as one of the clearest examples of a Light Medium that would extend the government and especially the military control over large areas of space, enabling thought and commands to travel swiftly over large distances and so become 'light. ' The dependence on the transfer of such ideas transformed Rome into the archetypal center of administration and finance.

Centripetal Force of Spatial-Biasing Media: Generating Abstractions

These media generate a Center—a point of convergence of materials, people and cultural patterns that are separated from the history and setting, where the transformation of material objects and social patterns into more standardized, new forms occurs rapidly and continuously. The more uniform content of the human activities in the center replaces and marginalizes much of the various surrounding places, acting as equivalent to the area it controls. This is analogous to the concept of the center of gravity of an object, the theoretical point at which physicists consider all the weight of the object to be concentrated. The forces acting on the whole object can be calculated to be acting only at the center of gravity, effectively reducing the object to a single point.

Centrifugal Force of Temporally-Biased Media: Generating Context

Innis considered that the methods of economic development and communication that emphasized the temporal nature of the environment would lead to differentiation and a fragmenting of systems into varying forms, unique to the history and the setting. A

common example comes from the study of religious divisions such as the formation of Christianity from Judaism as a return of the marginal to resist the centralized Roman Administration. The continued formation of new religious movements through fragmentation and cultural separatist movements seeking independence stands in sharp contrast to the centripetal tendency that the uniform thinking within governments and the military provide.

McLuhan's Concept of Visual Space and Acoustic Space

In *Laws of Media*, Marshall McLuhan (1988) elucidates the beginning of modern media ecology in the genesis of the Greek alphabet: "When the consonant was invented as a meaningless abstraction, vision detached itself from the other senses and visual space began to form". The consonant, which is a symbol of stopping of sound, unlike vowels doesn't exist as a separate sound but "was therefore an abstraction, non-sound, an idea of the mind". This atomized unit of sound, the phoneme that had no meaning, became the prototype of analytical processes that transformed the Western societies into our modern scientific and technological global world. The dominance of left-brain function in reading the alphabet led to a generalized habits of thinking that utilized the specialized abilities of the left brain to divide items into elementary particles (e.g. the phoneme unit of the alphabet) that could be recombined into varying set of sequences. This ability was developed in association with the visual sense, since the eye is evolved to extract a figure from a background, and seeks patterns of individual items in the surrounding space. Since light is ever-present and continuously emitted by the sun, without human effort, visual percepts appear to be just there, and we can feel that we are like cameras, as passive

objects that can receive 'objective' information and unaltered images. However modern cognitive science is revealing that even the simplest acts of visual perception involve complex processing and active effort that remain undetected. The mediated environment of modern humans forms a continuous, uniform linear container.

In contrast, McLuhan characterized the pre-alphabetic environment as one of auditory-dominant experience that forms an 'acoustic space'. In stark opposition to visual space, "acoustic space, always penetrated by tactility and other senses, is spherical, discontinuous, non-homogeneous, resonant and dynamical." (1988, p. 33). Most significantly, he emphasizes the presence of figure and ground constantly interacting and mutually defining each other, with an interval between them that preserves the existence of each aspect and prevents either figure or ground from suppressing the other. However, the visual process produces a figure without any ground that has no location. Acoustic space, exemplified by sound, music and oral language, involves both creator and receiver of sound, in a simultaneous, shared experience. The setting, and time are crucial to this environment, and they interact with the particular features of interest. The right hemisphere of the brain is specialized to detect the holistic patterns of the unbounded acoustic space. The internal characteristics of groupings as they interact with the surroundings create their own space, and are not inserted into a pre-existing area.

Composer died, is more linear, and involves more complex sequences as compared to folk and rock music. The transcending of early media categorizations is especially significant in the post-Renaissance era, during which scientific and technological inventions emerge at increasingly rapid rates. Digital processes, especially web pages and

email, and hybrid media such as TV, movies and music videos involve both basic types of sensory and physical processes, and have both centripetal and centrifugal effects on all cultures. Social processes such as identity (Castells, 1996) have undergone tremendous changes in the ‘Information Age’ and have bifurcated into both global spatialized and decentered forms. It would be highly useful to recognize some fundamental processes that transcend the existing dualities that may lead to confusion and technological determinism, and are better suited to the electronic and network media that dominate our current world. As well, a process that can quantify the effects of our inventions would further the discipline of media ecology. The remainder of this paper is dedicated to proposing and developing one such process.

Contextual and Abstract Processes of Media

Contextualization, the joining or weaving together of two or more features of our environment, and *Abstraction*, the separation of wholes into isolated parts are compatible with both Innis’s and McLuhan’s theories of bias and their resulting notions of media ecology.

Contextual Effects of Media

Contextual effects of media will provide a second aspect through which the figure of interest in the environment will be simultaneously considered. They will join this second feature with the object of interest and therefore the same object or event will acquire a different meaning. The contextual effect can be qualified and in some cases quantified, and can be defined as the degree to which the same content will be experienced differently and

evoke different responses in the user of the medium. A medium alters the aspect will be alter the experienced differently.

Abstract Effects of Media

Abstract effects of media will provide ways to extract a common feature that can be separated from the specific setting and time. The single uniform feature can serve as a substitute for the original in many situations, providing a continuous process of comparison based on a single common ground. While this process provides powerful analytical abilities, it reduces the meaning of a situation to a narrow range of standardized, universal types. This effect can be defined as the degree to which a single feature can be separated from particular situations, so objects and events can be evaluated on this basis only.

<u>CONTEXTUALIZATION</u>	<u>ABSTRACTION</u>
Joins features by considering two or more of them simultaneously	Separates features by considering single aspects sequentially
Creates a Reciprocal Plurality by preserving the original figure of interest together with the features introduced that interact without replacing the original.	Creates a Singular Identity by reducing the environment to a series of atomized aspects that replace the whole object and are considered identical to the original
Unites features into discontinuous groupings that cannot be reduced to parts but have emergent properties	Reduces features into a continuous space or field that varies in value continuously across time and space
Favours Right Hemisphere wholistic functions	Favours Left Hemisphere analytical functions

Encourages Analogical and Metaphorical Thinking	Encourages Metonymical & Propositional Thinking
Distinguishes Similarities and Differences that are Relative to a Second Feature of a Situation.	Finds Absolute Information that can be applied equally to any situation.

Table 1: Fundamental Characteristics of Abstraction and Contextualization

Discussion of the Main Features of the Process of Contextualization and Abstraction

Plurality and Identity

One of the most important differences between these two media processes involves the distinction between the formation of a singular identity that occurs within a visual/centralizing media environment and an blended duality (or multiplicity) characteristic of an acoustic/decentralized media space.

In the barter or non-monetary trading systems used in pre-literate times, the value of the service and the products are mutually determined by the buyer's and seller's personal history and specific situation. A trader who had accumulated many livestock might value grazing land or feed for his flock more than additional animals. If some of their animals died, their way of valuing these products would likely reverse. Their historical situation serves as a context for the interaction. As well, the cost for the trader would involve what the other party required, and how much the person valued what they had to relinquish. In this situation, neither party singly determines the exchange, but the process depends upon the blending or merging of the two situations. The blended result of the interaction preserves the distinct features of both participants, and resembles the process

of “conceptual blending” (Turner, 1996) that generates new concepts through metaphorical language.

The centralizing media generate a uniform domain that totally separates one feature of interest (size, weight, speed, cost, or chemical composition) from all other aspects of the object and marginalizes, discards or ignores all the other characteristics. The single feature is considered identical with the entire entity, and completely substitutes for the whole object, producing a content that erases any specific features not within the particular domain. The dominant economic theory of Innis’s era, centered on price and market, depended upon this approach. For example, the salary of a worker would fully substitute for the work done, and the money obtained would be considered identical to the product or service provided when he went to a store. Any one who possessed the same quantity of money would be considered to have done identical work of the same value whether it was obtained by productive labour, corporate tax evasion, dumping waste, selling illicit drugs or theft. The distinction between the original means of obtaining money is discarded in the modern monetary system. The ancient barter transaction was split by the written visual mediator of money into two static, sequential processes that isolate buyer and seller. The buyer must pay a fixed amount of money, or stored labour, and the seller then becomes a buyer and repeats this process in sequence with a different seller ad infinitum. In contrast to bartering, the value of items is fixed and the buyer and seller function individually.

Discontinuous Groupings and a Uniform Continuum

Agricultural trade between people from different regions, is an ancient example of a

common process of abstraction, through which the items are separated from their original setting and brought to an unrelated region. In this new location the knowledge of growing food, the labour to grow and pick it, the role of the food in the ecology and in the local culture are all separated from the food. If we go even further, the caloric and nutritional value of foods can be analyzed, and abstracted from the unique specific appearance, taste, aroma, pleasure-enhancement, social status, cultural meaning of the food. In this system, eating a bland, mushy mixture (e.g. 'astronaut' food) could be deemed identical nutritionally to consuming a steak dinner. The single feature that becomes isolated is also dramatically expanded in importance, and takes on the role of the object. One of the most common examples of this phenomenon in North America is the pre-occupation with the caloric value of foods, that may dominate thinking and determine food choices in isolation from the nutritional, economic, environmental and other factors.

In sharp contrast, temporally-biased media that form an acoustic space provide a new ground, or situation that introduces new factors that join together with the figure of interest to provide a context. The resulting interaction produces a dynamic oscillation between the figure and ground which will have properties that cannot be reduced to either one. This irreducibility has been termed an emergent property. As in an acoustic space, with listener and speaker, the interaction will change over time, with neither figure nor ground eliminating the other, but instead oscillate across this gap, with each figure and ground mutually defining each other.

To examine the effect of context of food, one can find in the anthropological literature examples of the complex interactions between the, natural forms of foods and

the many rules and restrictions on who is permitted or forbidden to consume certain foods, times of the year when foods must be eaten in rituals, and other times when the same food may not be eaten at all (Lakoff, 1987). In Lakoff's study of metaphor and its role in culture, discusses the gender distinctions that provide a crucial context for the permissible methods of cooking available to women and men. Restricting the use of pots to women, and designating cooking of meat with a spit over an open fire as only suitable for men joins gender issues with techniques and creates an important distinction between methods. A male cooking with a pot, and the food resulting from this taboo situation would be treated much differently than if he had used the accepted methods. In complementary fashion, the pots and spit serve to symbolize and reinforce distinct gender roles. However in Western culture generally, the methods would be considered identical whether cooked by male or female and the food in itself on the plate would be the issue, where (such as in a restaurant, where the gender of the chef may not be known.) the plate represents a uniform ground for the judgement of the abstract quality and taste of the food. In a traditional society, the cook (and their gender/status) and the method and the food interweave and this provides a non-uniform highly differentiated context that creates two new irreducible emergent entities, the female-stirred-pot-food and the male-pierced-fire-food. Finally, to complete this example, we could expect that new contexts could develop surrounding the imported foods, and these will mediate the role of the imported food in the new setting.

Metaphorical and Propositional (Metonymical) Thinking

Among Marshall McLuhan's most important contributions to our understanding of

human culture was his recognition that all inventions, not just language alter our perceptions and thinking: “all media are active metaphors in their power to translate experience into new forms” (1964/1997, pg 57) However, McLuhan himself detailed at great length how visual space that produces abstraction, while indeed translating our experience into new forms, requires that we think in ways that are traditionally opposite from the cognitive patterns of ratios encouraged by explicit metaphors of speech. How can we reconcile these conflicting conceptions of media? The duality of context coupled with information leads to a similarity between unmediated and mediated interactions that is ambiguously true and not true. Romeo’s proclaiming that “Juliet is the sun” requires the appreciation that indeed she can and cannot be like the sun. In the same way, we can consider McLuhan’s statement above as true and not true. Cultures dominated by oral means of communication, because speech decays immediately, cannot be certain of the words themselves (try *exactly* repeating more than one sentence you hear spoken at normal speed), but must use the rich context of the speaker, physical setting, other events to receive an overall effect from the speaker. Olsen (1988) contrasts this with the literate mind that forms *propositions*, statements that are considered exclusively true or false. The process of abstraction that literacy emphasizes leads to this possibility of full equivalence and substitution of mediated content for some aspect of the world that we term ‘true’. Therefore, the translation that involves abstraction , because it does not tolerate ambiguity makes the original figure ‘disappear’ into the content and only qualifies as a weak form of metaphor, that Gozzi (1999) has termed the “metonymic pole of discourse” while context, whether provided by a gesture, a picture or a spoken word moves our

thinking towards the “metaphoric pole” of communication.

Relative and Absolute Knowledge

In recent years, a contentious issue between the scientific community and a wide variety of scholarly and popular writers and researchers in the social sciences and humanities has emerged concerning the question of relative and absolute knowledge. Through scientific and rational means that apply the same method to many different situations, measurements and ideas can emerge that are considered identical, within certain domains, with the original aspect of our environment. This can appear to offer absolute knowledge that transcends differences across time and space. However, the evidence of the relative nature of our knowledge, that emerges from even the most precise physics has provided a strong challenge to this claim to objectivity. While it is true that all forms of knowledge contain bias, however, the type of bias that more contextual or more abstract knowledge creates is clearly different. Contextual bias limits the application of our knowledge to those situations that share some common features that can be grouped together. In contrast, abstract bias has wider application, but is limited by its tendency to reduce our experience to data and unintuitive forms that have limited relevance and emotional meaning. Indeed physics does offer nearly absolute knowledge but is quite esoteric, and religion and literature offer more involving experiences, but only for those who share some underlying background. Many other inventions fall in the middle of these extreme processes.

The Interaction Of Contextualization And Abstraction Within Media

What distinguishes the approach developed in this paper is the conceptualization of these

as complementary and competitive effects found both *between and within* each medium, not as monolithic qualities that exist in an all or none fashion. The variation in the proportion of these two main effects *within* each medium can help us predict the differences *between* media in their effects upon consciousness, and the relative proportion can contribute to the attempt to both quantify and qualify the effects of any medium and interactions between media. It is proposed here that the proportion of these two processes will determine some of the major qualities of the medium, that it can contribute to the categorization of media as heavy or light, or give them a visual or acoustic ‘flavour’. The attempt to find fundamental qualities that exist in all media is motivated by the assumption that this discovery would allow us to better understand the ecological effects of media.

In our previous examination of the economic system, we can detect the limitation of the process of abstraction and contextualization in any medium. Although monetary systems will tend to expand their territory by extracting and quantifying what is impersonal and of universal value, only those people who share some underlying local factors of culture and environment will fully participate in this process, indicating that there is some degree of context implicit even in the current global currency systems. Voluntary work, reciprocal communal labour, (e.g. barn raisings) exchanging gifts, and bartering depend upon strong shared values that join people outside of the economic process, but also utilize some universal concerns of food, shelter, safety, and require some degree of abstraction to function.

Gozzi in his detailed exploration of the enhanced role of metaphor in the era of electronic media, uses Jakobson's (pg 26) categorization of linguistic functions into two types: the signicative and the distinctive and relates them to the metaphoric pole and metonymic pole (respectively) of discourse. The signicative function emphasizes the context, and the potential effect of an event or object, its significance relative to some existing time-dependent condition. The distinctive function emphasizes abstraction or selection of parts and substitution of these parts for the whole. Gozzi observes that this emphasis goes far beyond figures of speech and affects patterns of thinking as well

These two functions of language emphasize the blended nature of all media. Whether media use visual or acoustic or tactile approaches, or they are heavy or light, temporally or spatially biased, they can all be considered to represent the merging of many dimensions, including contextual and abstract processes, although in widely varying proportions. Language may be uniquely flexible in its ability to range from the extremes of one pole to the other; however even though oral poetry and mathematics may reside at different ends of the spectrum, poetry still depends upon some fixed conventions, while mathematics uses some arbitrary elements that prevent them from being truly universal.

The Case of E-Mail

The Internet has attracted significant interest from popular and scholarly writers and researchers. How do email, speech and mail compare? How do electronic newsgroups and discussion groups compare to public speeches, letters to the editor, or spoken informal conversations are just a few of the questions the Internet has provoked.

If we applied the features of context and abstraction, what would we find? A mixed pattern emerges, in which e-mail provides both context and abstraction, in different ways. While email separates the words from prosody, gesture, facial response etc. more than speech, it manages to join the comments together temporally, (due to the very rapid delivery and interchange). The ability to clarify, respond is enhanced, compared to print, but is quite limited compared to oral dialogue. As well, some elements of style found in email and newsgroup writing, such as shorter sentences, incomplete sentences and phrases, inconsistent capitalization, are less uniform than print style, and so less abstract in style. (McLuhan, E. 1988) The content of a digital discussion is not reviewed by an editor as in print, and so the themes and conclusions in discussion are less directly connected in a logical sequence but favour indirect implications, in a conversational manner. The various messages also lack the cohesion of a single author and resemble a meandering narrative in style. The broadcasting of the messages, may formalize the thinking into prepositions of truth and falsehood, but the support for this is much more limited than in print articles.

Rather than a single author using a limited number of criteria applied to various topics, as in many print articles, the numerous 'authors' or correspondents in newsgroups or mail lists present a wide variety of approaches which are discontinuous and cannot be reduced to a single theme. Finally, some of the contextual aspects of email, list and newsgroups may be the result of reading with light projected through a screen at the viewer rather than reflected from paper, in parallel with the increase in involvement and context of viewers when watching TV compared with the effect of using a reflective

(movie) screen. (see Hot and Cool Media). In summary, the hybrid nature of digital communication is apparent when you recognize that it promotes some features of abstraction and some aspects of context. Researchers have supported this approach by concluding that e-mail is a hybrid process that combines literate and oral effects while creating a novel medium (Strate 2002).² The process of abstraction and contextualization can be conceived of as a final common result of different dimensions e.g. orality and literacy, interpersonal and mass broadcast, popular and scholarly styles and can serve to integrate them together. This may have benefits compared with the imposing of single dimensions or categories on media.

Interaction Of Contextualization And Abstraction Between Media: Co-Evolution

An excellent model for the study of media interaction, that helped bring to attention these two processes, is Derrick de Kerckhove's (1988) work with lateralization of ancient alphabets. He sought to understand why some scripts, such as ancient and modern Semitic scripts are written from right to left, and conversely, why Greek, English and other alphabets are routinely written from left to right. He concluded that the difference between the existing oral form of Semitic and Greek (and later English) languages determined the direction of writing. Because Semitic spoken languages use a consonantal root to generate different words, and the same root will be vocalized i.e. combined with different vowels, depending upon the semantic sense determined by the other accompanying words, Semitic scripts initially only had consonants. Reading right to left favours the right hemisphere that is better at judging contexts of whole groups of words needed to add the appropriate vowels. Since Greek (and English) is fully vocalized, and

has fixed combinations of vowels and consonants, the vowels were added to the original Semitic alphabet. In this case, conversely, the left brain, being better at sequence, is more efficient when reading left to right. Although the invention of alphabets is a strongly visual medium that atomizes whole speech into rigid sequences of infinitely recombineable sounds, because the oral languages vary considerably in the degree to which they depend upon meaning as a context to distinguish words, this influenced the direction of written speech and creates variation in the importance of semantic context within the overall highly abstract medium of alphabetic writing. In effect, writing has degrees of context within its main effect of recording speech as a set of abstract sounds. Similarly, Semitic and Greek/English oral speech display less or more abstract functions respectively within a generally contextualized medium. A similar pattern of mutual influence between decorative and accounting techniques was discovered by Schmandt-Besserat (Schmandt-Besserat, 1996). She found archaeological evidence of the change from a pictorial style that was mostly “evocative”, which gave priority to contiguous shapes and harmonized with the vase contours, to a linear hierarchical style that emphasized political-religious concepts and categorizes. She attributes this to the influence of the earliest forms of writing (Schmandt-Besserat, 1994) that used categorizing techniques such as linear registers and employed size difference to symbolize social status. This can be interpreted as an example of the way that media change our consciousness and this is then expressed outward as inventions of new media (Steinhart, submitted) that show oscillations between abstract-dominant and context-dominant forms.

Understanding ‘Hot and Cool’ as ‘Abstraction and Context’

The declaration that media are hot and cool remains one of Marshall McLuhan’s most cryptic concepts. Most people seemed to consider this concept as a propositional one; but if his interpreters are expecting the ‘temperature’ of the medium to produce a linear sequence of cause and effects, then they expect that radio or movies will pass on their heat, exciting people, more than cool television, the reverse of McLuhan’s conclusions. However, if we assume that his explanation for the greater success of Richard Nixon on radio and John Kennedy on television during their 1960 presidential debate is founded on the consideration of hot and cool media as relative degrees of abstraction and context respectively. We can recognize that radio abstracts the voice from the face, gestures and setting, and leads to a long sequence of speech. It may keep us ‘separate’ from the speaker and topic compared to television that provides appearance, gesture and voice as a multi-media context, that joins the personal mannerisms with the information into an irreducible whole. Experienced on TV, the speeches were judged relative to the visual context that ‘showed’ Kennedy as calm under pressure and sincere. The application of the criteria of abstraction and context helps explain the effect of the medium on the debate. Further research has confirmed that the same film shown on a cool television screen brings more personal involvement than when shown on a hot movie screen which encouraged more theoretical descriptions (McLuhan, E 2000). However, while radio appeared in this case to be hotter than TV, McLuhan concluded that it was radio that was hotter than print, and this had devastating results when used by Hitler and other fascist leaders in Europe. This led him to predict that if TV had emerged before radio, Hitler

would have been less successful in manipulating people. This approach can help us conclude that the relative degree of context and abstraction between two or more types of media determines the flow of heat and therefore the complementary degree of involvement. Media that encourage abstraction reduce involvement relative to media that present the topic with context. Our emotions are apparently tuned to the broader sensory offerings of context. Further research is needed to determine if the consideration of abstraction and temperature of medium is helpful in understanding and predicting other examples of media interaction.

Published Studies that Provide Models of Abstraction and Contextualization

Three experiments using illusions are presented below that provide us not only with evidence, but some quantitative measures of the effect of context upon perceptions. Illusions alter the usual context that we utilize to form judgements and so create ‘false perceptions’ that lead to judgements that are not valid under other circumstances and so are considered illusions. They provide a good model for the distinctions between relative knowledge, that is intuitive but valid in a limited sphere, and absolute measures that are valid in a larger realm, but require technology to extend our perception and are often counter-intuitive.

The Size-Weight Illusion

Flanagan and Beltzner (Flanagan, Beltzner. 2000) re-examined an illusion in which the size of objects influenced judgement of weight. The experiment involved the following:

- Two object of same weight, as measured on a scale, but of different size were used
- Subjects were asked to lift each object alternately, and judge their relative weights

- While they did this, sensors measured the force each subject's fingers generated to lift the object. After repeated comparisons, the subjects had learned to apply equal fingertip forces to both objects of different sizes but identical measured weight.
- Even after learning to apply equal force through repeated comparisons, subjects *judged the smaller object as heavier.*

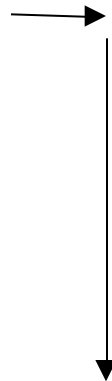
This simple experiment provides a good model of the interaction between the objective and the subjective forms of weighing. In all cases, weighing involves the counter-balancing of the downward force of gravity, with an equal upward force, using either objects (standard units on a scale) or the subject's own bodily activity that generated upward force. In effect, the initial process of weighing the objects using a scale, and making them equal in weight is a common form of an abstracting process. Each object is only considered according to the equivalent number of standard units that are subject to the same force of gravity, and so have the same mass or amount of matter. The size, shape, colour, composition (wood, metal, animal part) etc. of objects are ignored in this process, an example of what McLuhan (1988) termed 'perceptual closure'. This is an inevitable result of mediated interactions that amplify some perceptions of self and environment and reduce the attention and responses to others.

In the complementary second part of the experiment, the judgement of the difference in heaviness of the two objects appears to be determined not by the force that the subjects actually used, but the difference in size of the boxes. Because the subject learned to apply an equal force to each box, the authors concluded that judgement of weight occurs through thinking and perceptual processes that are separate from the direct

actions of lifting. The assumption behind this process is that people will conclude that any difference in their perception of the effort used to lift each object, is due to a difference in the weight of the objects. This suggests that people assume that weight varies linearly and continuously, a feature of abstract thinking. Presumably, the size difference mediated the difference in the perception of effort that was needed to lift each object, and size was inversely proportional to the biased sense of effort. This led to the discontinuous sense of weight difference, a characteristic effect of context. The metaphorical nature of context is being displayed in this experiment, since the direct bodily feelings of muscle tensing, movement and position, which is termed Proprioception, is being influenced by the visual and tactile processes that detect size difference. Ultimately, size difference is felt *as if* it were a different amount of effort needed and so alters the corresponding concepts of the objects' relative weight. This directs us to consider the concept of 'heavier', as an *extension* of the actual force expended, into visual or tactile sensory metaphors or symbols. Clearly the bodily sense of force needed, and used was significantly altered, and a new relative, contextual meaning of the concept of weight was created that is usually termed "heaviness". Commonly people will recognize that historic pre-existing qualities of the person lifting, such as fitness and strength, disease or pain function as a context that may affect the ability to lift something; a fit person may experience a similar effort/strain to lift something much heavier than someone injured who is lifting a much lighter object. And they may judge the object of equal weight. In this experiment however, the difference in effort was not perceived as personal, but objectified to generate the illusion. The process is represented

as a graph in Figure 1. The bias of context, which uses the size to judge the effort to lift the object weight (shown with the solid arrows) increases the apparent weight of the small box; the bias of abstraction uses the measured weight to reduce the perception of effort to be equal for the two boxes (shown with the dashed arrows).

Understanding the mechanisms by which the size difference altered the sense of effort and weight judgement could make an important contribution to the understanding of the mechanisms by which contextual aspects of media affect people psychologically in general. The large box, since it was taller, rose to a greater total height, even though both boxes were lifted the same distance above ground. Possibly the subjects made a visually mediated assessment of the relative total height of each object. This difference could have been interpreted as less successful lifting of the small object, and so made the lifting of the smaller object seem like a more effortful difficult process, translating into a concept of being heavier. Further testing could be done to establish the mechanism of the illusion.



Whatever the actual mechanism, the visual and/or tactile senses in this case seemed to have extended the proprioceptive sense into a contextual and relative form of weight difference, instead of the absolute and individual weighing of each object on a scale. This leads to the illusion and a change in the cognition or expectation of weight.

The objectification of the relative size of the boxes into a judgement of increased absolute weight, through consideration of context, is significant. as the size difference led to an external projection or attribution of difference in the weight of objects, even though it was the subject's function (assumed to be perception of effort) that was altered. In the discontinuous domain of context, effort is converted into substance, as if the absolute external property of weight was influenced by the internal visual/tactile processing. This psychological process, through which the perceived qualities of an external object are made to agree with the internal condition of the person, is known as reification. Media theory, which predicts that the effects of media are usually undetected and attributed to the content alone, helps us understand this common 'illusion' that can be part of cults and culturally sanctioned prejudices (Kelly, 1997). In the following sections we will consider how attributes that result from our actions are associated or joined with an external feature or object, and the interaction is treated as outside of our efforts and pre-existing our actions. (see Discussion) This is one of the consequences of the undetected nature of the medium of interaction, since the general process used must remain unattended to in order to focus upon a specific content.

The reciprocal potential influence of the weight measurement on the sense of effort is also shown on the graph.(arrows with dots and dashes) This represents the process of de-contextualization, or reductionism, which the investigators had utilized to equalize the boxes' weight and treat them as if they are the same size, nullifying the visual/tactile context and influence. This will bring an equality or convergence of expectation of efforts, and restore the linear relationships between effort and amount of substance that analysis strives for. Although not yet done, it would be interesting to conduct an experiment to determine if the knowledge of the abstract weighing process would subsequently affect the perception, the feeling of weight. In this model, I have treated each aspect of weighing as an anti-environment, that can uncover the bias in the other process that normally remains undetected. Neither is more 'correct', but each supplies a unique extension to our functions that can be beneficial in some situations. Context helps to recognize similarities and differences that may be important when choosing tools or weapons, and the abstraction of weight from size, shape, colour, helps see a similarity in disparate situations.

The Titchener disk illusion (Goodale, 1992) is a second experiment that can help illustrate these two fundamental ways to approach our environment. This procedure uses different background discs to create the appearance of difference in size between two identical discs. It appears that subjects use the relative size of the target and background disc to judge which target disc in the center is larger. Subjects consistently perceived the center disc that was surrounded by smaller discs as larger. In this experiment, an added dimension was measured to determine whether the perception of size for grasping and

picking up a disc was affected by the different size of background discs. While the judgement of the size and choosing of the discs was consistently affected by the illusion from the differing background, the grip size used to pick up the disc was not. One can describe the judgement of relative size by visual means as context dependent, and the perception of absolute size of a single disc that one must match with the right grip as context independent and abstract. The subjects demonstrated the use of both forms of knowledge within the same action. Measuring is only concerned with the size of each disc considered individually, when isolated from its surroundings.

Finally, a third study (Smeets, 1996) is now considered that combines some aspects of the previous two experiments. A different size illusion was utilized to determine whether and how it would affect the the size of the opening of the hand to grasp and simultaneously the force used to lift the objects. The goal of the experiment was to determine whether the two actions used different or similar visual information. As we would now expect, the grasp was unaffected by the size illusion, but the force used was strongly influenced by the apparent difference in object size. The size difference, even if only illusory, created an expectation that the larger disc was heavier. It appears that because the exact weight of an object cannot be determined visually, people use the relative difference in size to adjust the initial force they use. The context, in this case the different background was used for estimating weight, but not for actions upon individual objects since the exact size of an object is available visually. We will explore next how a person's personal and cultural experiences form a similar background that serves as a context for judgement of people's intelligence or guilt when accused of a crime.

Studies of context in more complex situations: Judging Truth and Intelligence

The experiments described above provide a simple way to observe the characteristics and the interaction of these two fundamental properties of all inventions and ideas. Illusions represent distinct and extreme examples of these different characteristics; in each study, the context either dominates or is ignored, depending on the actions and their purpose. However, it remains to be examined whether this distinction being proposed here has a relevance to more complex situations. Two further studies of cognition and social psychology will be reviewed that explore more complex judgments, about truth of propositions, and the ability to fairly judge intelligence among socially distinct groups.

‘Perceptual Fluency’ and Judgements of Truth

There is also experimental evidence that more complex judgements are also affected by simple contexts. (Reber, Schwarz, 1999) Differences in the visibility of words on a screen due to difference in contrast between the word colour and white background produced a difference in the acceptance of statements of fact as true or false. The statements that were placed in more readable colour combinations were more likely to be judged as true, even when actually false. The authors conclude that the ease of reading may be perceived as increased familiarity, since repetition of facts leads to quick and easy recognition. It appears that factors that alter the amount of cognitive processing or ‘cognitive effort’ that needs to be done can act as significant contexts that alter the probability of truth of statements and affects behaviour. Again, even though these are basic physical obstacles to increase effort and active subject participation, they are reified and seem to be acting as

undetected or unconscious metaphors that are experienced as if they are changes in the external objects, as we saw with the weight experiment.

Inhibitory Ability and Prejudice: Difference in Racial Stereotyping in Individuals

Research by Von Hippel et al (Von Hippel, 2000) supports the previously discussed findings about familiarity affecting the truth judgements that people make, and provides a possible mechanism to explain this. He explored the cognitive factors that contribute to prejudice towards African-Americans from other socio-cultural groups. This experiment demonstrated that non-prejudiced people are able to inhibit automatic stereotyped thinking, and replace this with more egalitarian beliefs. Their research suggests older adults can't do that inhibiting as well, as assessed from a standardized inhibition test that measure how well people could avoid reading distracting information in a different font. This difference in inhibition accounted for the increased bias in the senior citizens response to a test of prejudiced thinking. They were on average twelve percent more likely than young people to attribute a difference in intelligence between two fictitious people solely based on the difference in the name and implied cultural group.

Von Hippel emphasized that while adults tend to lose some of their inhibitory ability as they age, this ability is not just a function of age. There are individual differences in the ability to inhibit distracting stimuli across all age levels. In fact, the researchers did a separate analysis of the younger people in the study and found again that those who showed poorer inhibitory ability were more likely to be prejudiced than those who had better inhibitory ability.

This experiment is consistent with the other two presented here in demonstrating that the perceived effort to accomplish a task, whether influenced by object size, visibility of words, or ability to inhibit previous learning, is reified or projected onto external situations and can significantly mediate the way people behave in these situations.

Weighing Evidence: A Hypothetical Model of Interaction of Abstraction and Contextualization

In order to integrate the results from the research discussed above within a media ecology framework, the medium of Justice was selected, since it combines all three media within its processes: weighing, judging statement truth, and inhibiting stereotyping and prejudice. In ancient Egypt, the weighing of the heart of a person was an important process, seen in several elaborate murals in temples and tombs. A light heart, was favourable to afterlife, because a light heart could emulate the eternal sun, reborn each day, in its idealized prototypical journey as it crossed the sky. In the Bible, God told Moses that he would make Pharaoh's heart 'hard' – so he would suffer the plagues and free the Israelites – an allusion or even mistranslation of the concept that God would make Pharaoh's heart 'heavy'.

Weighing evidence is also a basic process of modern Law. Significant to this paper, Justice - who holds up the Scales of Justice - is famously blind. This cultural icon warns of the possibility that visual appearance, as all three of the experiments reviewed above demonstrated, can create illusions that could interfere in the accurate balancing of the weight of evidence of guilt with reasonable doubt, the task of every juror. They must

assume innocence and then compare this to the evidence that, if it brings the person 'down', will convict the accused of the crime. The evidence for innocence provides a neutral context that 'lifts' the person's reputation, balancing the force downward of suggestions of motive, opportunity and methods to commit a crime. The process of weighing evidence requires the cognitive effort to find a context that balances and neutralizes the probability that the accused committed this act. To conclude that the accused is innocent, requires the juror to provide an upward counter-balancing force.

The amount of effort to find neutral interpretations of facts, will depend upon many factors, and judging from the experiments reviewed here, the ease or difficulty in performing a task can unknowingly be significantly altered by various contexts that can strongly bias the perception of the accused and the juror's final judgement. The difficulty of imagining oneself doing or not doing what the accused is reputed to have done, and remain innocent would vary on the ability to identify with the situation of the accused. Different cultural and social groups would likely have a more difficult time with this process. As well, individual and age-related differences in cognitive ability to inhibit stereotyped thinking is relevant, and even in those motivated to be fair and use reason, stereotypes affect judgements according to the Von Hippel experiment.

Justice provides a good model for the interaction of context and abstract facts. The prosecution will often extract certain facts from the particular situation, and use physical cause and effect, and use them as probabilities of the evidence being associated with actual commission of the crime. One could produce an array of increasing probabilities of any fact being associated with murder. Circumstantial evidence, such as working in the same

large company as the victim would itself provide low probability that a co-worker committed the murder. Having one's fingerprints on the murder weapon is clearly much more highly probable, statistically, without any other factors considered, to be associated with the crime. Whereas police work, and prosecution is a linear dominant, abstracting medium with visual bias, defense tends more towards the contextual, temporal approach to judgement, incorporating past events, using circumstance, intention, and counter-evidence that is intended to bring greater ease to the task of doubting the charge. A discontinuous sense of the effort required to counter the evidence, produced by various contexts, allows one to believe that this person accused is different than others, s/he remains innocent while others weighed down with the same evidence may indeed have been found guilty. Each process, defense and prosecution, contextualization and abstraction is influenced by the other. It might be seen as a dialogue, which Innis considered to be a balanced medium, perhaps even the ideally balanced medium that was neither spatially or temporally dominant. Because of the similarities, between the weighing of objects and weighing of evidence, the method of visually interpreting the weight-size illusion experiment through graphing was applied to the process of justice, and weighing evidence in particular. (see Figure 2)



The graph above is an attempt to characterize the interaction between abstract features, e.g. fingerprints, motivation, witness descriptions, that link a person to a crime, and the contexts that alter the meaning of these facts. Some of the proposed factors involve similarity/difference in socio/cultural aspects between juror and accused, which could mediate the difficulty in identifying with the actions and situation of the accused as consistent with the assumed innocence, and bias the weighing process. As well, the articulateness of the accused, their evocation of fear/sympathy could all act as contexts that change the perceived probability of the facts being consistent with the crime. In effect the context could make a circumstantial or coincidental association between the accused and victim seem as if it were a more 'weighty' matter, such as witnessed argument, with a higher probability of relevance to the crime, or lighter (less probability) in the reverse direction. (solid arrows on graph.) Again, this model proposes that there is a tendency to reify the situation, and make the external situation consistent with the inner experience. This would lead a juror to change the discontinuity between cognitive effort and factual probability *by attributing the increased effort*, although due to context from

other domains, *as if it were solely and truly due to an increased absolute probability of guilt, that would be equally applied to any accused in the same legal situation.* The relative difference in cognitive effort to create a reasonable doubt from contexts, becomes an absolute difference in fact and probability of guilt through reification. McLuhan stressed that the medium acting as a pervasive ground, although the source of the altered perception and action, remains undetected, and this “un-detectability” helps explain the mechanism of bias and Reification. The complementary process, termed reductionism which also competes for the jurors consciousness reduces the variation in effort to doubt the charge, and the effort then tends to converge on a single value in relation to statistical probability across different trials and approach a linear, absolute criteria. (arrows with dash and dot lines). It influences users to treat all accused as if they had the same socio-cultural background, same social status, same job, same past record (or lack of), and so on. This can nullify the useful contexts, that are essential to justice, such as mental competence, self-defence, justifying circumstances e.g. stealing to feed children. However reduction of variation in consciousness of doubt can also serve justice by reducing the relevance of stereotypical thinking, articulateness /likeability of lawyers and accused that are unrelated to the fair and effective judgements desired.

Discussion

The results of this paper have shown that the simplest physical context, can profoundly alter our ‘higher thinking’ and judgements, bringing new metaphoric meanings to the same objectively measured situations, while separating out individual features can bring order and an absolute universal standard to otherwise disparate socio-cultural

interactions of people of different age, cognitive abilities and personality. These two processes are hypothesized to occur in every medium, but with widely varying proportions, and provide a mechanism to predict and measure the interactions of different media. With the progressive accumulation of technologies, and the increasingly frequent interactions between cultures and nations in the networked and globally capitalized world, the question of media interaction should become an increasingly urgent phenomenon to understand.

By simultaneously considering both abstracting and contextual forms of mediation, this method should avoid the concern advanced by Campbell (1988) and later Kelly (1997) about the inescapable 'hierarchy of vicariousness'. They observed that as culture changes, any attempt to correct or understand the bias and effects of one medium always requires the imposition of a different bias, and over time the separation between the original more direct interaction and the user of culture continually increases. This is related to the process by which one medium can replace another through obsolescence and retrieval, and the older medium consumed forms the content of the more popular new medium.

The method and theory presented assume that media effects cannot be talked about in either pure abstract or contextual terms, and so each medium has some fixed and variable effects upon their users. This concept can potentially help us to quantify the degree to which one medium can bias the results of other techno-cultural processes through both types of effects. The degree to which size or socio-cultural attributes has biased the judgement of physical or evidential weight should be a valid measure of the

process of contextual mediation, but only in those particular interactions. Although the abstract media effects would vary similarly from one application to another, it is proposed that the amount that the standardized measurements of weight or probability of committing a crime create convergence and agreement about subjective effort is proposed to be a useful measure of that medium. The reduction of variability of subjective effort and the tendency of users to accept a linear relationship between factors in other interactions, e.g. in medicine or politics, would be somewhat different than in the examples used here.

The assumption that the difference observed within one process, gives information about the mediation from another process is based on Bateson's (1979) characterization of information as a 'difference that makes a difference'. Context can be conceptualized or defined as a process that alters the abstract analytic aspects of media, and can be measured as the amount or percentage change in an abstract process. Similarly, abstract mediation is indicated by the change it brings to the contextual aspects of situations, e.g. sense of effort and other experiences when the facts are integrated.

This work suggests a method to measure, for example the media ecology that size brings to our interactions. In many areas of human endeavor, size seems to mediate important interactions as a context – it influences how people value consumer items, how they attribute social status, and influences the attractiveness or repulsiveness of physical attributes. We have also seen how size can be an analytical content. While traditionally the regularities in processes have been sought in sciences, and social sciences, in media ecology it is necessary to seek out and understand the biases in our perceptions and

actions. Hopefully this will help media ecology to integrate more thoroughly the disciplines of the humanities, arts, and sciences.

We can approach the medium of language as a translator between the abstract and (mostly) fixed features of our selves and environment, such as gravity, forces, temperature, and biological characteristics, (gender, skin colour, fitness to reproduce) and the contextual filters (clothing, wealth, job status, religious/community affiliation) that strongly mediate their effects upon living humans. Clearly language depends upon both fundamental processes, but to varying degrees, which deserves further exploration. It captures the functional relationships with our social and physical surroundings through recognizing relative differences of an individual's response and actions. The discovery and understanding of fundamental processes of media effects such as those proposed here will provide a deeper way to understand the important work of Lakoff and Johnson (Johnson, 1987; Lakoff, 1987) that recognized our bodies as the origin of meaning in language and hopefully enable us to extend their theory of bodily meaning, language and culture further.

The crisis of meaning that has emerged from the claims of those who believe in radical relativism and social constructivism has turned into institutionalized nihilism. (Nystrom, 2000, pg 51). Postman (2000) documents how this modern loss of meaning and relationship between situations, the order lost in the reversal of context into nihilism, drives us to seek new stable forms of knowledge. By retrieving some of the 18th Century consciousness to seek the common or universal characteristics within diverse needs, he proposes that we can foster cooperation and improvements in our human situation. He attempts to create a balanced approach in the tradition of Innis. (Postman, Pg 72). This

supports the major thesis of this paper: these two fundamental effects of media, are interdependent and must be balanced together to best understand and work with the ecology that technology and culture produce. If not, then the monopoly of single-sided knowledge that Innis warned of will inevitably generate the destructive oscillations of human history, such as the swings between scientific reductionism and relativism, and between hyper-individualistic capitalism and state-dictated communism/fascism.

The evolution of media across larger episodes of time may also involve the oscillations between the dominance of either abstracting or contextualizing processes. . This model may be useful in the development of more balanced media that offer benefit with less degree of polarization of consciousness and contribute to the stable flourishing of civilizations rather than the extremes of successive empires

Conclusions

This research is in its early stages, just using published material and theoretical models.

Original research should be done to further develop this thesis.

- This approach is consistent with media ecology theory and can further the understanding of how media interact as well as illuminating how separate media interact.
- It helps account for puzzling perceptual illusions in psychological literature and is supported by psychological concepts.
- It may have relevance to the theory and practical dealings with important social issues that involve critical balance between analysis and context.

(Additional Information of the work of Harold Innis)

The powerful effect of the economics of empires upon their colonies was virtually ignored by the economists of Innis's era. His research discovered a starkly different process than the dominant price/market theory described, revealing how the methods and means of obtaining resources were informing both the economics and politics of the day. For both the British and French Empires the fur trade was a lucrative business that funded their rivalry in Europe and North America. The trapping and transportation of furs was set within a large and inhospitable region. As a result the rivers were the main transportation routes for this business, and required a significant political organization to govern the vast land areas surrounding them. To trade with the Native Canadians, who were the chief trappers in the region, the colonists needed manufactured goods, and forts to store the goods and furs, and then policing to protect the forts from raids. This escalating complexity of the process led to higher debts and so financial institutions became involved as well, exerting constant pressure on colonists to shorten the waiting time before obtaining the benefit of investment ;this shrinking of the temporal aspect of the trade cycle required the invention of more advanced technical systems for obtaining pelts. Innis concluded that the effect of the Fur Trade was to bring more centralized political and financial organization to Canada and transform the relatively independent colonies into a more closely controlled extension of Britain and France, managed at a distance, at the center of Empires, a process that he term the spatializing bias of media.

- The temporal and environmental aspects of life in the colony would be virtually ignored or *marginalized*. Payment schedules would be based on the bankers' needs,

irrespective of delays experienced in the colony due to the seasonal variations in weather, local conflicts, animal breeding cycles. Rigid *sequences* of investment, trade and profit taking were assumed. The goal was to reduce time between these phases to the minimum.

- In contrast to the rich associations of trapping with knowledge of the forests and animal habitats for traders and natives, nothing of the setting, skills, efforts and time or the character of the animal was known to the owners of the skins. The whole complex process was severed and *reduced to a single aspect*, the monetary value, and the equivalent social status that either selling the pelts or wearing them could bring.
- In turn the pelts, when converted into money, became *identical* with any other commodity, such as tools, food, lumber or basic clothing and one item could be substituted for the other in the monetary system.
- Innis also focused on an even more typical example of a Centralizing Medium of Development: The Trans-Continental Railroad, that was integral to the unification of the Canadian provinces in Confederation. The railroad became the *common, single path* for much of the trade internally and externally, and so dominated the life of the regions surrounding it. Towns developed or withered based on their proximity to the railroad. Perceptions of time became separated from the regional variations in the pace of life, seasons and were uniformly synchronized to the single schedule of the train.

Innis's research on the Atlantic fisheries revealed a very different effect of economic and transportation development: The fleets of the European powers remained

more autonomous from the Empire's control. Because the ships provided much of the storage for their product, as well as the transportation for both crew and goods, they required much less complex coordination of political, security and financial processes than did the fur trade and agriculture. The weather, both locally and over the ocean, and the local currents played an essential role in fishing; the dynamic changes in these forces limited the mechanization and human control of the industrial practices. Relatively simple permanent structures for fish processing limited the size of populations, allowing strong local customs and culture to persist. In this form of development the traditions of technique and culture persisted, local knowledge of wind and current was essential to survival and success. Innis considered this an example of a Decentralizing or Temporally-Biased form of economic development. Because of the smaller investments, less time pressure was exerted on these industries and so the activities of fisheries occurred mostly within 'personal and natural time' - the human time duration needed to complete a task, and the temporal patterns of natural cycles of weather and animal migration and breeding. Unlike the fur trade, the fisheries did not expand spatially to compensate for the time pressure.

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