Data for a Brave New World: Stem Cell and Cloning Cartoons amid Information Overload

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"If people don't have a good sense of humour, they are usually not very good scientists either."
Sir Andre Geim, 2000 IgNobel Prize & 2010 Nobel Prize in Physics

"The most exciting phrase to hear in science, the one that heralds new discoveries, is not 'Eureka! 'but 'That's funny.'" Isaac Asimov

"A wealth of information creates a poverty of attention."
Herbert A. Simon, 1978 Nobel/Sveriges Riksbank Prize in Economic Sciences

Abstract

The emergence of cloning and stem cells from science into the public realm came with overtones of science fiction, for the announcement of a cloned sheep's birth in 1997 lodged in peoples' minds, preceding new research into stem cells and likely resisting communications to possible health benefits. In this study, cartoons were sourced from syndicates and examined as to evolving sophistication in scientific, political and cultural content in three periods from 1996 to 2011. Coding of 517 unit samples was completed in four spheres of concerns; culture, humanity, politics and metamorphose. Findings determined that cartoonists responded to media and public discourse in early years of Dolly's announcement, the image of that cloned sheep providing comedic as well as worrisome fodder for cartoons. Findings from the first period of study were overwhelmingly expressed in cultural and metamorphose concerns. In the second period, politics rose substantially to become equal to culture, mirroring the time period's political confusion and funding restrictions in the United States. In the final period, politics leads culture, indicating increased and more sophisticated understanding in and of the ramifications of cloning and stem cell issues. Throughout, the representation of humanity remained low: the two spheres within the social construction of reality, codes of Culture and Politics, were significantly dominant over

the two spheres within natural laws and nature as the primary order, in Humanity and Metamorphose. A revised “image word sense” concept for coding the entirety of communication in cartoons was demonstrated, with overall content shifts determining the sophistication of messages within cartoons altered significantly over the period of study largely related to political events circa 2001. The study suggests that cartoons, which contain narratives that tell us *to* think not *how* to think, can indeed be constructed and used as communication aids. Results of this study indicate that just as in science where the cell determines what it is to be, science is informed by data and humanities theory as to nature and society. Findings also show that cartoons may aid in increasing scientific communications and citizenship and be useful to communicators as an antidote to scarcity of attention and information overload.

Introduction

Since 1996, the issue of cloning and stem cell research has been in the public realm and during this time it has gained prominence in the public discourse. As part of this public discussion, stem cell research has been featured in cartoons. This study examines whether or not there have been changes in the scientific, political and cultural content of these cartoons over the past 15 years. And if so, are cartoons a simple and accessible method of communicating this complex topic?

Based on the literature and through empirical research using quantitative content analysis, the purpose of this study is to investigate the content of these cartoons within specific periods of time defined by political, cultural and scientific developments. To gain understanding of the content presented in cartoons, the concept of “image word sense” was used to analyze the semantics, creativity, scientific citizenship and communications in the development of

specific content coding. In this study, the cartoon is viewed as a cultural product, produced in an era of information overload and reflecting complex scientific concepts.

The specific time periods utilized in this study were identified as follows: three periods were structured, each with two junctures to allow for relating data to events in the media, cultural events and political realities, the full period of study being from July 1, 1996 to June 30, 2011 to allow for cloning references after the birth yet prior to the announcement of Dolly, the cloned sheep. Cartoons were collected through online searches of the terms “cloning” and “stem cell” in major cartoon syndicates that supply newspapers through subscription-based rights: 517 unit samples were collected and data logged into an MSAccess database cross-referenced with image samples. Each unit sample was documented by nine fields such as date published, cartoonist and URL, with the overall narrative of each unit evaluated by the codes of Culture, Humanity, Politics and Metamorphose.

Interpretation is provided by identifying the overall findings, four figures representing data results by code and junctures and observing a phenomenon of codes separated by nature and by social construction. Nine of the 517 cartoons were also interpreted in detail in order to demonstrate the process of establishing coding to identify the characteristics of the cartoons and to show cartoons can be complex narratives. This detailed process reviewed text, image and symbols represented in the cartoons from the image word sense perspective. In that sense, aspects of the cartooning art informed the study throughout, including the presence of humour concepts such as incongruity and irony. This study makes an important contribution to our understanding of how complex ideas can be communicated through cartoons. It also provides insights into the broader socio/political context in which these messages are produced.

Background

Scientific and medical research communities were invigorated with the 1998 isolation of human embryonic cells. Although cells from mice were first isolated in 1961 and studied since then, this new discovery involving humans was explosive in many arenas. Given the delicate matters surrounding embryos – human beings in development – numerous vested interests became engaged in the burgeoning issue: reproductive technologies, theology, ethics, governments and as with any new technology and commercialization, industry sectors. As a result, the topic emerged into media with its attention-getting overtones of science fiction and speculative notions. The topic also emerged into public discourse but was not commensurate with the concept of better health. The debate around stem cell research unfolded emotively among vested and special interest disease groups and health associations on alert as to any possible – albeit faint – benefits and applications, fed by imaginative media at a time when the issue was even still somewhat of a mystery within the scientific community.

While therapeutic gains to individuals through the use of adult stem cells in regeneration and repair had been used for decades such as in bone marrow transplants, the idea, the very imaginative notion even, of possibly using embryos to cure an impossibly long list of injuries and diseases became increasingly compelling as the issue burst into public consciousness. It was indeed a novel discovery, previously situated by cultural references in the realm of literature and science fiction; yet there was a complication in the public sphere that likely overshadowed positive perceptions of stem cell use – the 1996 birth of the mammal Dolly, a sheep cloned from an adult animal that was announced to the world in February 1997, and lodged in people's minds as a fantasy similar to speculative science fiction – when stem cells were later announced as

possibly having therapeutic health benefits, the public could not hold the two disparate and dissonant images in their minds, as scientists, government and communicators struggled, often miserably, at communicating what the various publics needed to know about stem cell research.

But unencumbered by the weight of ethical and moral discourse, this work looks at the use of humour in communications[1] through cartoons, on this intricate emerging science and health topic. It evaluates cartoons as semantic units of cartoonists' interpretations of the media and public discourse. A brief historical overview and background of stem cell issues is included; however, I am not addressing ethics discourse, theology, the embryo as a commodity, reproductive technologies, funding or debates in the viability of and therapeutic value of the subject, except for associated and relevant cartoon references. In readers, I assume a higher than average consideration of issues than evident generally in the public sphere, along the lines of a *more* thoughtful and reasoned "reasonable person" since cartoons are not to tell us *how* to think, but *to* think. A caveat: I do not comment on image quality, assign values on artistic expression, nor examine various forms of humour such as cross cultural, disparagement, humour's effects on health or well-being, farce, superiority and so on.

[1] Although not discussed, usually relating to persons, Gregory Bateson's theory applies that "one cannot not communicate," so a person's expression of humour is entirely valid. Similarly, Martin Heidegger's idea of what is revealed and concealed in alethia and its association with truth is under *Future Considerations*.

Research Question

My research question then is: How has, over the past 15 years (from 1996-2011), the content of cloning and stem cell cartoons changed? In a period rich with sociopolitical changes in the realm of this science, how have such changes affected the content of cartoons depicting issues of stem cell research during this era. Additionally, by determining themes and semantic significance extending from Robert Philip Weber's "word sense" (1990) to an "image word sense" that takes into account multiple elements of communication, do cartoons reflect discourse and as such, exhibit scientific citizenship, bring issues to the public, provide knowledge transfer and counteract information overload, thereby aiding in the communication of complex issues.

Cloning & Stem Cells Emergent Years

Cloning and stem cell issues, along with a new lexicon, were largely revealed to the public and media in 1997 in Dolly's announcement. As the first animal cloned – a sheep from an adult somatic cell – its existence was, to many, straight from the realm of science fiction. As a new issue and in pure communication terms, the detail in the emergence of such research was inadequate and scattered. No one person or entity particularly owned the issue and it was fraught with moral and legal implications. Some coverage included fantastical suppositions and the media profiled the research's detractors as much as its potential advantages. The issue burst into the public consciousness as front page news while much of the issue's foundation, vagaries and details were tenuous and incomprehensible. Just as the image of a cloned sheep became firmly imprinted into peoples' minds, so too was the identified "inventor" Professor Ian Wilmut simply because he was the lead author on the paper, later attributing 66 percent of the work to colleague Dr. Keith Campbell with experiments done by scientist Bill Ritchie[2]. It is this image of a cloned sheep that firmly rested in peoples' mind, causing bewilderment and suspicion in soon afterward hearing about the application of stem cells for therapeutic health purposes.

Simply, the two broad types of stem cells are embryonic (zygote) and adult (somatic, non-reproductive)[3]. In a developing embryo – the fertilized egg – stem cells can differentiate into specialized embryonic cells. In mammalian development such as in humans, cells undergo stages of development in migration and division (embryogenesis), characterized by layers that then

[2] An example of inaccurate communications and sourcing, repeatedly cited publically, academically and by media. Among others, see Cramb, Auslan. March 9, 2006. I didn't clone Dolly the sheep says prof. *The Telegraph*. (Accessed March 28, 2012.)

[3] For terms see *Appendix 1: Definitions*.

essentially build and create the mammal. In adult organisms, stem cells can act as repair mechanisms in a person's body, replenishing specialized cells in self-regeneration and maintaining organs such as blood and skin. The number of stem cells in an adult is far fewer than zygotes, one reason why embryonic research has been and continues to be pursued.

The evolution of stem cells is multifarious and, perhaps like any discovery, there is questionable attribution[4]. Just as Dolly's inventor, this is seen in Rosalind Franklin's discovery[5] of DNA's molecular structure, usually credited to James Watson and Francis Crick who won the 1962 Nobel Prize in Physiology or Medicine for their "discovery." But, in 1961, Canadians Ernest McCulloch and James Till published results of bone marrow experiments in the journal *Radiation Research*, later showing cells capable of self-renewal, an essential component of the stem cell meaning. "Most Canadians are unaware that two of their own – a lanky physics whiz from Alberta and a rumpled Shakespeare-quoting MD from Toronto – made a discovery 50 years ago that transformed the understanding of human biology and opened new doors to the treatment of cancer and other diseases" (Bernstein). The first proven existence of human stem cells was Till and McCulloch's, the latter of whom who died days before the 2011 anniversary celebrations their seminal research paper; findings not discovered in other research for nearly 20 years.

> "Still, that so few of us know – let alone celebrate – the fact that the stem cell is a Canadian discovery is baffling. Canada founded the entire field of stem-cell science. We have done much of the heavy lifting for decades: discovering neural stem cells, skin stem cells and cancer stem cells. If hockey is Canada's game, stem-

[4] See comment and footnote on existing chronologies in the next section, *Concerns in Communications*.
[5] Maddox, Brenda. 2002. *Rosalind Franklin: The Dark Lady of DNA*. Harper. New York, NY.

> cell science is Canada's science. Not knowing about Dr. Till and Dr. McCulloch is not knowing about Maurice Richard and Wayne Gretzky" (Bernstein).

However, in 1974, as a post-doctoral fellow in England, American Gail Martin discerned a method to keep stem cells alive so scientists could study the properties. Extracting these cells from mouse embryos, Martin is attributed as the first user of the term "embryonic stem cell," later used by American James Thomson's 1998 work in human embryos[6].

Most discourse centered around one salient distinction as being most important, being the distinction of source (the human embryo or zygote), which stirs ethics debates and is seen to expands the potential of stem cells. Scientific discoveries are announced almost daily, with some legislation in limbo, as with President Barack Obama's election promise[7] and March 2009 attempt to reverse[8] the 2001 ban on embryonic funding by former President George W. Bush. Throughout, what remains is public debate and semiotic confusion in terms, such as human embryonic (hES) and embryos created by somatic cell nuclear transfer with inherent problems with induced (created, as opposed to found) pluripotent stem cells (iPS), as they could carry unpredictable genetic alterations, changing the cells to cause cancer and essentially meaning no two reprogrammed cells are alike. It is this scenario that is referred to in remembering it is the cell that determines what it is to be.

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[6] With Dolly's public revelation and subsequent human embryonic research releases, the stem cell base year for this paper is 1998 when the potential and applications of such research became more public.

[7] Verbatim from Science Debate 2008, *The Questions and Answers: Barack Obama's answers to the top 14 science questions facing America* at www.sciencedebate.org/news20080830.html (Accessed April16, 2012).

[8] For details on legal challenges see the chronological listing at the Coalition for the Advancement of Medical Research at www.camradvocacy.org/resources.cfm (Accessed April 16, 2012).

Besides any benefits not being fully known – while wished and hoped for – there are numerous other risks not detailed in media, such as immunological rejections and teratocarcinomas[9]. Instead, the public hears about embryonic potential often through media such as a latent reference to a former president's Alzheimer's disease (the late Ronald Reagan) or celebrity exposure such as actors Michael J. Fox (Parkinson's disease) and the late Christopher Reeve (spinal cord injury). However, it is the embryo (human or animal) that stirs debate such as the outcome of a hES debate in 2001, when then US President Bush used personal moral reasoning to suspend government funding for hES research[10], effectively stalling years of controlled research and potential clinical trials.

Competing events dominated public information: in politics, life sciences[11], organizations (Eppler & Mengis), government funded agencies, lobbying by vested disease groups and associations, in tearful patients shown on the front pages of newspapers and by media coverage of deaths and injury to celebrity patients. Stem cells are also of great commercial potential[12] in patents, private laboratories and consumer products such as notepaper sold showing a photograph of a boy who in the last frame becomes a sheep, the cutline "Cloning mishap sparks national debate"[13]. As well as cartoons being cultural goods in paying cartoonists, agents and

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[9] Caused when cell divisions develop into a malignancy or tumour.

[10] Embryos used for controlled research are largely from unused and unneeded eggs from reproductive procedures such as in vitro fertilization, with such use consented to by a woman upon egg retrieval.

[11] "...more than 3,500 clinical studies listed in the U.S. involving stem cell treatments, and throughout the world there are over 100 diseases currently being treated with stem cells. Not wanting to miss the boat, Wall Street analysts follow several stem cell stock indexes, and one research firm recently pegged the compound annual growth rate of the U.S. stem cell market during 2012-2013 at 45%." Kenyon Hoag advertisement, *The Scientist*, June 2011

[12] See www.the-infoshop.com/topics/BO06 _en.shtml,Lancôme's Absolue Precious Cells Advanced Cream, US$150 for 1.7oz. "shown to improve the condition around the stem cells, and stimulate cell regeneration." www.lancome-usa.com/skincare/anti-aging/absolue-precious-cells.htm. (Both accessed September 15, 2010).

[13] MiKWright Ltd., Grand Rapids, MI, product #7861

syndicates (Bourdieu, 265) stem cells have been featured on textiles (a Canadian exhibition to honour McCulloch and Till, GRAFT: Linking Textiles, Art and Science[14]) and in art exhibits. Although cartoons might not help a viewer decipher an issue, cartoons also pique a viewer's interest, illuminate and translate difficult concepts in knowledge transfer and can be a catalyst for further information retrieval.

In returning to McCulloch, he was a voracious reader, with an "insatiable appetite for human narratives [that] no doubt fed his rich imagination, and shaped the way he approached science – creatively, colleagues say, like a thrilling adventure unfolding"[15]. In adopting this viewpoint in this research, other so very human narratives unfold, thereby leading us to richness in further understanding the issue in combining the humanities and science.

Concerns in Communications

The use of stem cells for potential health benefits and public discourse around that debate has grown substantially from what was published in the early years about cloning. As cloning emerged prior to stem cells, it accounted for great comedic potential as well as public confusion. There was, and likely still is, confusion in the public as to how "cloning" relates or does not relate to "stem cells." It is not just scientific achievement or a confluence of events, health matters or a public policy debate fraught with theological and moral concerns. In being predicated earlier by cloning, when Dolly became cloning's equivalent of a poster child, stem cells seem appended to

[14] Textile Museum of Canada. www.textilemuseum.ca/apps/index.cfm?page=exhibition.detail&exhId=330useum.ca (Accessed March 2, 2012).
[15] Abraham, Carolyn. January 29, 2011. Scientist was a pioneer in stem cell research. *The Globe and Mail*. Toronto.

the quasi-knowledge of an already suspicious public, wary of xenotransplantation's possibilities and overtones of science and speculative fiction[16]. The now omnipresent term "brave new world" holds a story within the phrase. Full of intrigue, possibility and appropriately futuristic, it can also be slightly fear-inducing. Huxley clarifies it in his 1946 foreword of the 1932 book: "The theme of *Brave New World* is not the advancement of sciences as such; it is the advancement of science as it affects human individuals...It is only by means of the sciences of life that the quality of life can be radically changed. The sciences of matter can be applied in such a way that they will destroy life or make the living of it impossibly complex and uncomfortable; but, unless used as instruments by the biologists and psychologists, *they can do nothing to modify the natural forms and expression of life itself*" (emphasis added, Huxley, xx/xxi). In his book, the

> "standardization of the human product has been pushed to fantastic, though not perhaps impossible, extremes. Technically and ideologically we are still a long way from bottled babies. But by A.F. 600, who knows what may not be happening?" (xxv).

The unfolding of stem cells into public acceptance could be seen to mirror that as Huxley writes, also of the early years of organ transplants during the 1970s. As well as cadaveric donations, current policy and transplants that now see donations from living donors as with the kidney. The progression and public adoption has also been through increased education, better and advanced informed consent, refined policies toward assumed patient consent and legislation (such as when one gets a Nova Scotia health card and/or a driver's license, s/he self-selects donation wishes, also on behalf of minor dependents). Transplants are commonplace and barely

[16] Increasingly, science fiction is known as speculative fiction, e.g. a St. Mary's University undergraduate and Elder Learners course "to explore visionary and speculative literature ranging from early nineteenth century speculative fictions…" See www.smu.ca/servicecentre/documents/UndergraduateCalendar20102011web_001.pdf.

newsworthy except for the more emotive and morally laden procedures such as full face transplants[17].) In 1998, when the world's first hand transplant was performed, a member of the transplant team said "a face is just like a hand" as each contains "mostly the same tissues;" that face transplants would soon follow. (As of 2004, more than 20 hand transplants had been performed and ethical approval was sought to perform face transplants, which are increasingly being performed. But as Françoise Baylis clarifies, "In the event of technical failure or immunological rejection, the transplanted hand can be removed and the patient can be offered a prosthesis. In sharp contrast, a total or partial loss of face would be devastating for a recipient who could not be returned to her previous state of being." As well, such an operation's moral relevance concerns the harm/benefit ratio (30) and there's a difference with standard organ transplantation where loved ones generally feel positive about the person's organs "living on" in another person. Baylis points out the "enormously complex ethical" considerations of personal identity and recognition by the self and by others: "Intuitively, we know that this is not an understanding likely to be encouraged in the context of facial transplantation, as the face has unique symbolic and affective meaning" that is "more than skin deep" (31). Similarly, while the concept of stem cell use seems to be acceptable in adult regeneration, it is often these comparable "morally relevant aspects" (31) such as identity that separate and also connect public discourse on stem cells in the salient debate on human embryo use.

For all the advances in biological science, the emergence of stem cells was different, as Howard Varmus, 1989 Nobel Laureate in Medicine contends, being "the most visible and

[17] Apart from science fictional references, such as the Eye of the Beholder episode of the 1960s television series *The Twilight Zone*. Part 1 of 3 at www.youtube.com/watch?v=j9dwKQ6xyIs&feature=related (Accessed July 8, 2010.)

contentious manifestation of the promise of biological science" (197). Nor is there a definitive and clear worldwide chronological record[18] of events as with other discoveries. A few years after the birth of Dolly, the Canadian Institutes of Health Research convened a working group on stem cell research (in 2000) aiming to develop national policy and to publish stem cell research guidelines[19] in March 2002. But while such research and collegial communications were burgeoning within the scientific community, knowledge transfer to the public did not keep pace as did communication about transplants. In an overload of information[20], both accurate and inaccurate and much detail still misunderstood, there has also been a gradual vernacular shift in science and media who now translate concepts in more publically acceptable euphemisms such as the term "regenerative medicine"[21].

In this context, there are four significant considerations that make the study of communication around stem cell research challenging:

1. As cloning emerged prior to stem cells, cloning's negative and grotesque implications emerged onto the public radar well before scientists even knew what they had in stem cells and could cohesively counteract detractors with a common vernacular and knowledge. It is suggested that a communication difficulty was in

[18] Numerous sources cite differing dates and attributions, e.g. in Haran et al., *Human Cloning in the Media: from Science Fiction to Science Practice*, there is no mention of Canadian research. In Appendix 1: Cloning timeline: "The timeline is drawn from the following resources: Bowring (2004), Klotzko (2001), Kolata (1987b), Wilmut et al. (2000) and Wilmut and Highfield (2006), (189). This comment is not affronted nationalism, it is an accuracy concern of when information is cited and repeated as in the case of Wilmut.

[19] See www.cihr-irsc.gc.ca/e/19312.html and www.nserc-crsng.gc.ca/NSERC-CRSNG/Policies-Politiques/stemcell-cellulesouche_eng.asp.

[20] Jeff Goldblum's character in the movie *The Big Chill* (1983) was a writer for *People* magazine, who said the average article had to be short enough to be read on a single trip to the bathroom.

[21] Toronto's McEwen Centre for Regenerative Medicine www.joinstemcellcity.com "intended to rally enough public support that the progress of stem-cell science will not be slowed by political chill or poor funding." Abraham, Carolyn. April 4, 2012. Website launch gives stem-cell research a boost. Toronto*. The Globe and Mail.*

the reality that people could not hold or replace a promise of better health through stem cells in their minds with the dissonant image of a cloned sheep;

2. Media hyperbole also created an explosion of information and people did not know what or who to believe, except in the case of vested disease interests in the latching onto hope. Communications was marginal, reflecting confusion in government policy with often conflicting content in an information overload, making it difficult for the public to filter information or at least to understand the issue's changing landscape;
3. Research and encompassing legislation in the United States was stalled in part because of a 2001 funding cessation imposed by then-President George W. Bush, whose priorities were based on religious and moral viewpoints and the Republican Party's stance against human embryonic research.
4. There is still no commonly accepted and definitive timeline of the early discoveries and progression of stem cells, little public awareness that blood-forming/bone marrow stem cell transplants exist, nor is there coherent communications.

The representation of stem cell research through single panel cartoons and comic strip art is remarkable in that it represents very complex information in a relatively simplistic form, in a format often dismissed as incidental to communications. Appreciation for this form of communication indicates that we see the value in graphic representations of how communications and images cut through information overload and textual clutter. Although a cartoon image might not seem to help a viewer fully decipher an issue, cartoons can pique a viewer's interest, translate difficult concepts and be a catalyst for information retrieval. While

cartoons and comics[22] might initially seem as a marginal vehicle to communicate complex information, even to the point of disdain, their use in academia and science is widespread, taped to office doors[23], tacked to laboratory corkboards and used in presentations to engage with and bond a speaker to an audience. Cartoons often illustrate current newsworthy topics; anything anyone or any entity does provides fodder. For an issue as complex as stem cells, information must be public or newsworthy enough so that a message, point of view or humour is not only understood by viewers for cultural reasons, but also could be responded to emotionally; the cartoon does not tell people *how* to think, but *to* think.

An example is *The Far Side*, a wildly successful and widely syndicated cartoon that ran from January 1980 to 1994 and transcended its postings on laboratory bulletin boards. The content provided interpretations of scientific and ordinary events and became a daily staple for 14 years, still enjoying spin-off sales in mugs and bestseller books. While there is a long history of health and medical cartoons used to address public health and medical issues, this cartoon is used as a type of "base year" herein. *The Far Side* cartoon's "far out" scientific and other meanderings were the very basis of why it became one of the most successful cartoons of all time; it also showcased scientific foibles through cartoonist Gary Larson's creativity. In addition, it celebrated the expressions and gestures of people who essentially were scientific nerds; viewers understood the inherent messages and framing (Goffman) due to a lifetime of

[22] While cartoons/comics are different forms, data and comments herein include both given an otherwise smaller sample, that editorial cartoons as such moved into the comics pages, both forms are stacked on newspaper pages and coding's image word sense is suitable for both formats.

[23] "The Eagleman*lab, on the ground floor of Baylor's Ben Taub General Hospital, could be the lair of a precocious teen-ager. The doors are pinned with cartoons…" (*Assistant Professor, Neuroscience, Baylor College of Medicine, Texas.) Bilger, Burkhard. The Possibilian. April 25, 2008. New York: *The New Yorker*. 54.

observations and clues gleaned from surviving our own high school dramas. And cartoons' glimpses into a specialty knowledge area were not understood from or through academic tomes or years of study – it was precisely through those daily life experiences and understood through an *educated imagination* (emphasis added, Frye, 1963). Larson's cartoons celebrated science as being as quirky as a person: biomorphic representations of living cells spoke to other cells and the idiosyncrasies of archetypal scientists were explored. As in any good cartoon, Larson created mini stories, which cartoonist Will Eisner maintained is the most critical component. "Not only is it the intellectual frame on which all the artwork rests, but it, more than anything else, helps the work endure. This is a daunting challenge to a medium that has a history of being considered juvenile pap" (Eisner, xii).

Larson's images became ubiquitous, explained what others could not or did not – and have endured. Some three years after Larson retired and his series ceased syndication, stem cells were proffered to a stable of cartoonists, with audiences wary but receptive to maintaining an insider's take on scientific issues.

Addressing Scarcity of Attention

Particularly for complex scientific issues, the often cited and reworked adage, "A picture is worth a thousand words"[24], remains so because of time restrictions, universality and likely

[24] Originally written by Fred R. Barnard as a baking soda advertisement for the trade journal *Printers' Ink* as One Look is Worth A Thousand Words (December 8, 1921, 96-97). Barnard revised it to One Picture is Worth Ten Thousand Words (March 10, 1927, 114-115). This adage is often cited as a Chinese proverb, with a similar version attributed to Napoleon Bonaparte.

greater possibilities for viewer receptivity more than a newspaper feature, as is seen in an[25] era of "scarcity of attention." This state is what Herbert A. Simon identified in 1961 when he proposed that as humans spend the vast amount of time processing information, what was needed was not just more information, but the right information; the scarce resource being "human attention." An economist, in the very field that studies allocation of resources, Simon[26] also wrote of the need to combine science with creativity because of a nearly total ignorance of science. "In this kind of world, how can we all communicate with each other?" (2001, 214). Simon saw how science and technology were relevant to the broader concerns of society and perceived as a power base, he saw how people were shut out and perceived that "the crucial decisions of the society" were being made by a technological elite while people grappled with "technology-saturated policy questions" and "scientific demagogues" with such powerlessness they could not even evaluate arguments and evidence (215).

From all this, we find numerous implications for improving public communications further toward scientific citizenship[27], also for communications practitioners in direct practical understanding, knowledge transfer and application, stricter media guidelines as to announcements - all including a parallel shift or supplement of visual rather than just textual literacy, through using more image-based forms. "Indeed, visual literacy has entered the panoply of skills required for communications. Comics are at the center of this phenomenon" (Eisner, xv).

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[25] While many might say 2010 sits firmly in "the" scarcity of attention era, I am respectful to the source, using "a" scarcity of attention, reflecting Simon's early and prescient observations.

[26] Simon also first used the word "satisfice" (1956) as a level of acceptability to *suffice/satisfy*, e.g. balancing the cost of getting information vs. getting *all* information while his bounded rationality theory includes limitations.

[27] If readers find educational cartoons questionable, consider www.ScienceCheerleaders.com who challenge stereotypes, encourage activities in citizen science and "inspire the 3-4 million U.S. cheerleaders to consider careers in science, technology, engineering and math" (Accessed March 6, 2012).

One example of a linguistic and design change is seen in the December 2007 transformation of when the Canadian Blood Services rebranded the unglamorously named Unrelated Bone Marrow Donor Registry into the OneMatch Stem Cell and Marrow Network, clarifying donors' ability to donate stem cells along with umbilical cord blood banking (Canadian Blood Services, A1)[28]. That their operating and public name was reframed was not newsworthy, nor unfortunately was the understated pre-existing and long-time use of adult cells (since 1988) understood by the public – still now – so contrary to how cloning and human embryo use garnered significant inflammatory media coverage.

Purpose of Research

The purpose of this research is to investigate whether or not the content of cloning and stem cell research political cartoons has changed over the past 15 years. In the previous section, I have described how this 15 year period was rich with sociopolitical changes related to this science, and as a consequence I am interested in how such changes affect the content of cartoons depicting issues of stem cell research during this era. Based on the literature and other readings, I wanted to examine this by conducting empirical research to gain personal experience and knowledge of data use in the humanities, as well as understanding the communicative essence in cartoons I could analyze through a quantitative content analysis. I compared cartoons to examine

[28] Canadian Blood Services. December 2007. OneMatch Stem Cell and Marrow Network News. 5:1 As of March 30, 2012, almost 320,000 Canadians registered. See www.onematch.ca.

understanding, sophistication and content from the earlier years when cloning emerged, from July 1996 into June 2011.

Given the purpose of this study and with such research increasingly gaining support and moving in the public consciousness, what did the content of cartoons reveal? Four inquiries dovetailed with the study's structure:

1. To use data and quantitative content analysis in empirical research in an aspect of the humanities – humour and communication in cartoons – that might seem to many to be an incidental area of inquiry;
2. To build upon Ellen Giarelli and Lorraine Tulman's research through detailed coding and data analysis and demonstrate increased public receptivity to cartoon use and public understanding;
3. To determine if cartoons fall primarily into the realms of **Culture**, **Humanity**, **Politics** or **Metamorphose** (see *Appendix 2: Coding Sheet & Codebook*); codes that were established through understanding the literature, semiotic analysis and signs from Weber's word sense into a full "image word sense" that includes all aspects of what is in a cartoon and intuitions of what is left out… This included putting "science fiction" into the code of **Culture**, since it is suggested the overall argument against this shows research to be somewhat beyond this realm of the brave new world;
4. To investigate the potential of these cartoons as literal interpretations, points of view and clarifications to possibly increase the accuracy of scientific communication and citizenship.

Theoretical Foundations

Comparatively few individuals will ever have a technological relationship, clinical need, face a moral or ethical quandary, or even require a professional understanding of stem cells. Human health issues have always been a significant interest area but through media, ersatz emotive relationships with stem cell research have been created through a science that has become politicized and opinions with misinformation or information. Stories are often spurred by clinical research and new discoveries offered up to the public as hope and a panacea for almost every disease and injury. My analysis was limited to the categories described under Coding, literature supporting the interpretation of findings, data and interpretations.

This document does not in any substantial way include stem cell research, clinical applications or ethical and theological debates. The scope here is not to review the success, failure or communication of media messages, but to conduct an analysis on a small component of a newspaper generally considered as entertainment. Within a low involvement (viewers can turn the page after a quick glance), low priority (not being a news story or feature) and a seemingly low status area (usually the back of a section grouped with other cartoons, considered by newspapers where people first look), cartoons might not be taken as seriously as other information sources.

Existing knowledge and academic work in this area provides a basis for examination; the most appropriate literature being two papers by Giarelli, both published in *Qualitative Health Research* (2006, with Tulman in 2003). Cartoon images were found to be “a useful source of data” (2003, 945) in uncovering interpretations to understand public discourse. Giarelli conducted semiotic analyses “to assess the degree to which the meanings of text relative to their

context are accurately represented" (945). She also argued for the potential of cartoons to promote public health and well-being "through their manifest and latent meanings" (2006, 61).

In this latter paper, she examined cartoons published between 2001 and 2004: 86 referred to cloning and 20 referred to stem cell research. Giarelli found cloning was depicted negatively, while stem cell research was depicted "as having a potential positive value" (61). Interestingly, perhaps reflecting the newness of cloning and stem cells as public issues, Giarelli, a professor of nursing, does not use either term in the 2003 paper, "cloning" only referred to in the Case Study (953-954). In her 2006 paper, "cloning" and "stem cell" are used in the abstract and title, with keywords noted for "human and nonhuman cloning" and "stem cell research." In media coverage, stem cell research and its resulting health issues have been reflected in increasingly specific detail in the transmission of complex ideas (Nisbet *et al*). According to cartoonist and author Scott McCloud, "The art of comics is as subtractive an art as it is additive. And finding the balance between too much and too little is crucial to comics creators the world over" (1994, 85), as cartoonists make assumptions about readers' experiences and stored memory. For this balance to work and to transcend communication to public audiences, the concepts require a translator (a cartoonist, a communications practitioner) who can see humourous possibilities, an element of irony perhaps, and can communicate ideas. Editorial cartoonist Bruce MacKinnon explains the latter concept: "I'm fine if people disagree with my point of view. But if they simply misinterpret the cartoons, I see it as a failure on my part to communicate the message effectively"[29].

[29] Legge, Lois. September 16, 2010. MacKinnon perfects the art of making news funny. *The Chronicle Herald*: Halifax, NS. A11.

Scientific humour is also of a higher-order; it is not bawdy (Kirsh & Kuiper) or scatological, thereby exhibiting Frye's high demotic concepts as opposed to low demotic, more colloquial forms of language and semantics, and visual expression and semiotics. While it could be argued that a particular cartoon is not understood because of geographic (Canadian events, United States' congressional districts), generational, genre (politics, sports, health), we must assume that readers are somewhat literate and can source explanatory information and certainly we should be able to assume that communications practitioners have a greater degree of literacy. Some cartoons are complex, although, "Since comics are easily read, their reputation for usefulness has been associated with people of low literacy and limited intellectual accomplishment" (Eisner, xv). Frye also distinguishes the language of self-expression, the language of the practical sense (being social participation for the working), then language for the level of imagination – essentially his three distinctions for using words, which he then uses to distinguish the arts from the sciences. "Science begins with the world we have to live in, accepting its data and trying to explain its laws. From there it moves towards the imagination: it becomes a mental construct, a model of a possible way of interpreting experience (1963, 6).

> "You can see why we tend to think of the sciences as intellectual and the arts as emotional: one starts with the world as it is, the other with the world we want to have. ...But of course it's nonsense to think of the scientist as a cold unemotional reasoner and the artist as somebody who's in a perpetual emotional tizzy. You can't distinguish the arts from the sciences by the mental processes the people in them use: they both operate on a mixture of hunch and common sense. A highly developed science and a highly developed art are very close together, psychologically and otherwise" (6/7).

In addition, social criticism is a theme exisiting in “virtually all successful political cartoons” (Edelman, 68). Cartoons on the politicization of stem cell research and government funding cuts emerged during Bush’s presidency. Then, years later, President Obama restored funding for stem cell research and encouraged science education in schools, as seen in a simple *Washington Post* cartoon of Obama blowing dust off a book entitled “Science.”

This example, as in the case of most political cartoons, cartoon also belies rigid classifications – it is a point of view, often humourous, often opinionated and quite possibly, with numerous interpretations based on how a person thinks about an issue. To use such methodology or conduct a quantitative analysis on such cartoons is almost illogical, a position reinforced in Weber through the use of “word sense” rather than merely counting the number of times “stem cell” or “cloning” appears – this approach gives us nothing of use, illuminates nothing, signifies nothing. In using word sense and cartoon image sense – both of which cartoonists communicate by – it is likely the meaning of a cartoon can be intuited more accurately than a piece defined as art, which carries more subjective weight in interpretation. To assist in using content analysis then, we turn to Edward deBono:

> "The vertical thinker is forever classifying things, because in this way vagueness can be controlled. The vertical thinker is more interested in seeing on what basis he can pull things apart, the lateral thinker is more interested in seeing on what basis he can put things together. Some minds might even carry this passion for rigid classification to the lengths of trying to capture ideas with a symbol and then relating them to other ideas with further symbols. This sort of mathematical definition may make it easier to handle ideas, but it also restricts them to a definiteness they may not naturally offer. The confining rigidity of a symbol is a form of commitment

> that effectively prevents the free contraction and expansion of an idea that may be necessary for its development" (DeBono, 86).

From this perspective, this study attempts to inform the quantitative classification of cartoons through semiotic analysis. Giarelli (2003, 2006) cites Roland Barthes's technique of visual analysis of denotation and connotation – both valuable here in semiotic analysis. For example, to quell moral concerns and relevance, the term "pre-embryonic" was adopted instead of the word zygote. A zygote – 0 to 14 days old – is still an embryo, with re-naming being an attempt to semantically differentiate cells that in the minds of some people are human "babies."

In 1999, Umberto Eco wrote of this new millennium in a paper for a congress of semiotics in art, culture and other inter-related semiotic specialties such as medical, legal, information science and media. These areas "mirrored the coexistence of a plurality of interests on the most diverse topics" (3). He noted "specific semiotics attains a scientific status, or close to it – as far as this is possible for human sciences" that are descriptive and somewhat predictive as to how a user of a given sign system will interpret messages according to that system's rules (4). Eco's historical overview illustrates that contributions to semiotics "mostly concerned two items which were crucial for their cultural purposes, namely, textual interpretation and the relationship between words and universals" (1). According to Eco, the word "semiotics" reappeared in the seventeenth century "to designate a doctrine of signs also because only at that moment the European culture became fully aware of the existence of other cultures and other forms of writing," but it was from the1960s what Eco called a semiotic boom, where communications became a "heavy industry" (2). Secondly, Eco details his distraction in a parable about too much information and his own scarcity of attention, in logging onto the Internet to search for a quote:

> "I frantically saved and printed a lot of curious documents but, more or less at two 'o clock in the morning, I felt stoned and I switched my computer off. At that moment I realized that I had forgot my original purpose in starting the research. In a continual deferral from text to text I had lost the opportunity to produce the habit which would have allowed me to pick up what I originally wanted" (13).

The scarcity of attention gave him two insights, what Eco describes as "the thing itself" (10). Here then, semiotics relates to Simon's scarcity of attention particularly in media and education, with stem cells as "the thing itself:"

> "…in the semiosic virtuality of the Web (a very deconstructive creature, indeed) we risk to loose [*sic*] every idea of purpose and of action. Secondly, that one of the duties of semiotics, in the next millennium, will probably be to teach people not only how to use signs to surf in the infinite ocean of semiosis, but also how to return, not forever, but always at every stage of our semiosic interrogation, to Dynamical Objects" (13).

A cognitive psychologist and winner of The Sveriges Riksbank Prize in Economic Sciences in Memory of Alfred Nobel in 1978, Simon addresses the relevance of language. In 1969 he wrote, "It is increasingly difficult to carry on a twentieth-century conversation about information with a social scientist who belongs to the humanistic rather than scientific subculture of his discipline. The difficulty does not stem from jargon but from a complete disparity of meanings hidden behind a superficially common language" (39). As discoveries continue to be made in the parallel races for increasing grants and under pressures to publish – particularly in universities and associated health and research centres – organizational demands for public profile will increasingly push communications practitioners to garner positive media stories. Therefore, Simon's attention economy—compounded or aided by social media—is considered for ideas on

how semiotics and cartoons can help people understand stem cells in a higher-order citizenship, aided by the work of the translators, the cartoonists. This use or non-use of language is important also given the newness of the words in the subculture and jargon. For how can the public readily engage in discourse when words and acronyms – totipotent, pluripotent, xenotransplantation, iPS, hES – are not common and represent no familiar meaning or sign?

Here is where an image word sense can assist. And for assistance in developing my coding process in this analysis, I referred to Barthes and his examination of messages and signification in his conceptual framework of *Rhetoric of the Image*. Barthes asks how a meaning gets into images, where meaning ends and if it ends what is beyond (32). Barthes first defines signs as being the actual linguistic message which he looks at in two ways, denotational and connotational. For example, in a cartoon wherein a magazine cover is displayed with the header "Genetic Science," he would denote this to be a scientific document. The connotational aspect might then imply a certain professional level of readers, advertisers and economic[30] worth (33). The set of connotators is "a rhetoric, rhetoric thus appearing as a signifying aspect of ideology" varying by substance but not form (49).

Next, Barthes then sees a coded iconic message, a totality of messages connoted by the image that forms a coherent whole that requires generally cultural knowledge (35). He then describes anchorage, which seems to be a type of slug or label of an item and relay which he sees as a less common function in fixed images, "seen particularly in cartoons and comic strips" where

[30] Although comic books are a different vehicle, estimated overall 1997 North American sales were $300-320 million. A conservative estimate for 2011 was $417 million. www.comichron.com/yearlycomicssales.html.

text and image function in a complementary relationship. From this, we move to specific considerations in science and art.

Semantics in Scientific Citizenship

Much of the non-clinical literature on stem cells centres on perceptions and opinions, politics and debate and resulting media controversy. There is also ample literature on hype (Bubela, Caufield), ethics and resource allocation (Baylis & Downie), language (DeBaets, Georgia Biomedical Partnership[31], Parens), engagement (Irwin, Elam & Bertilsson), public trust and science fiction depictions (Elam & Bertilsson). I do not intend to deal with these subject matters in any substantial way, except to interpret as appropriate in cartoons analyzed. However, it is essential to be aware of these non-clinical and the clinical topics, since these are portrayed in cartoons. Positions often structured to appear as scientific stances can be moral or commercial positions (Doan) that gain public uptake through inherently simple messages, as identified with propaganda (Ellul, Bernays).

As to understanding science, a 2008 telephone survey[32] found approximately 26 percent of American adults thought they had a good understanding[33]of science, with 4 percent able to name a living scientist. “People will respond to demagoguery if they don't believe they have sufficient knowledge and sufficient confidence in their ability to weigh arguments and assess what's behind them,” said Walter Massey, a board member of Chicago's Museum of Science and

[31] Georgia Biomedical Partnership. 2007. Georgia Biomedical Partnership Urges Amending SB 148 to Remove Language Hostile to Stem Cell Research. April 23, 2007, 15.
[32] Of 1,304 adults polled by Harris Interactive for the Chicago Museum of Science and Industry. At www.msichicago.org/about-the-museum/press/harris-poll (Accessed March 2, 2101).
[33] Jon Miller, author of *Science Literacy and Pseudoscience*, said most of the rest "don't have a clue.”

Industry that commissioned the survey. “The danger is that we move increasingly toward being a society where the most important decisions are ultimately made by fewer and fewer people.”

In looking at scientific citizenship and semantics, it is helpful to refer back to Larson`s *The Far Side*. Larson, who retired when he was 45 years old, found humour in life and the lab, creating single-panel cartoons that combined “surrealism with an amateur’s interest in science.” The terms “bizarre,” “absurd” and “demented” – generally all negative descriptors – were frequently used to describe Larson’s work, although book collections sold millions (Tucker, in Walker, 230). It is unlikely Larson would have obtained high syndication numbers and substantial book sales if only the scientifically educated and high demotic paid attention to his work. His ability to translate arcane and sometimes dull scientific matters (perhaps his excessive use of cows) created curiosity and his ability to put science into everyday life became compelling. Larson communicated his amusing vision and representations of science, expecting viewers to evaluate facts, social facts and meanings as they had seen in media representations. “One can expect that the construction of translation mechanisms using metaphors as messengers of meaning…is counterbalanced by other words that support the differentiation of meaning between restricted and elaborate discourses” (Leydesdorff & Hellsten, 65). Therefore, cartoons become an ideal vehicle for scientific knowledge. They communicate fear, wonder, angst, hope and any positive or negative emotions a viewer might feel in black humour and irony.

It is also helpful to look at forms of cultural narratives[34] in essentially artistic aesthetic constructive formats that describe a sequence of non-fictional or fictional events. An imaginative

[34] While it certainly can be debated cartoons express other rhetorical modes, exposition, argumentation and description, we assume the content allows and expresses this here, for further study.

product (as discussed later in Bordieu's cultural goods), these goods are expressed in reality. In his study on media and public understanding, Eric Jensen, reported that "news stories suggesting the imminent cloning of humans have inspired fictional entertainment media over the years, including numerous popular films," examining elite British press coverage of human cloning from 1997 to 2004. He then analyzed five human cloning films released between 1978 and 2003. "Two sharply divergent discourses emerged from these data. Unqualified hope and habitually hyped claims of future cures permeated the press discourse. In contrast, the films constructed human cloning as an inherently dangerous technology often wielded by hubristic scientists in the tradition of Frankenstein." Jensen suggested that both the exhibited positive and negative indicated "an impoverished and 'thin' public debate on the issue of human cloning."

Commenting on cloning in media coverage and including aspects of audience receptivity, Richard Holliman analyzed media coverage of cloning examining the production, content and reception of two years of media content (1996 and 1997), the period that included the announcement of Dolly. "A reception analysis, which investigated the significance of this coverage in informing respondents' views about cloning, showed that these respondents were particularly influenced by coverage of Dolly the sheep. In conclusion, the paper considers how media coverage of cloning might influence the construction of scientific citizenship."

Communications practitioners who manufacture consent (Bernays) are generally part of the upper level group that organize and negotiate relationships to the cultural apparatus. For example, the production and dissemination of a video news release or podcast and other vehicles on a new discovery might seem straightforward. Although the specialty of science communicators is evolving with higher standards, there are numerous associations of science

writers that encourage professional development, media are not required to have journalists spend valuable time becoming familiar with scientific language, understand discoveries or be briefed on issues.

Science & Creativity

"Creativity in the Arts and the Sciences" was one of Simon's last papers (2001, originally presented in 1981); he argues how the Nobel awards advance objectives in human creativity and scientific discovery in contributions to human welfare. He writes of the history and the sociology of science and cognitive psychology as having the same methods, "if less frequently, yet with comparable success, to the study of the mechanisms of artistic creation," asking "what mechanisms account for the products we regard as creative?" (204). Although Simon believed there was nearly total ignorance of the natural sciences, even among the scientifically educated with education limited to narrow fields, he was concerned about how people could effectively communicate with each other. Since science and technology are relevant to broader concerns of society and perceived as a power base, "regular" people have been shut out. Simon writes people perceive that "the crucial decisions of the society" are made by the technological elite while people grapple with "technology-saturated policy questions" and "scientific demagogues."

Under such powerlessness, Simon explained people cannot evaluate arguments and evidence (2001, 215). As many scientists and artists, he also examined the theory of right brain (being creative, holistic, intuitive) and left brain (analytic, logical), clearly stating this does not divide humans into two ways of thinking. Rather, he argues that creative products are "subject to scrutiny by ordinary minds. Genius is not needed to assess the products of creativity, and those

products are not qualitatively distinct from other products of thought" (216). In the creative realm, it would seem that cartoons addressing scientific issues might meet Simon's criteria.

The Cartoon as a Cultural Good

On the same day Canada's "national newspaper" *The Globe and Mail* ran 10 cartoons and comics (and a syndicated comic in Report on Business), New Jersey's *The Star-Ledger* ran 32 comics and cartoons. In the latter newspaper, an article noted five "well-known and much-loved comic strips" being honoured in stamps[35] by the United States' Postal Service. The release was held at Ohio State University's Billy Ireland Cartoon Library[36] and Museum (that holds more than 450,000 original cartoons and 2.5 million comic strips). Additionally, a four-month[37] legal cartoon exhibit "Superheroes in Court! Lawyers, Law and Comic Books" was at Yale University's Lillian Goldman Law Library, site of "one of the finest collections of rare law books in the world" (Schwartz), the rare books librarian saying comics are a natural fit with the institution's interest in law and popular culture. A *The New York Times* article about the show quoted that although "comic book creators' knowledge of law had a few gaps" (Schwartz) readers probably didn't mind "that the creators sacrificed a bit of reality for drama,[38]" a consequence that likely also materializes in science cartoons. As to comics being beneath the dignity of such an institution,

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[35] Bakes, Joseph. 2010. Sunday funnies come to your post office. *The Star-Ledger*. New Jersey. July 8. 35. *The Globe and Mail* and *The Star-Ledger* (New Jersey's largest newspaper) both dated July 8, 2010, excluding the editorial cartoon. No inference is made as to readership comparisons: the example show cartoons/comics in two markets.
[36] http://cartoons.osu.edu/?q=teaching-aids includes an extensive list of recommended books on teaching with cartoon art, K-12 lesson plans, content standards for social studies/history and for social studies skills and methods.
[37] To December 15, 2010, see www.law.yale.edu/library.
[38] Schwartz, John. 2010. Long Arm of the Law Nabs Crusaders. *The New York Times*. New York. September 15: C3.

the lawyer curating the exhibit noted some comics on display were worth $25,000. This shows that comics are valued as cultural goods, as well as function as collectibles, are of historical interest and certainly valuable to cartoonists and syndicates.

Caufield and Caufield (2008) brought the work of artists, scientists and social commentators together to explore legal, ethical and social concerns in biotechnology including stem cell research, cloning and genetic testing. The images and comments highlight linkages between scientific and creative research, stressing the role art can play in critiquing biomedical technologies. In the Winter 2002 special edition of *The Comics Journal* on cartoonists, artist and editor in chief Gary Groth's introduction stated "There has been a dedicated and purposeful effort on the part of these cartoonists over the last 30 years to explore subject matter that was previously impermissible to broach in the comics form and to refine the language of the art to accommodate the needs of that subject matter, in short, to move comics in more artistically mature and fulfilling directions" (5).

Writing about what the twenty-first century might hold for comics, Brian Walker stated "Humans have a basic need to communicate, and cartoons are one of the most effective means of self-expression" (327). And, in his seminal work, *Comics and Sequential Art*, cartoonist Will Eisner sees the aesthetics of comics – sequential art – as creative expression, a distinct discipline and an art and literary form "generally ignored as a form worthy of scholarly discussion (5). Over his years of drawing, writing essays and teaching, Eisner found the form receiving very little consideration in literary or art curricula (5). As he dismantled the components of comics, he found he was involved in the art of communication more than the application of art (6), with the

success or failure of communication depending on the ease which the reader recognizes the meaning and emotional impact of the image (14).

Cartoonists are also fearless communicators – they can advocate or condemn, in single frames of precise meaning – what a scientist or communications practitioner writes in an article. It is this application of art in communications that I also examine, showing cartoons as a creative vehicle that can communicate complex science.

Science Citizenship in Cartoons

Assuming an image has a title, cutline and/or words within a cartoon, it is not necessary or practical to determine if a viewer reads the words or first sees the image. The use of text is compounded since "the process of writing for graphic narration concerns itself [sic] with the development of the concept, then the description of it and the construction of the narrative chain in order to translate it into imagery. The dialogue supports the imagery – both are in service to the story. They combine and emerge as a seamless whole" (Eisner, 113). Viktor Weisskopf said "We cannot at the same time experience the artistic content of a Beethoven sonata and also worry about the neurophysiological process in our brains...But we can shift from one to another" (Barthes, xiii). This reinforces the concept of "image word sense." Viewers see a cartoon in its entirety, words and graphics melding on the page as they make the coalesced conversion through the eyes into the brain. The point is the entirety, the whole piece of communication rather than just the image or just the words. Although referring to a comic narrative rather than a single panel cartoon, Eisner said, "In comics, no one really knows for certain whether the words are read before or after viewing the picture. We have no real

evidence that they are read simultaneously" (59). Although this idea of image word sense is not proposed as a well-constructed theory, we can be informed by Eco's reasoning.

Stem cell and cloning cartoons published between 1980 and 2000 are specifically examined in a paper (Giarelli and Tulman) on cartoon image literature that states "social science research has established the utility of analyzing cartoon images to infer public belief and attitudes, social trends, cultural patterns and healthcare." The authors determined that "cartoons are a legitimate, interesting, and engaging source of data" (2003, 945). Larson's biomorphic representations of life forms – germs, amoebas and embryos and anthropomorphic representations of animals and human – was a precursor of today's science cartoons, since its debut on January 1, 1980. By the time Larson retired in 1994 after fifteen years drawing the cartoon, he was being published and syndicated in more than 1,900 newspapers (Cook[39], Gilson). Another cartoon series, *Bizarro* by cartoonist Dan Piraro, entered syndication in 1985, now disseminated to more than 200 newspapers.[40] Piraro speaks to students also as an "animal rights activist" and was awarded the 2002 Humane Society's Genesis Award for Outstanding Cartoonist.[41] He communicates his views on animal rights as he sees fit in his role as an artist in commercial syndication. Many of his stem cell (and, suitably, cloning cartoons) examine the more humourous xenogenics aspects.

By examining what cartoons communicated about stem cell research from 1996 to mid-2010, and examining whether content changed over time, this study provides insight into the

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[39] Cook, Rebecca. December 1, 2003. Gary Larson revisits "The Far Side." *Associated Press.* At www.augusta.com/stories/120203/art_LB0609-5.shtml (Accessed June 11, 2010).
[40]Accessed June 8, 2010 at www.toonopedia.com/bizarro2.htm.
[41]Accessed June 8, 2010 at www.dailyink.com/en-us/content_offerings/features.php.

practical significance of cartoons in addressing communication issues. This might be helpful for communications practitioners who work in scientific citizenship, or knowledge transfer, healthcare, associations and educational facilities. Cartoonist Stu Heinecke says cartoons are the ” “magic bullet” to creating successful advertising and marketing campaigns, projects, presentations, direct mail, emails and even job searches. “They’re the best-read and remembered part of magazines and newspapers, and we have been using them for the past 30 years to produce record-breaking campaigns for some of the biggest marketers in the world. Heinecke says various experts have claimed humour doesn’t work in advertising and marketing but he shows otherwise in his business, that cartoons have “powered countless record-breaking campaigns for the world’s biggest direct marketers.”In a 1998 speech – the same year as the discovery of human embryonic stem cells – while accepting an award from the American Society for Information Science, Simon pronounced that, “people do not really want forecasts of the future; they want assurances of the future…Our plans must account for the things we propose to do, the things we propose to change, the laws of nature that govern them and the laws of human nature that are so flexible they are hard to use for predictions” (Hardin, 13). New business opportunities created from burgeoning genetic and stem cell research have been vast and will continue to be so. Hence practitioners need to have fundamental knowledge of deep scientific issues, narratives and latent meanings.

Information Overload: Scarcity of Attention

Cartoonist David Sipress perfectly sums up contemporary angst in the suffering from information overload in a caption of his cartoon showing a man and a woman walking down the street. The

woman saying, "My desire to be well-informed is currently at odds with my desire to remain sane.[42]" While this is a fairly simply cartoon on first glance, the underlying message is deeper – an example how in viewing cartoons, one must take the time to look, to understand, to feel and to fully see what the cartoonist, like an author, is attempting to communicate.

A case in point – Richard Saul Wurman[43]'s line that "A weekday edition of *The New York Times* contains more information than the average person was likely to come across in a lifetime in seventeenth-century England" (Wurman, 32). Perhaps reflective of the stress that information anxiety causes that assessment of Wurman's was drawn on in a review of Davenport & Beck, rewritten as: "If you like to keep on top of what's going on in the world but find it difficult to get through more than a section or two of the Sunday *New York Times*, take heart. Were you to actually plow through the whole thing, even just once, you'd be taking in more factual information than was gathered in all the written material available to a reader in the 15th century"[44].

In this vein, the application of Simon's writings in attention economics to stem cell research comes when we examine just how to enable greater understanding. Cartoons do not marginalize issues; cartoons require an artist to communicate using an image, perhaps with text or a small caption in a judicious use of space with constraints. Simon was prescient; in addition to his writings on science and creativity as in his scarcity of attention concept we see a practical method for determining how to improve science citizenship – and see this having occurred in the

[42] Dated January 28, 2009 at www.funnytimes.com/cartoons.php?cartoon_id=20090128#.T42sgNW2zDw (Accessed April 17, 2012).
[43] A brilliant man, information architect and author of numerous books, also the founder of the TED Talks.
[44] www.amazon.com/Attention-Economy-Understanding-Currency-Business/dp/product-description/157851441X

content of the work by cartoonists over the past 15 years. This term and concept appears in first use by Simon in a paper (1955) and collegial discussions and to professional audiences about the use of computers and technology (1961). He continued to write on this issue also using "attention economics" (1996). Since the more public terms "information overload" (Toffler 1970) and "information anxiety" (Wurman 1989), references have emerged in *Public Relations Quarterly* (Brody) and throughout a literature review for organizations (Eppler & Mengis). The concept is in use in "Attention economics" (e.g. March 1, 2007, *Journal of Economic Theory*) and by Richard Lanham[45]. Many references do not cite Simon even in exact contexts, e.g. Tyler Cowan's literal use of "the scarcity of attention"[46].

Simon considered the attention issue as a question of ineffective filtering, that "We have too many boxes of information arriving at our loading dock" for which we must find mechanized ways to organize the "boxes" (Lanham, 8). He wrote (1996) that many designers of information systems incorrectly represented their design problems as information rather than attention scarcity, as a result building systems that excelled at providing more and more information, when systems were required that excelled at filtering out unimportant or irrelevant information
The humanities ("arts and letters") change places with those disciplines central to the "economy of stuff," being "the physical sciences, engineering, and economics as usually written" (xii), which "flows from the center to the extremes. But in an economy of attention, the vital energy flows

[45] When I checked Lanham's titles on Amazon.ca, the website proposed other books in the feature "Customers Who Bought This Item Also Bought…" the site recommending *The Management of Time* and *Stress for Success*.
[46] Cowan, Tyler. 2007. *Discover your Inner Economist*. New York: Dutton/Penguin Group. In an email responded to May 3, 2008, Cowan confirmed he didn't cite Simon, that, "Simon wouldn't usually be cited, precisely because he has been so successful..." (Q: "I assumed you were referring to Herbert Simon who gave a lecture/wrote that in 1969 but didn't see him noted in the text, index or chapter references. I'm intrigued, wondering if in academia his theory is so widely known/accepted it's not referenced or one of those forgotten ideas that resurfaces."

the other way, from the extremes inward" (229). Asserting that style and substance change places, Lanham writes that neither in the complex relationship can be trivialized or discriminated (180), in his book reprinting a cartoon (opposite title page) by Roz Chast entitled "The Triumph of Substance over Style" that appeared in *The New Yorker* in 1989. Simon wrote about information systems, noting people were faulty when saying there was an information scarcity, when more information was being made available to more people: what was needed were systems that excelled at filtering out unimportant or irrelevant information.

Written almost 50 years ago, Daniel Boorstin's book *The Image* evaluated the nineteenth century's explosion of magazines, book clubs, abridgements and compilations – such as *Reader's Digest* and *Science Digest*. These clubs sorted through the many magazines as reader needed help and were "glad to join an 'association' to give them the 'nub' of each of them" (139). Of science, Boorstin illustrated the fast pace of advances and multiplication in the outlets of printed matter that diffused those advances. He claimed a "modern divorce between scientist and humanist" where the latter "considered language, rhetoric, vocabulary, and dramatic structure inseparable from idea" (139). Boorstin writes that more than ever, the scientist treats a scientific article or book merely as a vehicle, in a reversal, with scientists encouraged to write for the masses and lay audiences, literary skills and dramatic structures lacking, concurrent with less reader receptivity to literary skills. In the 20 years prior to the book's publication, "the number of scientific and technical articles published each year increased two or threefold" (139). He explains that in 1960, articles in the sixty or so major world languages numbered between one and two million published in up to 100,000 technical journals.

A 2007 Department of Canadian Heritage report on the book industry offers some explanation; under the sub-heading *More Product Competing for Readers' Attention*, the number of new books published in Canada in 2004 was 16,776, while in the United States the figure was almost 300,000. Along with ebooks, used books still retain sales; Internet retailer AbeBooks lists 13,500 booksellers with more than 100 million titles (15). "Canadians are living in an increasingly saturated media environment" facing more demands on and options for leisure time, people finding it difficult to fit in reading for pleasure (16). A 2004 study comparing book buyers five years apart, found "lack of time" as the main reason people bought less books (23). As Simon predicted, "To collect and digest the information on any subject has therefore become a vast and complex new problem" (139).

In the clamour for attention, it is attention that is the scarce resource. People now engage in the economics of attention – even in the multitude of new ways to communicate – in that it is a scare resource: "information is not in short supply in the new information economy. We're drowning in it. What we lack is the human attention needed to make sense of it all…Attention is the commodity in short supply" (Lanham, xi).

Methods in Data & Content of a Brave New World

This study used quantitative analysis with content analysis to determine changes in cartoon data over time. While I primarily used the three texts below to inform research, I did take direction from Barthes, in *Images, Music and Text,* that research must reply to "a demand for

responsibility: the work must increase lucidity, manage to reveal the implications of a procedure, the alibis of a language, in short must constitute a *critique*"(206).

To inform the methodology of this study, the following texts were consulted:

- *Basic Content Analysis, 2nd edition* by Robert Philip Weber includes content analysis to "describe trends in communication content" from a social science perspective (9). Used to qualitatively assess "the relationships among economic, social, political, and cultural change" (10), Weber's focus on semantic differentials, forms of validity (construct, discriminant, face), variables, classification and interpretation is instructive and important, particularly his ambiguity concerns. As Weber notes, smaller portions of texts – such as the recording units in cartoons as to his word sense and theme – are less difficult to code and less likely to present coders with conflicting cues. Detailed in Raskin below as a necessary condition of humour being opposites, Weber mentions "semantic differential," where three basic classification dimensions are each anchored by a polar opposite: evaluation (positive vs. negative); potency (strength vs. weakness); and activity (active vs. passive) (19). Weber also shows examples of classification dictionaries (24-36), suitable for cartoons as this relates to the accepted practice by syndicates of "tagging" cartoons by main theme, although in some cartoons in some syndicates as later seen, not accurately and in most cases not detailed, i.e. in a search of "cloning," a cartoon might refer to stem cells. The key-word-in-concept is helpful for single semantic units in the context in which it appears. Here, each cartoon will be analyzed for Weber's word sense into an extended image word sense.

- *The Content Analysis Guidebook* by Kimberly Neuendorf includes guidelines for coding, codebooks and coder training (132-137). After logging data in a MS Access database, I looked at semantic differentials (Raskin's opposites below) as considerations such as reality vs. fantasy and like importance vs. triviality. Neuendorf posits that content analysis is "the fastest growing technique" in mass communication research (xvii) and that semiotic analysis focuses on the "deeper meaning of messages" – the deep structures, latent meanings and such aspects as signs, central themes and artifacts such as in the analysis of a film (6) and deeper meanings in cartoon samples. Neuendorf also introduces semantic mapping (184-187) as do Leydesdorff and Hellsten, of interest in the growing field of visualizing information/informational graphics.

- In addition to oppositional contrasts in humour, Victor Raskin's *The Semantics of Humor*[47] uses "deep semantic analysis" as the core in his approach to humour (xiii) using his necessary conditions where text "should be partially or fully compatible with two different scripts and secondly, a special relation of script oppositeness should obtain between the two scripts" (xiii). As in the previously noted argument in stem cells (source vs. potential) there are polar opposites, often an example of latent meaning. This creates a deeper meaning, as much of the issue has not been well

[47] Regarding his examples of humour, Raskin points out "some of the jokes are, in fact, quite nice and good, besides being useful for the semantic analysis, but this is equally irrelevant." (xvi). I had similar editorial restraint.

explained. Raskin's belief is that humour (verbal humour) is a universal human trait which includes "language, morality, logic and faith, etc." (2). With a stimulus as a necessary condition for humour (4), each humour act must occur in a physical environment - what he identifies as "one of the most important contextual factors" (5). This context "may determine the meaning of semantically recursive items" – such as latent meanings, for example when the image shows animals in a lab, people with animal heads (as we see in a sample later) – by conditioning, directing, and modifying the perception of a humourous situation. Raskin outlines a brief history of humour then identifies the move to cognitive skills and (citing others) "a contest of intelligence and imagination and of figuring things out" in a form of mental superiority (23). He clarifies "there are virtually dozens of terms which permeate and utterly confuse classifications of humor" (32), primarily dealing with incongruity, e.g. malice, ridicule, disparagement, nonsensical and release theory (not examined herein). His semantic theory chapter[48] discusses implicature, linguistic knowledge and non-autonomous semantics, which apply as do his combinatorial rules (76), where the meanings of words, interpretation of the whole sentence and the ability of the receiver to derive meaning are applied also in "sophisticated humour," incomprehensible or unfunny to those not familiar with the material alluded to (46).

Although due to space considerations it was not possible here to be fully informed by the qualitative research of Pushkala Prasad in *Crafting Qualitative Research: Working in the*

[48] He notes it is "one of the most important and, accordingly, boring chapters. It is also one of the shortest" (45).

Postpositivist Traditions and the strategies of Jaan Valsiner, their writings are of compelling interest for increased data use in the humanities, in that "The data in the social sciences are real (as bases for our knowledge-construction), yet they may represent their underlying social phenomena in different ways. Data derivation can occur along two basic lines. One entails quantification of the phenomena…the other, the qualitative data emerge as the translation of selected features of the phenomena into some form of structured depiction" Further, "the adequacy of each depends upon how they represent the objects the researcher is interested in, and these are determined by the theoretical constructions" (Valsiner, 100). Prasad writes that "what is needed is an appreciation of the intricate terrain we call qualitative research with all its implications, tensions, and interlinkages without resorting to too many oversimplifications" (4). He advocates for "theoretical grounding" warning that otherwise, "the implicit assumption here is that sustained encounters with the field will, on their own, guarantee the emergence of sound qualitative findings" (5).

Cartoons on cloning emerged prior to stem cell issues on the public radar, which I believe have had a stronger negative representation with cloning animals detracted from the more positively perceived ramifications of stem cells. The implications here relate back to public comprehension of moral debates, health benefits and the portrayal of issues more situated in the realm of science fiction, when they might show effective communications.

Methodology

Data Collection & Sampling

Cartoons were collected through the use of online databases from major cartoon syndicates based in the United States and two minor databases in Canada that supply newspapers through subscription-based rights to print the cartoons. Rights are secured through a syndicate and cartoons are then routinely supplied for publication, with very little editorial interference with spiking by a newspaper of what they or their readers consider an objectionable story line[49]. The terms (tags) used to source cartoons were "cloning" and "stem cell," reflecting the coding and tagging accuracy of the syndicate. These terms may reflect chronological differences shown by the term "cloning" used in earlier cartoons, to the more sophisticated and broader "stem cell" term that appears to be used in tagging by the syndicates in later years. These distinctions were logged as being indicial to the time span examined.

Numerous cartoons tagged in syndicates as "clone" or "stem cell" did not relate – cartoons clearly dealt with other topics (such as cyclones, IMClone insider trading, computer clone, Star Wars, cell phones), therefore, these were excluded (an exception is something such as a cell phone being correlated to stem cells, as in a "stem cell phone" ID509) In all cases where a cartoon was tagged and there was ambiguity, the cartoon was reviewed for image word sense to

[49] Editorial cartoonists usually enjoy editorial freedom. For *Doonesbury* cartoonist Garry Trudeau's 2012 storyline on ultrasound abortion bills, some newspapers opted out of running the strip while others posted it online. Trudeau said that overlooking the topic would have amounted to "comedy malpractice." Carmichael, Emma. March 13, 2012. Here Are All the Controversial Doonesbury Abortion Strips Your Local Paper's Not Running (UPDATE). http://gawker.com/5892879/here-are-all-the-controversial-doonesbury-abortion-strips-your-local-papers-not-running (Accessed April 2, 2012). In 1993, syndicated Canadian cartoonist Lynn Johnson sent letters to the some1,400 newspapers that carried her strip *For Better or Worse*, advising that in an upcoming strip, a regular character would admit he was gay. With both support and objections, 19 newspapers cancelled her strip.

evaluate if three elements could be assumed to communicate the topic. If a cartoon was part of a series and could stand alone as such, it was included (although regular series readers might have inferred the topic with one reference). If a cartoon was tagged as such, e.g. the Christopher Reeve topic, the cartoon was included if it related to stem cell research but not included if it related to his death, i.e., showed an empty wheelchair with Superman logo on the chair back

For the 15 years represented in the study, data were grouped into three equal periods each with two equal chronological junctures. This format allowed for historical explanation and interpretations. Although certain junctures might obscure other patterns, this is consistent with reporting statistical information in increments (e.g. surveys asking ages, 40-44, 45-49, etc.) and one must settle on some structure. I then looked at frequency, the number within the intervals (junctures) so a frequency table such as a histogram might show data units within each value.

Therefore, the following three periods and junctures were defined:

Period A

A1: July 1, 1996 to December 31, 1998

Amorphous "start," content previous to this would not relate to events or discourse, 2007 announcement of Dolly, although 50 years of successful adult blood-forming bone marrow

A2: January 1, 1999 to June 20, 2001

November 1998 brought the first major public embryonic cell announcement during a period reflected by increased public interest and understanding of stem cells

Period B

B1: July 1, 2001 to December 31, 2003

Politically driven climate with George W. Bush suspending hES funding in August 2001.

B2: January 1, 2004 to June 30, 2006

With increasing political activity and debates, a cloning announcement by a South Korean researcher and his subsequent recanting, US considers bill to expand funding

Period C

C1: July 1, 2006 to December 31, 2008

The US Senate considers a bill to expand funding which Bush vetoes July 19, 2006. Presidential election campaign material in 2008 includes such discourse and assurances on opposite sides.

C2: Jan 1 2009 to June 30, 2011

President Barack Obama assumed office and his March 9, 2009 executive order allowed 120 days for new hES research guidelines and resulting lawsuits.

Coding Considerations as to the Literature

Further to logging units by date junctures, it was essential to apply Weber's word sense and the expanded image word sense to attempt to determine and sort content, since communication and commentary are ultimate goals of cartoonists. First, in examining cartoons in the realm of science fiction, I determined those units to be, in current reality, past that functional assignation of coding since it is apparent there is increasingly formalized scientific investigation in such spheres. From this and deBono's lateral thinking concept, I considered that the reality of current investigation into cloning and stem cells placed research in the realm of the brave new world. I felt it important to reflect these matters in a more inclusive code, that being **Metamorphose**; the process of *undergoing* (emphasis added) transformation rather than morphogenesis (the beginning), metamorphosis or metamorphism (see *Appendix 1: Definitions*) of transformation.

Using the literature to inform this and other codes, I categorized three additional codes; **Politics** to represent the political landscape and where ultimate power lies for policy and funding. I originally considered Individual/Society as a possible code but in considering more social and cultural constructions of reality – including placing religion, ethics and morality into social constructs – informed by Berger & Luckmann, I separated concerns in two additional separate

codes as to **Humanity** – individuals and health concerns – and **Culture**. For explication purposes here (for detail of all codes see *Appendix 3: Coding Sheet & Codebook*), **Culture** included media representations, mass media and/or social marketing issue, media vehicle portrayal within the semantic unit (e.g. a newspaper, a television set), science fiction, education, propaganda, cultural references (e.g. literature, films) uncontrolled science, scientific misstep, gender, exaggeration, potential escalation from fear to horror, theology/religion, ethics, morality[50], recognizable or inferred cultural artefacts, settings and discussions.

In determining appropriate codes, I also looked at plausible existing knowledge of the issue in the public realm, considering Frye's low and high demotic and/or professional knowledge such as scientific. This higher order humour is key, as we saw in Eisner and Kirsh & Kuiper, reiterating Frye's sense of development in and understanding of art and science as essential to an individual. And, as seen in Giarelli, examining latent meanings was deemed essential for accurate coding: much like we saw in Eco's estimation of "the thing itself." Rather than be concerned with a minimum knowledge level, I thought it essential to reflect higher comprehension, reiterating what as Raskin refers to "sophisticated humour" which "contains an allusion and is either incomprehensible or unfunny to those who are not familiar with the material alluded to" (46). Finally, by going back to Barthes' concepts of denotation and connotation in messages, a full "picture" of codes and coding became clear and applicable.

[50] Although ethics and/or morality could possibly log under Humanity, I believe these to be largely culturally defined much like theocracies and in the social construction of reality.

Parameters & Restrictions

Value ranges of the arguments (such as to the meaning of quality) within each cartoon are not addressed. Additionally, the estimated knowledge of artists, quality or accuracy of content and whether individual cartoons rest in a particular type of humour, as noted in Raskin e.g. satire (political, news, Juvenalian[51] etc.) will not be identified. While hyperbole is well-used particularly in cartoons depicting science, this, as well as numerous other humour techniques and devices, will not be specifically examined.

The restriction of using syndicate databases is primarily for the purposes of control and access. In an online Google Images search for "cartoon" OR "comic' and "stem cell," an unrefined result of 692 of 72,200 such images was returned with duplicates removed (as at June 8, 2010).[52] Although both the purposeful and random nature of humour sharing is aided by the Internet – with a significantly larger potential audience – such a search was not used due to measurement purposes.[53] Additionally, due to the nature of self-posted material on the Internet, there would have likely been deleterious effects on coding and accurate sourcing purposes: images might not have been publically disseminated through a control such as a syndicate. Such images could also be uncontrolled duplicates of those in syndicate databases and/or re-works or revisions of an originating artist's viewpoint, therefore violating copyright.

[51] Of which Orwell's 1984 is an example, rather than Roman satirist Horace whose humour is playful, not evil.
[52] Simon Fraser University Library's Editorial Cartoons Collection shows more than 7,000 drawings published in Canadian newspapers from 1952 on. In the search, "stem cell" tagged one cartoon, "cloning" tagged seven (including the stem cell duplicate).
[53] e.g., www.comicflasher.de/inter/fs_main.html and Open Project's www.dmoz.org/Arts/Comics/Comic_Strips_and_Panels/ Directories. Both accessed June 10, 2010.

Method of Analysis: Procedures

Refer to *Appendix 2: Coding Sheet & Codebook*. Using cartoons sourced, a quantitative content analysis was used for data collection with these procedures:

1. *Access to Databases*

Accessibility was determined by the public online databases of syndicates that represent cartoonists in an agent relationship. Syndicate rights are assigned by an agency to a purchaser such as a newspaper on a subscription basis, a newsletter for occasional use and/or per cartoon/cartoonist fee for one-time reproduction rights such as for use in a public presentation. As it is not possible to determine each cartoon's dissemination or correlate a particular cartoon with circulation and/or readership statistics, the reach of individual cartoons was not determined.

2. *Availability & Numbers of the Units of Observation: Cartoons*

One unit is each single cartoon, whether single panel, dual panel or comic strip version. Exact duplicates were removed: e.g. in databases as black and white line drawings, with the same version in colour available on the major[54] United States' syndicate sites.

3. *Unit of Analysis/Recording Unit*

The coding scheme is based on Weber's *Basic Content Analysis*. In defining the recording unit (21) and given the defined amount of text in cartoons, Weber's altered "word sense" to a fuller image word sense was applied. Each cartoon was assigned a code, considering

[54] Two major sites, *Creators.com* and *King Features*, do not allow searches by tag or topic feature; *Tribune Media Services*' archive is not searchable by keywords; editorial cartoons are client and password protected. Sourced through site searches and/or personal communication with company representatives, with parent company ownership. As of June 30, 2010.

the contextual cartoon image-sense[55] as to primacy. Based on literature and sample cartoons, I identified four primary categories of:

Culture (e.g. media, science fiction)

Humanity (e.g. benefits, problems, aging, societal implications)

Politics (e.g. politicization, political decisions, funding priorities)

Metamorphose (e.g. biomorphism, chimeras, xenogenics, personification)

Additionally, a code of **Outliers** was identified, for matters not relating to content of the four primary codes above.

These codes are detailed as to context and content in *Appendix 2: Coding Sheet & Codebook*. For each cartoon, each a semantic unit, an image word sense was coded. While this allowed for consideration of latent meanings for each recording unit, for interpretation and to obtain a reasonable sample size of the 517 units, one category was coded. Since the total number of outliers was minimal (9) these are not discussed.

4. Quantification, Coding Instruments & Analysis

Following categorization, content was coded, data entered and results interpreted.

5. Test Coding

As in Neuendorf, practice or pilot coding can inform researchers prior to final coding (133). After coding 12 sample cartoons, I conducted test coding on 40 additional units to assess validity, variables, classification accuracy and replication, revising the codebook as necessary. During this test I found some cartoons tagged by syndicates as "cloning" as

[55] I use this term to inform Weber's "word-sense" and to distinguish "image-sense" from "a graphic representation of a concept denoted by a (set of) term(s)" as in www.springerlink.com/content/gl3t27n46720q371 accessed September 23, 2010 along with http://dspace.mit.edu/handle/1721.1/54651.

were also tagged as "stem cell." My research project was initially concerned with just stem cells, but the test coding process encouraged me to think through the timing of cloning's public announcement (Dolly, February 1997) with the 1998 stem cell finding. Given the close time frames, I thought it best to include cloning, particularly because I believed Dolly's birth was lodged into peoples' minds, also since in some conversations very very few knew that blood/bone marrow stem cells, the discovery of McCulloch and Till had successfully been in use for many decades. Hence, during this test coding I altered the period to include cloning cartoons and their ramifications.

Findings by Periods, Junctures & Codes

In the process of and from coding in date periods and junctures, there were some absorbing results and significant detail (see *Appendix 3: Database Citation Notes, Appendix 4 Cartoon ID Notes)* with four findings I deemed significant. In summary by period:

Period A: Junctures A1 & A2: July 1, 1996 to June 30, 2001

In this period, cartoons depicting **Culture** are overwhelmingly represented; the issue was new, albeit with a pre-existing background, with a major public announcement fraught with overtones of speculative fiction. This public trepidation was aided by media misunderstanding partially which resulted from a lack of official information with governments in response. This meant that official communications were also lacking in content and capabilities by practitioners (See above in *Cloning & Stem Cells Emergent Years* and *Concerns in Communications).* Since I believe the other codes are more difficult

to portray in cartoons, culture essentially being all around us in our usual habitats, it is perhaps not a surprise this category shows the most units in this period. There is only one **Humanity** cartoon, the issue not fully understood or known as to these ramifications.

Period B: Junctures B1 & B2: July 1, 2001 to June 30, 2006

Cartoonists are increasingly reflecting the move from individual concerns to the larger world: this period saw the highest activity in **Politics** of the three periods, with a distinct shift that coincided with increased political, media and public discourse, representative of activities in the US with Senate hearings and Bush's funding veto, with ethical and moral debates dominating attention. **Culture** remains high. Canada sees research guidelines finally published March 2002.

Period C: Junctures C1 & C2: July 1, 2006 to June 30, 2011

Implications of research continue under **Culture** with subjects such as the emergence of cloned meat. Not a period of resolution, but of progress, as we see President Obama assuming office, one of his first acts reversing the veto.

Four findings are most significant and intriguing:

1. I found the high rating of **Culture** to be reflective of speculative fiction concerns, likely because the birth of Dolly was announced prior to stem cells and that as any emerging

issue where there are periods of explanation, acceptance and adoption, this issue has taken time to move into any phase of understanding;

2. The low rating of **Humanity**, 31 of 517 units, is understandable in the earliest period, but is a code I thought would have included many more units in the latter two periods once the public (and policy makers/governments, cartoonists, media etc.) became cognizant of deeper issues, and given that the purpose of stem cells is to better human health, the cartoonists' role being not to tell us what to think, but to encourage us to think;

3. Seen in Figure 3, when clustering the two codes with nature at their core (**Humanity**, **Metamorphose**) for 107 of 517 units, I compared that result to the two codes with societal construction at their core (**Culture, Politics**) that numbered 401 of 517. Although entirely reflective of reality in how humans dominate and attempt to manage nature and the natural world – also in other areas – it was surprising to see such weight in the socially constructed cluster. And this is where that salient knowledge applies; *it is the cell that determines what it is to be;*

4. In *C2: January 1, 2009 to June 30, 2011*, the total is 24 cartoons (1 **Outlier)** during the juncture that President Obama took office that first month. Of the 10 coded **Politics** in 2009, 8 relate to Obama reversing Bush's hES ban and his science promotion. C2 shows that stem cells fell significantly with 16 in 2009 (the 1 **Outlier)**, then 8 in 2010. The last cartoon found for the entire period of study is dated August 26, 2010.

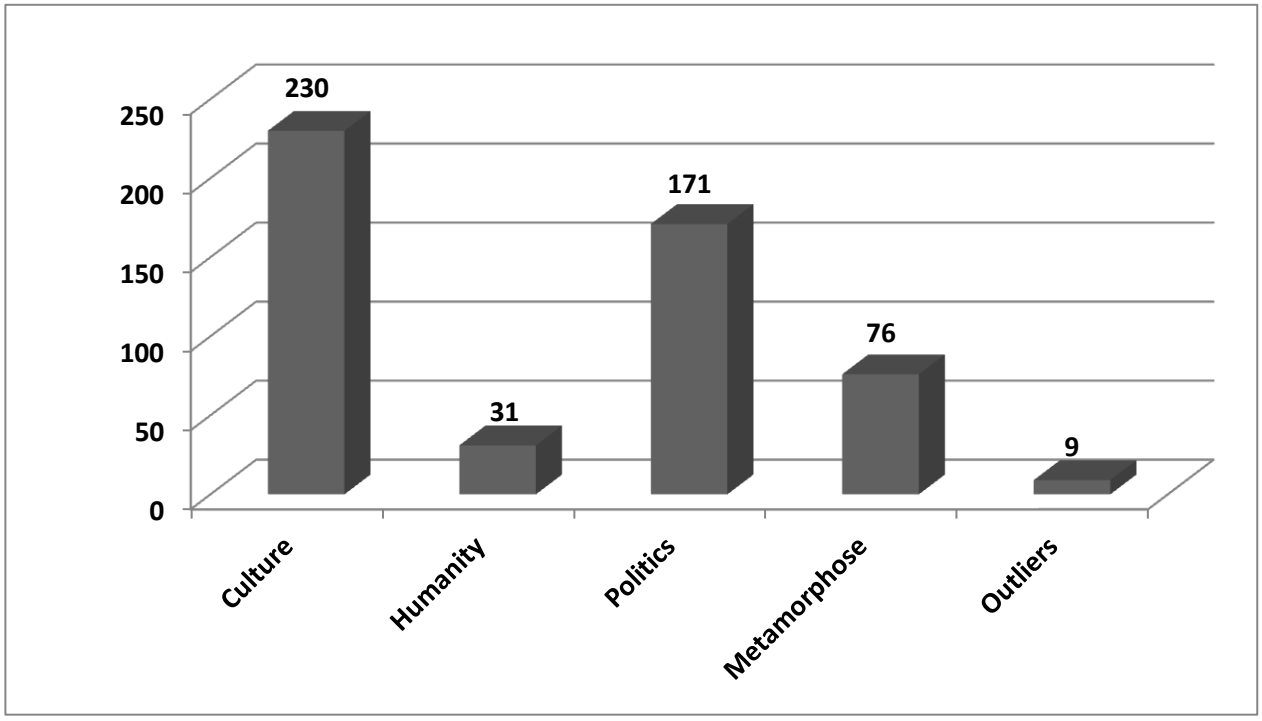
Of additional interest but not part of this study:

- in relating to scientific citizenship and role models, the ~gender count[56] of scientists reflected in cartoons was 111 male and 19 female;
- of the 517 cartoon units, 41 were by female cartoonists[57];
- media vehicles (such as television sets, radio microphones and newspapers) appeared in ~84 cartoons, which showed mediation of the issues and that cartoonists needed to relate events to headlines to strengthen the topic connection to readers.

From the study, we see how humanities theory and data use can inform science as to the richness of the concerns and the discourse, particularly giving weight in that often cited idea of "the art and science of" issues.

[56] Counts are approximate as some images were not examined from the full size cartoons at the URL.
[57] There is resistance to opinionated women creating strong cartoons says cartoonist Ann Telnaes, who won a Pulitzer Prize in 2001. Although *The New Yorker* publishes other female/male cartoonists, 4 of 57 in its Cartoon Bank are female (www.condenast store.com/-st/Cartoons-by-Artist-Prints_c146230_.htm, accessed April 16, 2012). In 2008, 15 of 185 Association of American Editorial Cartoonists members were women, in 2005 less than 4% of editorial cartoonists. Many women (e.g. Sue Dewar, editorial cartoonist, The Ottawa Sun) use their last name, or last name/initial as Donna Barstow: "In 2 years, USA Today used only two cartoons by women [1 by her] out of 960 cartoons…Time's Cartoons of the Week had four in a year, a little over 1% (email with Barstow April 2, 2012).

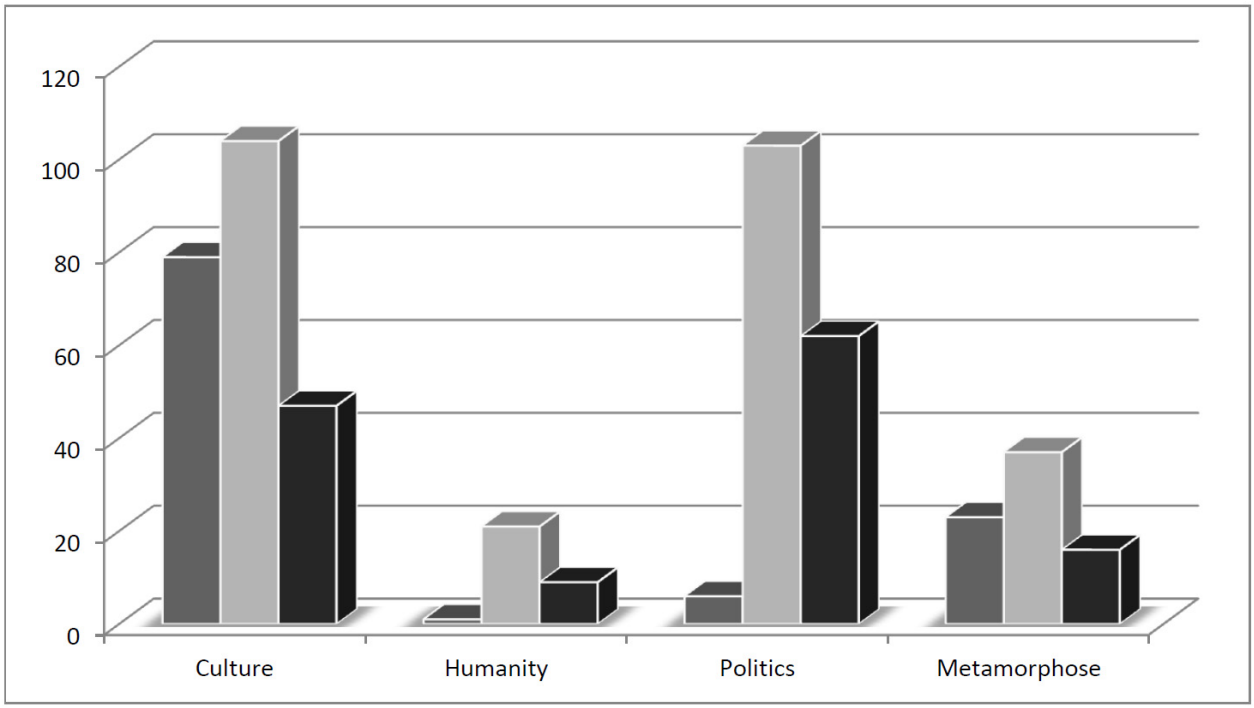
Figure 1: Number of Units (517) by Code



In Figure 1 above, the total **Number of Units** (517) is shown for the overall period of study (July 1, 1996 to June 30, 2011) by code with 9 **Outliers** identified. In showing semantic units by the coding image word sense, **Culture** concerns are overwhelmingy represented, followed by **Politics**, then **Metamorphose** (*see Appendix 2: Coding Sheet & Codebook*).

Although many cartoonists did reflect issues of **Humanity** well, the category has consistently low numbers in each juncture, perhaps a reflection that implications for regenerative health were not fully understood or the aspect was avoided. As in the description of the second cartoon (ID147) in *Period B: Unit Sample B2* to follow, there is often little humour when various truths such as death or pitting a baby human against an adult human are depicted. This comparatively low number might also be reflective of Dolly being announced prior to stem cells, which as noted I feel created a public wary about possible positive health aspects. Aspects and protrayals of speculative fiction are also seen here in the relatively less delicate subject of **Culture**.

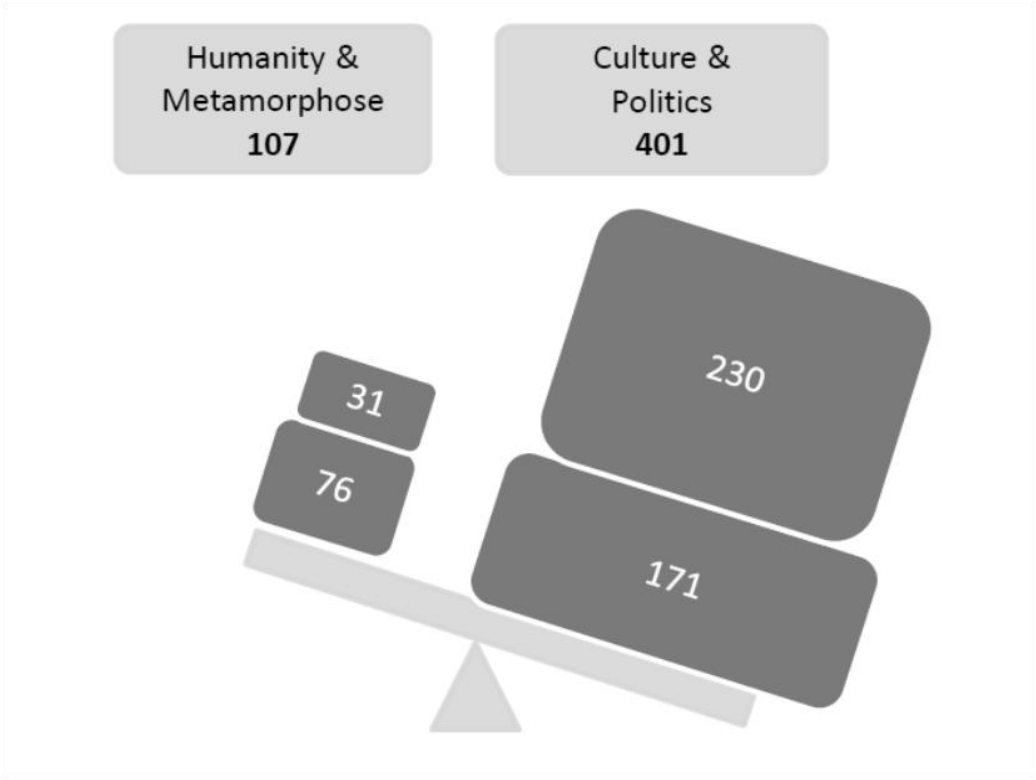
Figure 2: Code by Period



	PERIOD A: July 1, 1996-June 30, 2001	PERIOD B: July 1, 2001-June 30, 2006	PERIOD C: July 1, 2006-June 30, 2011
Culture	79	104	47
Humanity	1	21	9
Politics	6	103	62
Metamorphose	23	37	16

When split into three equal periods in Figure 2, we can see how **Humanity** fared over the full period of study; generally abysmally in relation to other coding categories in considering stem cells are to improve health. While there were various celebrity/notable potential patients proffered up, translating health and disease concerns otherwise difficult, however this reflects overall information as effects on **Humanity** were still unknown by the middle period – there was little accurate public information communicated. **Culture** shows strength throughout the full period of study from Dolly's announcement onward. This also relates to **Metamorphose** in depictions of anthropomorphism and biomorphism, clearly a frightening prospect, therefore ripe for humour. Of particular note is how **Politics** rose from little representation (6) to a spike during the years (103 then 62) that Bush restricted funding and there was much debate in congress including hearings and discord amongst US-elected representatives.

Figure 3: Clustering by Natural Order & Social Construction

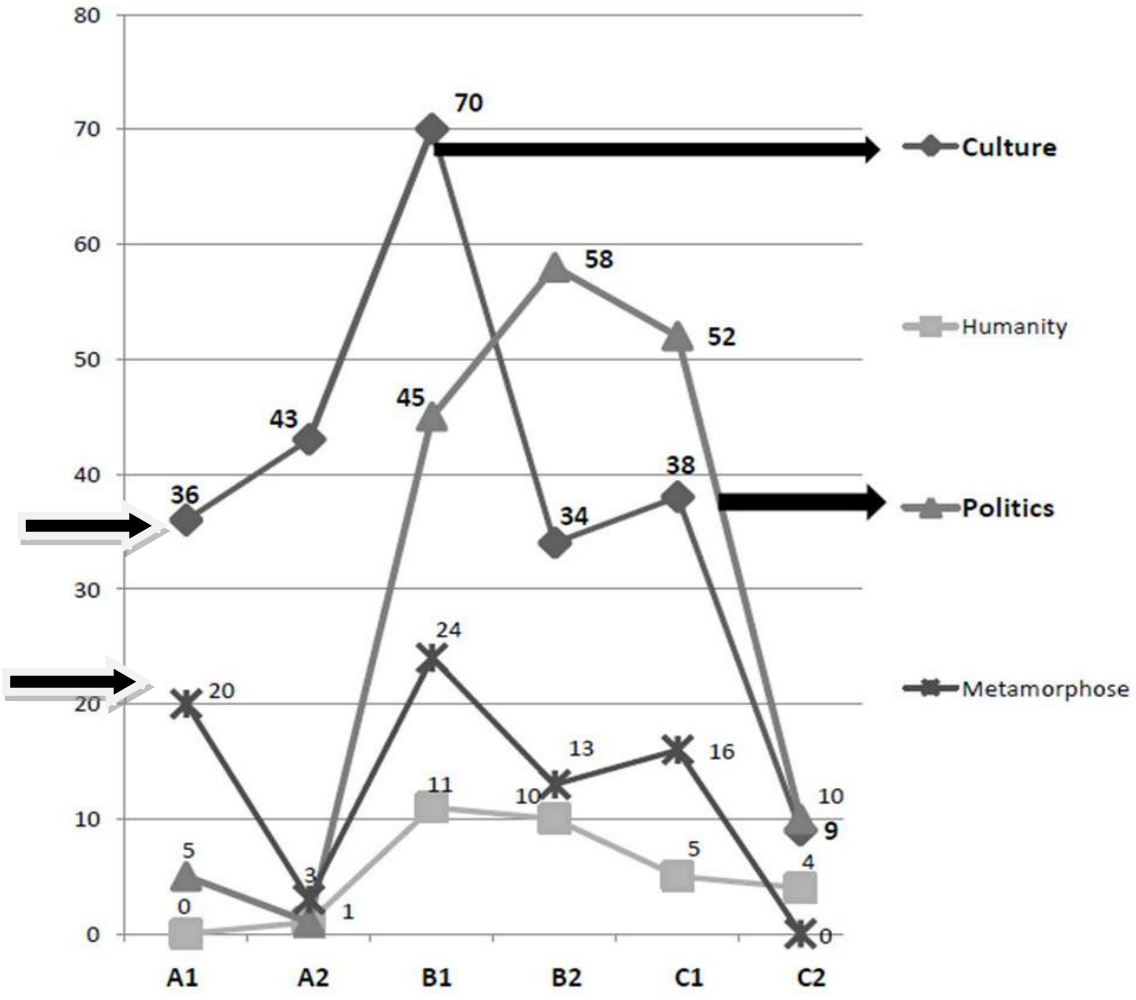


Graphically, when we cluster the four codes according to nature and social construction (removing the 9 Outliers), there is distinct evidence the cartoons in Figure 3 are weighted toward representing social construction. **Humanity** and **Metamorphose** are grouped as having the laws of nature at their core (e.g. Thomas Aquinas' natural law, Kenneth Burke's fundamental dialectic of the natural order as human beings even with aspects that can mitigate natural structures, Northrop Frye's primary concern being nature). Here we see 107 of 517 units clustered. Likewise we cluster, **Culture** and **Politics**, the grouping of socially constructed codes (e.g. Berger, Frye's secondary concerns being society) we see more than four of five cartoons – 401 of 517 units – as having primarily social representations, perhaps indicating the efficacy of a social system's ability – and even purpose supposedly being – to manage the natural order (Burke).

With concepts in science throughout the codes, the overall coverage and representation of science by the cartoonists become more refined in content such as depicting lab settings and language use with less word play/gags. By further examining these two clusters and sorting data by code, we could align political and media events in significant detail to show correlation with event-based cartoons (e.g. funding veto) and those of arcane knowledge that perhaps is geographical or generationally based (e.g. cartoons about baseball star Ted Williams' remains and cryonics). At all times however, we must remember the caveat: it is the cell that determines what it is to be, with science, data and theory that nature is the primary order.

Figure 4: Code Numbers by Junctures

Period A		Period B		Period C		
A1: July 1, 1996-Dec 31, 1998	**A2:** Jan 1, 1999-June 30, 2001	**B1:** July 1, 2001-Dec 30, 2003	**B2:** Jan 1, 2004-June 30, 2006	**C1:** July 1, 2006-Dec 31, 2008	**C2:** Jan 1, 2009-June 30, 2011	
36	**43**	**70**	34	38	9	**Culture**
0	1	11	10	5	4	Humanity
5	1	45	**58**	**52**	**10**	**Politics**
20	3	24	13	16	0	Metamorphose



In Figure 4, we see the entrance of cloning cartoons into the public realm at **A1,** with units in **Culture** and **Metamorphose** portraying worst-case scenarios (i.e. "what if?" humans were crossed with animals). At the highest number of units per juncture, we also see that **Culture** dominates the first three junctures (A1, A2, B1 as shaded) with **Politics** – since the issue has become deep in the power structures, media and public discourse – taking over the top count in the last three junctures. With 23 units in C2 (16 in 2009 with 1 **Outlier**, 8 in 2010) we see the stem cells drifted off the radar; the last cartoon is dated August 26, 2010. In 2009, of the 10 **Politics**, 8 relate to President Obama reversing Bush's ban and promoting science.

Interpretation & Discussion

Interpretation of Sample Units by Juncture

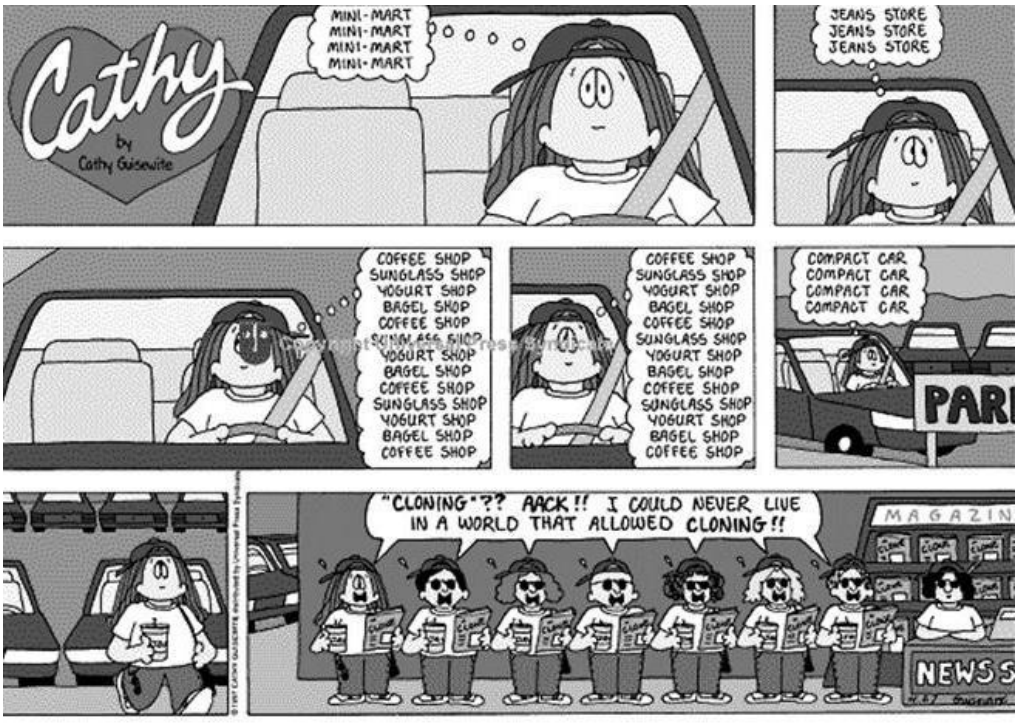
Given there were 517 samples from which to choose, all (including outliers) that could be deconstructed or commented upon, it was difficult to decide on representative samples for discussion. For example, in *Period A: Unit Samples A1* immediately below, selecting a cartoon that represented the image of Dolly would have been entirely suitable, so I also erred for an overall representation of **Culture** that brought in other aspects not previously discussed. Since the B1 juncture saw the most cartoons published, three cartoons are interpreted for a total of nine cartoons described in this section (reprinted with permission). Everyone brings their own point of view, estimations of qualities and if a cartoonist succeeds in communicating; the following commentary is personal interpretation.

Period A: Unit Samples A1

ID 339 SargentBen UU February 26, 1997

While there were a few earlier cartoons, the immediacy of cloning when Dolly was announced on February 22, 1997, clearly provided the spark. Within a few days, this cartoon (ID339) appeared, the "Cloning Lab" being a credible setting (also given the sign of

something brewing in the glass flask in the background, carried by another clone or perhaps the original Dr. Bupkus). We see some kind of bureaucratic administrator who looks suspiciously like the scientist holding the clipboard except for the artefacts of clothing and between them the cloned sheep. The imagery is obvious, the dialogue clear – including the administrator's hesitation since the sheep has left the barn (so to speak) and he might recognize himself as if in the mirror. In one image we see what was apparent to others 15 years ago, that if this can happen with a sheep, here is the substantiation cloning can also be done to humans, unleashing concerns of science gone mad, the image of a cloned sheep firmly in our minds.



ID331: GuisewiteCathy. UU. April 27, 1997

Using an urban social setting and with a cartoonist as the narrator for the words and the actions are not being filtered by another, we follow the life and tribulations of the central character Cathy here (ID331),

who readers might have pre-existing knowledge of as she was one of the first cartoons speaking to women[58]. The content of these sequential narratives often dealt with her dating woes, workplace issues, relationship with her mother and the like, largely social and situational topics. Aimed at the ever increasing lot of working women, there was also a recurring character of her boyfriend – but there was no children. Although she often appeared feckless, there usually was resolution and redemption.

In this sample, we see a recurring theme of its **Culture** code – Cathy's preposterous life with inumerable chores and errands she had to pursue and to accomplish, so the concept of a clone would be attractive. There is the set up, with the last frame showing comic irony – what Frye also refers to as myth, "by which I mean the Greek word mythos – plot or narrative – is a story which in literature says explicitly, 'This is what is happening,' and implicitly, 'This is not what is happening at all" (Denham, Eternal, 32). As we see in *Cathy* and what Frye sees, is that "What irony appeals to is a sense of normality on the part of the audience. That is, we recognize a certain action to be grotesque or absurd or evil or futile or whatever, and it is that sense of normality in the audience that enables irony to make its point as irony. Without that sense of the normal, irony would cease to become ironic and become simply a description" (Denham, pg 29). What is more "normal" to a working woman than driving manically while her ticker tape of a mind recites incidental errands? In the last frame, Cathy joins the similarly clad, drinking the same beverage, reading the same newspaper, speaking the same words in opposing an evil and grotesque occurance. This type of scientific humour is not the laugh-a-minute type, nor the low

[58] *The Globe and Mail* placed the Cathy cartoon in its Report on Business section to encourage women to read the section by purposefully looking for the cartoon.

demotic that Frye refers to – we have entered the high demotic where a person might see an article in a newspaper, followed a radio panel debate on stem cell use and developed an intelligent foundation to create discourses, perhaps in workplace or in families. Those functioning in a high demotic state likely understand a level of wit and intelligence that is able to consider alternative positions, even if thos positions are not agreeable.

As to the inclusion of the newspaper in the final frame, many cartoons over the total period of study included media references or images – for not only is a cartoonist reflecting on where and how s/he receives information, s/he can include media activity as a sign of credibility or media just as a socially accepted and constructed medium. Given the revelation of Dolly was in February 1997, the irony and message here clearly reflects the public discourse of that period, what Berger and Luckmann[59] refer to as everyday life, in the social construction of reality.

Period A: Unit Sample A2

ID400: EliotJan. UU. April 9, 2000

[59] Published 15 years earlier, *Character and Social Structure* by C. Wright Mills introduces ideas in their book.

In cartoon ID400, we see cloning perfectly related to social contructions of reality, manifestly exhilbiting the scarcity of attention in specific situations and overall in what is going on around people every day (Berger & Luckmann, Bordieu). In a movie theatre we see boorish behaviour in people talking and not paying attention to the movie with the sound of munching, frustrated drivers honk horns, people are on cell phones surrounding the subjects, there is swearing and common vernacular with the ever-present male spitting just as one happens to look at him, a man burping and throwing garbage away while a receptacle is is front of him... it is clearly **Culture** (perhaps more the absense of culture).

We understand from the first frame or two what is happening, we might feel a sense of angst building and we do not have to wait until the end of the narrative to understand what we are seeing. While we await the punchline, we sense the wholeness, componded by the sense we have no control, for it is the omnipresent "they," the others who have control such as governments, science, commercial entities and so on:

> "We *listen* to the poem as it moves from beginning to end, but as soon as the whole of it is in our minds at once we 'see' what it means. More exactly, this response is not simply to *the whole of* it, but to *a whole in* it: we have a vision of meaning or *dianoia* whenever any simultaneous apprehension is possible" (Frye, 1957, 77/78).

This juncture is noteworthy in that 22 of the 48 cartoons are by a single cartoonist in a recurring strip that does not appear elsewhere (nor does the cartoonist) in the period of study. Comprising almost half of the units in this juncture, this would seem to skew the A2 results, but the strip's occurrence fell under the parameters and there is no judgement here of quality or

suitability – the comic appeared. However, in examining the comic strip more fully, the substance and story almost seem incidental – it doesn't exhibit Frye's high demotic content or provide complex information; as a recurring theme and with recurring characters it could be considered an outlier under different parameters. If the samples were restricted to single panel/editorial cartoons, this grouping would have been eliminated along with other strips and cartoons, thereby lessening the overall study sample size. An additional fact is that this series was reprinted numerous times over many years providing the cartoonist and syndicate with duplicate funds, that seems somehow creatively apathetic compared to other cartoonists (for details see *Apppendix 4: Cartoon ID Notes,* 323 block). While a different audience might be viewing on different days, these type of strips usually enjoy regular readership, quite possibly assumed that regular readers suffer from information overload and don't remember they've already viewed the comics. This kind of refinement in the parameters of the semantic units is left to *Future Considerations* to examine.

Period B: Unit Samples B1

"All I'm saying is that if God created man in his own image he was a bit of a cloner himself."

ID510: MankoffRobert. CB September 3, 2001

Writing about cartoons without noting *The New Yorker* is like writing a cookbook using few ingredients. The history of cartoons at the magazine is well covered by its own publications, compliations, specialty theme

cartoon books, books of rejected cartoons[60]and at the Cartoon Bank, a novel repository and sales agency that licenses cartoons for commercial and public use. Robert Mankoff, *The New Yorker's* cartoon editor and Cartoon Bank founder, created this representative unit (ID510) during a period that the word "clone" was settling into public discourse, the subject matter still in a comedic infancy. His idea could have "stemmed" from any conscious or unconscious thought, perhaps viewing the cover of another magazine[61] or reflecting the sentiment that "Cloning may be considered as the last frontier to overcome male sterility and give the possibility to infertile males to pass on their genes[62] from Italian scientist Severino Antinori (intriguing given that Italy is a heavily Catholic country). With the word play of "cloner," suggesting God as a clowner as in clowning around and cloning males.

This cartoon is coded for many reasons as **Culture**, for it shows a socially constructed setting of a probably dull get-together, the reality taken for granted as such (Berger, 2), expressing the relationship between human thought and social context with ideologizing influences (9). This setting of every day life where small talk and such discussions are pursued is an intersubjective world shared with others that "sharply differentiates everyday life from other realities of which I am conscious" (23), where reality does not pertain to problematic or complex unanticipated daily realities. This image does not represent such an apparent difficulty. This reflects a line of a conversation, perhaps the topic read about in the newspaper that day and

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[60]*The Rejection Collection,* currently three volumes in the series suggested and edited by cartoonist Matthew Diffee.
[61] Such as the cover story of *Time* magazine, Human Cloning is Closer than you Think www.time.com/time/covers/0,16641,20010219,00.html and You Again: Someone Will Clone a Human in the Next 12 Months. *Wired* www.wired.com/wired/archive/9.02/full.html (Accessed March 2, 2012).
[62] This reference was selected given Frye and the use of "grotesque" in the cited Cathy cartoon. Although this article is dated March 9, 2001, same as the cartoon, the story was active prior and *The New Yorker* is dated for the following week's activities. www.newscientist.com/article/dn501-cloning-plan.html (Accessed March 2, 2012).

filed away for the party, perhaps with the tinge of snarkiness instigated by wine consumption since we see the woman holding a wine glass. If a character was drawn looking at their watch – and who has not at a work gathering as this cartoon appears to be situated due to the artefacts of dress and suits – Berger notes this indicates an instinctive urge to reorient and to enter back "within the temporal structure of everyday life (28).

But this image is as it is, a room the cartoonist enters as an artist – like any of the people shown whether in business, teachers or amusingly, copier salespeople. The artist also dwells in the reality of everyday life (cartoonists often situate events in casual party scenes). Speaking of specialists such as artists, "Indeed, one of their most important problems is to interpret the coexistence of this reality with the reality enclaves into which they have ventured" (26). As viewers, being interlopers into this party scene is much like eavesdropping, for we can easily enter the scene, we are not outsiders, especially since readers of *The New Yorker* are likely to appreciate feature stories and the cartoons. We are expert enough to participate in the conversation, because we experience these in everyday life and we do not require "exceedingly complex esoteric systems of expertise" (46) to participate as we can access whatever more we need to know, until we become subject to information overload often making conscious choices to specialize. "As more complex forms of knowledge emerge…experts devote themselves full-time to the subjects of their expertise, which, with the development of conceptual machineries, may become increasingly removed from the pragmatic necessities of everyday life" (117).

ID147: MillerWiley. UU. : September, 10, 2001

As this B1 juncture period recorded the highest number of units, three cartoon samples are shown to denote the range. The second sample (ID147) exemplifies the construction of a seemingly simple cartoon where every element shown – or not – is purposeful. In drawing, Roland Barthes calls this elemental purpose "coded signification" (19) that in photographs "separate out various connotation procedures, bearing in mind however that these procedures are in no way units of signification such as a subsequent analysis of a semantic kind may one day manage to define" (20). This is almost what is attempted here by means of not just looking at text within a cartoon, the cutline, words on signs or t-shirts and items within the frame, but an image word sense that combines all these and other elements, what Barthes refers to as the "linguistical nature of the image" (32). "From the moment of the appearance of the book, the linking of text and image is frequent, though it seems to have been little studied from a structural point of view" (38). He notes that the linguistic message is present in every image. Although he doesn't specifically cite cartoons, he writes of symbolic messages and the signified and signifiers that

readers can chose to ignore or not (39). However, while these might be lost or overwhelmed in a painting or photograph, messages[63] cannot be lost in a cartoon.

Cartoonist Wiley Miller largely portrays cultural issues in single panel and strip format[64], both providing viewers with strong sequential narratives that are restrained and pointed. We see the steps of the US Capitol building in Washington, the iconical government tourist attraction where Congress meets. A congressman[65] accompanies (out) a likely end-stage patient – the bald head could imply advanced age and/or chemotherapy – encumbered by an oxygen tank and sitting in a wheelchair. Here the congressman leaves the patient, who might have come to speak at a hearing on stem cell use (US Senate Appropriations Subcommittee on Labor, Health & Human Services and Education[66]). There are many implications in "You're on your own…" perhaps simply as the US health system that leaves many millions of citizens – even in 2012 – uninsured or underinsured, with a comic irony in his politician-speak of "best of luck."We know though that political and social order is legitimated through power and control and "political roles are legitimated as representations of these cosmic principles" (Berger, 103). Therefore, although responding emotively by the lack of **Humanity**, given the Congressman's stance, we cannot code this as such: it must be coded in **Politics**.

Being a compassionate Republican though, he leads the patient to a ramp to assist in getting down the steps, which we clearly know will send the already suffering patient surely to

[63] While each element in a cartoon is to have meaning, it is possible some elements are unconscious inclusions, as described in the manifest and latent concepts of Thomas Merton, whose work is not discussed here.
[1] "He used the single-panel format for creating a sequential comic." Accessed March 2, 2012 at http://lambiek.net/artists/w/wiley.htm.
[65] Dramatism and dramaturgical views of identity such as described by Kenneth Burke and Erving Goffman are not examined here, but could further illustrate the congressman as an actor merely fulfilling his role, act, performance, purpose, the audience role provided as readers.
[66] Accessed March 2, 2012 at http://stemcells.nih.gov/policy/legislation/archive107.htm

death, with a bit of speed from the shortened stem cell ramp that provided little hope. The setting and the situation is absurd, yet shows truth. The cartoonist does not have to show viewers anything else, because we are already in on the joke. Milan Kundera's comment aligns with the cartoonist who brings out this image word sense delicately and also forcefully, for great comic geniuses "are those who have discovered or have uncovered for their audiences the comic aspects of what those audiences have not previously thought of as comic" (Denham, 30).

The date of the cartoon's publication is notable – not only because stem cell issues were quickly replaced by terrorism realities a day after the cartoon appeared on September 10, 2001. One month prior, August 9, 2001, Bush announced that funding for stem cell research, an issue he called "one of the most profound of our time[67]" would be restricted to existing stem cell lines being cultured and there would be no new human embryonic cells for use. Prior to the cartoon's publication, reaction to Bush's announcement unleashed opinions and vested interests throughout the media, scientific communities and religious groups, to a bewildered public. On August 27, 2001, the lead US agency, National Institutes of Health[68], announced that it was creating the Human Embryonic Stem Cell Registry to list hES research that met its eligibility criteria. (Although the scientific communities remained engaged, stem cells on the public radar lessened somewhat, likely because media covered terrorism topics thrust into the public sphere.)

Looking again at the cartoon, we can see a moral judgment presented, since we know the Republican stance was largely against the use of hES, due to religious and ethical beliefs. What is subversive, and horrifying or delightful depending on a reader's viewpoint, is that in cartoons "all

[67] Lindlaw, Scott. "*Bush allows some stem cell funding*," Associated Press, August 9, 2001. At www.washingtonpost.com (Accessed March 2, 2012).
[68] See http://grants.nih.gov/grants/guide/notice-files/NOT-OD-01-059.html (Accessed December 16, 2011).

efforts to discover rules or laws in the sense of moral mandates telling the artist what he ought to do, or have done, to be an authentic artist, have failed" (Frye, 1963, 26). Any criticism becomes personal as to whether the viewer aligns with the message. "It is still possible for a critic to define as authentic art whatever he happens to like, and to go onto assert that what he happens not to like is, in terms of that definition, not authentic art" (26), and "irrefutable, as all circular arguments are" (27) in moral value-judgments disguised as critical (50). Frye also comments on deliberately constructed hierarchies of values, that these are "based on a concealed social, moral or intellectual analogy" with "pretexts for minimizing the communicative powers of certain writers" (cartoonists, artists, etc.). Whether targeted as being obscure, obscene, nihilistic or reactionary, he believes these to be disguises to maintain the decorum of the social and intellectual classes (23).

Looking back at the patient, we clearly see him as a person, an individual counteraction to the sanctity of life viewpoint the congressman espouses only for embryos it seems…the government rules, it has the power. This incongruity is perfect ironic humour, for we know the sanctity of life the patient faces is really his death, for "the entire purpose of a cartoon is to reveal truth in a surprising way" (45), compressing whatever the issue is from what could be an essay into a single frame. A depiction such as this can worry communications practitioners: just how would they handle such a sensitive issue? "Many nonprofits deal with serious, even deadly diseases, or human tragedy somewhere in the world. Surely, cartoons and humour don't belong anywhere near such serious issues. And yet, they do," with cartoons generating record results for such fundraisers (Heinecke, 29).

While numerous cartoons do not have headers or titles, cutlines or writing within the image and Barthes coded and non-coded messages suffice (as does an image word sense since we then use descriptors to describe what we see), it is a worthwhile experiment to now look at this cartoon and remove the words – granted perhaps hard to do after such thought.

1. First, remove the dialogue and evaluate if you can intuit the cartoonist`s intention.
2. Also remove the words on the ramp. As we still see the person in the wheelchair and the ramp off of which he is about to be launched, we do not need to focus on the medical issue. This cartoon as is could be situated in the debates on health care reform in then President Bill Clinton's era or the current climate with President Obama endeavoring to reform health. If a viewer is aware of the attempts in Congress to defeat such reform, this cartoon is easily transferable in the imagination.
3. Now remove *The Compassionate Conservative* – it is probable, by signifiers such as the column, that a viewer could indeed discern what is taking place. I surmise this is likely for many reasons which includes the viewer is likely high demotic, is culturally aware, can engage in intellectual discourse (enthymematic in Barthes, n 84) and understands the goals and responsibilities of communications. Barthes comments that in a paradox, images without words (certain cartoons) "always covers enigmatic intention" (n, 39). As further support that the action signifies what is occurring[69], we refer to Aristotle's poetics "where the notion of character is secondary, entirely

[69] Although not cited in this work, also Kenneth Burke's notion of act, actor, agency, scenes and purposes.

> subsidiary to the notion of action: there may be notions without 'characters'" but not characters without an action (Barthes, *Images*, 104).

Although there were changes to funding after President Obama assumed office, that cartoon could easily have been published ten years later than it was, still reflecting political paralysis.

ID405: TolesTom. UU. April 21, 2002

This third B1 juncture sample is included since the concept that improved health lies at the heart of stem cell research was conspicuous by its absence in data. This cartoon (ID405) was coded under **Humanity**, also because of the crucial understanding in stem cell research, that cells are live entities and in a shading of anthropomorphism, cells have "their" own ideas what the cells become – "they" do not have to be agreed with, might not be controllable and therefore have unanticipated and variable outcomes. This then seems to counter Kenneth Burke's principle of higher order, that people cope with the forces of nature through ideas and actions that help them manage environments. Although "medicine and public health are clearly part of this innovative order" (19), the cells are strangely, "themselves," like people. Therefore, there is an epistemic responsibility to understand the consequences of research and the application to humans, well

outside depictions of art, cartoons and fantasy. It is precisely as Frye writes, that because comedy usually "moves toward a happy ending" (1957,167), cartoons can provide a door to enter discourse and because we know "that irony never says precisely what it means" we can regard cartoons as an "ironic game" (47).

We might have thought of the late Christopher Reeve (ironically, portraying Superman in the 1978 movie) and spinal cord repair, Ronald Reagan and stem cell research in Alzheimer's or Michael J. Fox who advocates for stem cell research into Parkinson's[70]. Indeed, stem cell cartoons over the years have portrayed each of these individuals. "Issues seldom galvanize public attention solely on the basis of their technical, ethical or political significance, however – people rather tend to awaken to social problems when an individual surfaces as the figurehead for the issue of public concern." If we can recall media coverage, viewers likely experienced humanist concerns through these rhetorical icons as "someone who other people can speak through" (Kenny, 18); through a public figure vehicle as portrayed by cartoonists. For publics who were unaware of stem cells' possibilities and claims – those had not tracked the issue like scientists, commercial interests or government – watching these public figures experience something so very human became a point of learning. Much like a woman might not read pregnancy books until she wants to be pregnant or a teenager is oblivious to saving funds for retirement, examples of points of learning, viewers might not care about stem cells. In a perfect learning or educational world, there is foundational layering of knowledge, examination, thought and opinion – but in

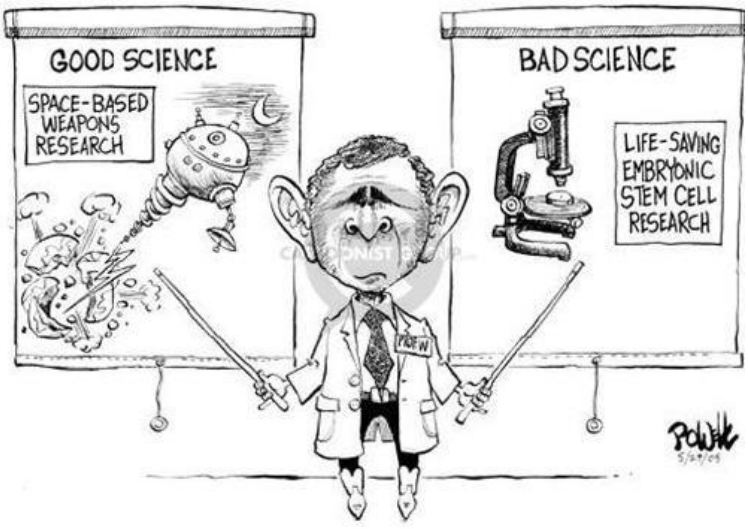
[70] www.michaeljfox.org/newsEvents_mjffInTheNews_pressReleases_article.cfm?ID=56

reality, learning often stems from a particular juncture of experience or anticipated point of learning.

These situational points of learning are not particular to age-related knowledge – when planning a trip to Sri Lanka a woman will likely research information about the country before going. It is likely thus with a personal interest in stem cells as acquiring knowledge about such research does not have a point of learning for the non-vested. If one has Parkinson's or has a family member with the disease, they are piqued by media reports and can seize on the possibility of some dramatic improvement. They care; they follow the discourse, perhaps lobby for funding or sit on an association's board. Since cloning emerged first, people might have considered cloning just enough to be fearful of science-fiction like mistakes and pronounce an opinion, but stem cells offered an amorphous hope to those suffering from a point of learning in being concerned with a particular disease or health issue. Particularly in cartoons coded as **Humanity**, a heightened intimacy is established as viewers can feel empathy and/or sympathy with the characters as well as the cartoonist and perhaps hope; we have shared understanding and bonds.

As to a viewer thinking cartoon are incidental and have no economic or cultural value, it is of interest to note that this cartoonist Tom Toles won a Pulitzer Prize for Editorial Cartooning (as did many of the cartoonists logged in the study) in 1990.

Period B: Unit Sample B2



ID181: PowellDwane. CG. May 29, 2005

McLuhan considered older comics to be "a pastoral world of primal innocence from which young America has clearly graduated," and wrote that the artist Pablo Picasso was "long a fan of American comics. The highbrow, from Joyce [James] to Picasso has long been devoted to American popular art because he finds in it an authentic imaginative reaction to official action" (153). Duncan cites great writers who turn to producing comedic works later in life, who, "in the fullness of experience and creative power, regarded comedy as a profound expression of art. It is necessary to point this out because tragedy has a much higher status than comedy, especially among those who do great art (Duncan, 376). In examining Bush's facial expressions in this cartoon about official policy in the United States (ID181), we can see confusion, a quizzical expression, furrowed brows, a closed mouth and perhaps the depiction of an internal dilemma. The image word sense also mocks Bush as "comedy, and especially ironic comedy, *institutionalizes* doubt and question. It is *sanctioned* disrespect." Just as Duncan cites the Office of the President suffering jokes, which ward off threats to social order, the "incongruities and follies" and "mystifications and grandeur" become known, "returned to reason through laughter where it submits itself to the greatest power of all – reason born in discourse among free men" (387). We must code this as **Politics**.

Bush's expressions and stance are representations of human expressivity, objectifications as "enduring indices of the subjective processes of their producers. For instance, a subjective attitude of anger is directly expressed in the face-to-face situation by a variety of bodily indices – facial mien, general stance of the body, specific movements of arms and feet, and so on" as well in objects (Berger, 34), as in dramatism and dramaturgy theory, through props and the scene and so on. Of course, we see Bush's rhetoric expressed in what is labeled as "Good Science," being war weapons which kill many thousands of humans and "Bad Science" which is to save lives, yet kill embryos. Bush is not communicating so much as he is attempting to persuade viewers he'd made a difficult and correct choice.

But how can one argue against the possibility of saving a life? In this cartoon, we see then Bush doing just that. In examining euphemisms and propaganda, we can see how vested interests are structured to appear as moral stances, and witness commercial rationalizations that gain public uptake through inherently simple moral messages. To argue is to take a stance that one cannot see the other possibility, a refutation of the most human trait in what apparently separates humans from animals, that of being able to predict consequence without having actual experience, through the not even educated imagining. We see a pothole as we are walking up the road and walk around it; we do not blithely step into it unless perhaps a young child purposely jumping in puddles collected within. In extension, mention embryonic or xenotransplantation and the media go mad with coverage, turning stories into moral emblems with commentary. In cartoons, this is exhibited through the ironic mode of comedy, where the cartoonists "make reason an ultimate value" (385). "This is irony which neither accepts nor rejects, but doubts. Irony helps us to endure what we cannot, or will not, change" (Duncan, 380).

> "The air of detachment, of playfulness so characteristic of irony disturbs a superior, for he is never sure his majesty is believed...Through irony we discuss the shortcomings of superiors and inferiors, even as we admit that their weaknesses must be endured, for without superiors and inferiors social order would be impossible" (385).

Added to this is the time frame in which we view this cartoon and what "space-based weapons research" means, as since television arrived and space exploration pursued, later instantaneous transmissions of war zones, we know these weapons have the power to cause catastrophic apocalyptic destruction. McLuhan cites cartoonist Al Capp about the arrival of and popularity of television. "His confusion and dismay were a perfect match for the feelings of those in every major American enterprise. From *Life* to General Motors, and from the classroom to the Executive Suite, a refocusing of aims and images to permit even more audience involvement and participation has been inevitable." Capp, who created the strip *Lil'Abner*, said, "But now America has changed. The humorist feels the change more, perhaps more than anyone. Now there are things about America we can't kid" (152). Given that Capp and McLuhan wrote these observations in the 1960s amid the confluence of scarcity of attention and emerging technologies, it is apparent and indeed gloomy in 2012, that we realize "The everyday reality of life is taken for granted *as* reality" (Berger, 23). "What is 'here and now' presented to me in everyday life is the *realissimum* of my consciousness" (22).

There *are* (emphasis added) many things about which America "can't" or won't kid – increased terrorism, strange emerging viral diseases – things of which the world knows more and more of, precisely because of emerging technologies as McLuhan writes of, as with the arrival of television "and its iconic mosaic image, the everyday life situations began to seem very square, indeed" (152).

Period C: Unit Sample C1

ID410: PiraroDan September 21, 2007

As with any subject matter, in tapping into overt fears in the realm of science fiction and a brave new world, cartoonists have free reign – somewhat exhibiting what Marshall McLuhan wrote in that "The artist is always engaged in writing a detailed history of the future because he is the only person aware of the nature of the present. Knowledge of this simple fact is now needed for human survival" (McLuhan, 70/71). This is seen – warned of – in cartoon ID410 coded under **Metamorphose** where the cartoonist translates the present and the future. McLuhan also wrote of the artist's ability to parry "the bully blow of new technology with full awareness" and for people "to recognize their need of the artist" and their prophetic work. "The artist is the man in any field, scientific or humanistic, who grasps the implication of his actions and of new knowledge in his own time" (71), the "modern comic strip and comic book, provide very little data about any particular moment in time…The viewer, or reader, is compelled to participate in completing and interpreting the few hints provided by the bounding lines" (1964, 148).

In the almost 50 years since McLuhan's words, viewers understand Weber's word sense, but there are far more social and cultural issues portrayed in many more mediums and communication vehicles, each with various amounts of detail required as to knowledge and ability to operate, in parallel information overload. Social and generational changes incorporate

science fiction to various degrees, such as electronic transmissions and technology and travel to space, and we feel – in having gone through generations of drift – perhaps much like Frye did, "Satire shows us in *1984* the society that has destroyed its freedom, and in B*rave New World* the society that has forgotten its concern" (Hart, 95).

But we have not forgotten these concerns, because in cultural goods – such as literature, films and comic books – the cumulative timeless stock and range of speculative fiction has grown. When Isaac Asimov wrote "that's funny" as part of the second opening quote (title page) it is highly doubtful he meant "funny" as in something laughable – he would have meant "funny" as in odd, weird, intriguing or an abnormal occurrence or result the scientist had not expected, some incident worthy of further investigation. like a plot point in a movie that spins viewers off in other directions from the plot we first expected. Asimov "memorably identified the three major types of science fiction as "What if," "If only," and "If this goes on." Magnificent works have emerged from each of these categories, but readers — and writers — have reserved their greatest love for the first of the trio" (Filippo), the "what if" we see in most cartoons. This is what viewers ask from this cartoon and others where **Metamorphose** occurs, as "asking simple, counterintuitive, counterfactual or even childlike and naïve questions — the kinds that begin with those two words — seems to unlock the storytelling imagination like nothing else" (Filippo). Functioning as a practical negation, these cartoons "can only work by pretending not to be doing what they are doing writes Pierre Bourdieu. "Among the makers of the work of art, we must finally include the public which helps to make its value by appropriating it materially (collectors) or symbolically (audience, readers), and by objectively or subjectively identifying part of its own value with these appropriations" (265). Piraro does not have to write "what if?" in the cartoon,

for again, readers are in on the joke, perhaps "exared[71]" – excited and scared at the same time by the possibilities.

With the advent of cloning though and as an empathizer with the plight of animals, he has what Berger and Luckmann calls knowledge in a specific agglomeration with reality that pertains to the social context (3), along with the fears in this new speculative fiction, previously situated in the realm of science fiction. The cartoonist has "the power to produce reality...highly abstract symbolizations (that is, theories greatly removed from the concrete experience of everyday life) are validated by social rather than empirical support" (Berger, 119). In drawing a cartoon, rather than writing a newspaper article telling people to oppose xenotransplantation and chimeras, Piraro is a comic performer, a clown who can project whatever mischief and laughter he wishes to, knowing he is portraying one pole[72] of "true comic irony and satire... which defines the enemy of society as a spirit within that society" (Frye, 1957, 47).

Although the use of animals was of specific use here, cartoonists often use animals and assign human characteristics to them (e.g. language, clothes), precisely because "hybrids function as simplified emotional schemas, cute and cuddly models of our characteristics, desires impulses and failings" writes Mankoff. "Animal cartoons are popular with cartoonists because they easily enable us to construct the classic foundation of a joke; the crossing of our ideals with our instincts" (115). As anyone, cartoonists have individual opinions. As viewers, we do not have to be aware that cartoonist Dan Piraro[73] is an animal activist and a vegan – he is genuinely

[71] Aubrey Betteke Martin's word.
[72] The other pole being "the recognition of the absurdity of naive melodrama, or at least, of the absurdity of its attempt to define the enemy of society as a person outside that society" (Frye, 47).
[73] See www.bizarro.com/vegan.

commenting on a future world situation just as any fantasy or sci-fi novel of the 1950s, but the possibility he illustrates is not clearly just of his imagination. Frye invokes John Stuart Mill, who "in a wonderful flash of critical insight," said that the artist, "is not heard but overhead" (1957, 5). Besides commenting on events, the content matter is of personal interest to Piraro, perhaps in performing a public catharsis of sorts. The speediest of the bunch, the rabbit, seems to ready a tranquilizer shot to subdue the mouse with the gun – which although in an anthropomorphism with legs here, a mouse normally being the least scary lab subject. We look at the animal in the cage; is that, can it be a human foot and a human hand? Besides experiencing a frisson of fear, viewers also can relate to the appearance of a single fairly obvious human representation (the male scientist) depicted to situate the cartoon in current reality. Frye writes of the "sick joke, which brings us back very close to Aristotle's catharsis, because the sick joke expresses forms of pity and fear which achieve something of a purgation of those emotions" (Denham, 31), Frye sees as a person's moral feelings[74].

Berger notes that human existence is an ongoing externalization, "As man externalizes himself, he constructs the world *into* which he externalizes himself," projecting his own meanings into reality (Berger, 104). The cartoonist's illustrate this, clearly moving from a historical visualization of reality of the "'What' to the sociologically concrete 'Says who?'" (116). He is forcing us to evaluate our world and our constructs as to any new normal. Rationality also requires alternative actions be fully known (i.e. instead of animal-to-human, can conduct human-to-human research?), but in actual decision making with few alternatives known at the time, it

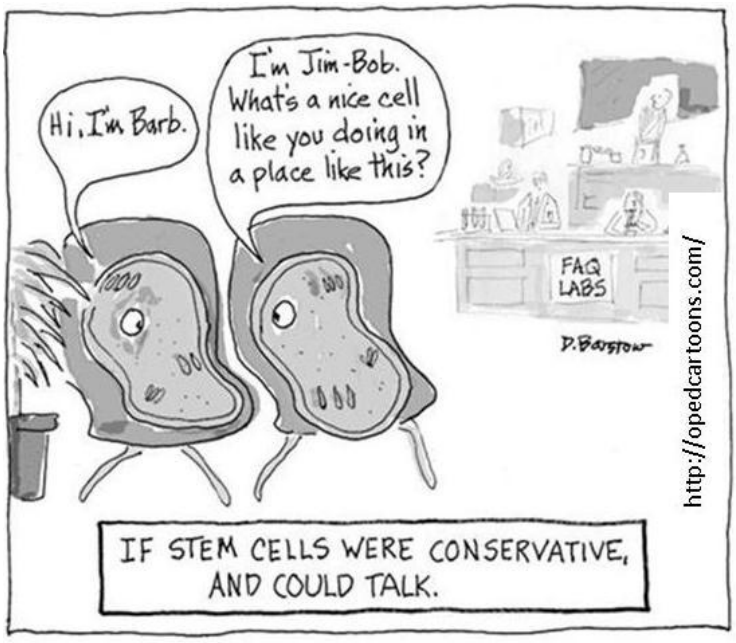
[74] It must note Frye's lovely humour: "There must be at least fifty theories on the market about the meaning of *catharsis*. I can perhaps save time by giving you the correct one, which by coincidence happens to be mine" (28).

might be difficult to fully evaluate the future worth. This evaluation activity in our minds is also exhibited in how “the arts form a kind of counter environment, setting something up which is really antipathetic to the civilization in which it exists” in a type of “controlled hallucination, where things are seen with a kind of intensity with which they are not seen in ordinary experience” (Denham, 33).

This controlled hallucination we experience with cartoons is an intimacy established between the cartoonist and viewers: we shared a moment…Just as scientists who contributed to their community and bonded by posting *The Far Side* cartoons on laboratory doors, the shared connection in shared viewpoints became more common, extending well into the public sphere. As readers saw more complex cartoons and themes emerging in narratives that could otherwise equal a feature length article, our experiences and opinions became more refined in this time period – in hearing and reading media about cloning and stem cell issues and lobbying actions of the vested interests and disease groupings. In Berger’s words, “the object of thought becomes progressively clearer with this accumulation of different perspectives on it” (10).

This is another reason why investigation matters – if we are to fully engage in everyday life, we need to be aware of, develop and be able to express thoughtful opinion and formulate intelligent criticism of not only the humanities, but what is considered reality of everyday life.

Period C: Unit Sample C2



ID491: BarstowDonna - January 1, 2009

At first glance, unit ID491 might seem to be coded as **Metamorphose**, yet the image word sense is much more complex and requires an understanding of social and political forces of the time. The cartoon shows a politically "conservative" cell, as in Republicans being the "Grand Old Party," and not funding research due to Bush's funding restrictions and personal beliefs. The cartoon was tagged as being published the first day of the C2 juncture, after the election and before January 20, 1999 when Democrat Barack Obama became President of the United States. But the cartoon also portrays a socially conservative "type" of cell, that if cells had free will – as do most humans – these cells (Barb and Jim-Bob) would have choices in where each replicates, an option that does not appear to exist for "mere" cells used for research (nor apparently by conservatives allowing women freedom to choose their own reproductive rights). The image word sense warrants coding under **Politics**, albeit a **Metamorphose** vehicle.

The "Jim-Bob" name choice is intriguing and an amusing study could compare names with political affiliations; my assumption is few Democrats are named "Jim-Bob," it being culturally associated as low demotic. Might there be a different impression if the cell was named "Mohammed" or "Nianzu"? Of course, that would warrant contextual and geographic interpretation. Another irony referring back to natural order here is the crucial point in stem cell

research that counteracts socially constructed control such as politics as *it is the cells that largely determine what they are to be*.

Coding is also complex as the far background shows a laboratory setting, the sign "FAQ Labs," a meaningful acronym for Frequently Asked Questions as there are many questions. I could code the subcategory as **Culture** relating to ethics, morality and/or theology, as this appears to be a query; what are these cells are doing here? If firmly so, the cartoonist might have used "human embryonic cells," instead of "cell" in the query and "stem cells" in the cutline. With personification though (in **Metamorphose**), viewers attribute human characteristics to Barb and Jim-Bob. The judicious use of "stem cell" appears purposeful then, a decision by the cartoonist to semantically question stem cell research and equate it with liberal politics (i.e. not Republican), what I believe to be the point (hence, image word sense) of the cartoon.

Discussion

Over the years that cloning and stem cells have been in the public realm, we see a noticeable increase in the sophistication of cartoon content. The results show us there were differences in sophistication in scientific, political and cultural aspects over the larger period of study with notable markers in the six junctures. While that progression might have been assumed by some, this issue was compounded by a complexity in that cloning's Dolly precipitated stem cells, which I believed remained with people as being more from speculative fiction than science. In addition, the cartoons showed media and political parallels that were not assumed, with some surprising correlations and findings. The results by period and juncture showed us:

Period A: In the emergence of the issue, we see immediate aspects of confusion and basic response with little complexity in cartoons that overwhelmingly express **Culture** concerns such as in media and speculative fiction realms also in **Metamorphose**. With only 1 cartoon exhibiting an image word sense of **Humanity**, it is clear that cartoonists are not fully aware of the issue as far as human health and translation of this to the public has not been communicated. With few logged under **Politics**, it is clear the issue is not understood as being in the realm of the power brokers nor are the ramifications of political control translated.

Period B: In this period, we see **Politics** rise to become equal to **Culture** which mirrors the time period's political realities and media comment with particular surges relating to the 2001 funding restrictions. While there were increases in **Metamorphose** and recognition of the potential effects on **Humanity**, these were small gains in representation: we see socially constructed codes being most often communicated.

Period C: In the final period, we see **Politics** now in the lead as **Culture** concerns lessen, indicating more understanding of the issues and that awareness by the audiences has kept pace. **Metamorphose** and **Humanity** cartoons drop, each by more than half the previous period. Stem cell and cloning largely fall off the public radar with the last cartoon appearing in August 2010 with no such cartoons from then until the end of the full period of study June 30, 2011.

These findings indicate there were significant changes in the content of cloning and stem cell cartoons since 1996. These changes reflect advances in sophistication in scientific, political and cultural content and cartoons can be used as communication aids in a scarcity of attention era. Further, it was determined that:

1. Finding ways to use data in the humanities may facilitate effective communication on scientific issues;

2. The research confirms Giarelli and Tulman, demonstrating increased receptivity to cartoon use and public understanding;
3. Analysis by others (Weber, Neuendorf, Raskin, Barthes) and the concept of image word sense determined that cartoon content could be situated into various realms, i.e. **Culture**, **Humanity**, **Politics** and **Metamorphose** concerns;
4. Cartoons can aid in increasing scientific communications and citizenship; and
5. There is a rationale for issue-based cartoons to be used as vehicles of effective communication, in a scarcity of attention era.

Limitations of the Study

Communications negotiates the exchange, supplying copy or file footage complete with the symbolic artifacts such as lab coats and test tubes. But the semantics could be questionable; there is no guarantee that packaged information is accurate, ethically acceptable, balanced and done without a vested interest. With commercial, fiduciary, legislative and proprietary interests, there is also no guarantee that what is transmitted is in the public interest. Or media seek out the story, scientist or breakthrough, devoting time to exhaustively research and develop a feature, intent on being fair and exposing the angles, conscious of semantics. And just like a newspaper or journal editorial, cartoonists are translating a point of view to make viewers think, not telling them how to think. These are complex situations that cartoonists translate, without having to turn stories into moral emblems. One looks at a cartoon, and in a few heartbeats its essence is captured and discerned, the story told and viewpoint communicated, the truth often ruthlessly apparent in a way that a more complex piece of communication cannot show.

Future Considerations

There are many more ways to refine and sort the data, which would be intriguing – by cartoonist including showing partisan communications, by a secondary code and so on. For example, identifying a sign/signifier of "media" within a cartoon could easily be applied as a code in looking more closely at each of the 517 units to determine how many units show media.

As noted in the *Period A: Unit Sample A2* juncture, in the example of one cartoonist dominating that juncture (22/48, all coded as **Culture**) with comics replicated many times, data collection could be refined with additional parameters (see *Appendix 4: Cartoon ID Notes*, Primary/Key ID column, 323 *et al* and 5: 13/10/1986). Additionally, in discovering this one example, to further aid data structure and interpretation linking additional qualitative reasoning, I would fully examine Prasad's and Valsiner's writings on research.

1. Given that a commonly accepted timeline of cloning and stem cell events is not in use, future study should cross reference data with media and political events to further refine this analysis.
2. The study was not meant to examine mindsets or opinion so a caveat must be addressed if this aspect is to be pursued. There are aspects that could be considered such as political viewpoint of the cartoonist and cartoon reach (audience), including products of the syndicate. An example here would be correlating media owned by Fox News Channel with its conservative editorial positions and its offerings.
3. To additionally make sense of data, I aim to apply Professor John Stasko's Jigsaw software (www.cc.gatech.edu/~stasko) for visualizing information using my data's CSV values. Associate Chair of the School of Interactive Computing at Georgia Institute of Technology, Stasko is also Director of its Information Interfaces Research Group. As data availability

"has skyrocketed over the past 10-20 years, largely fueled by the growth of the internet," the group looks at new ways to manage data. Many of the group's projects focus on the creation of information visualization tools and visual analytic tools to help people explore, analyze and understand large data sets and "sense-making activities on data sets such as large document collections."

4. In future studies, I would expect to examine philosophical relationships and interests, such as Gregory Bateson's (footnote 1) theory from his 1972 book *Steps to an Ecology of Mind* ("one cannot not communicate"). Similarly, Martin Heidegger's significant deliberations of what is revealed and concealed in aletheia and its association with truth would be applied in exploring a writer/cartoonists' intents.

Ramifications for Communications

As we see particularly in the data and deconstruction, the format of cartoons and their ability for semantic encapsulation is a benefit, particularly in this era when the humanities must find ways to increasingly use quantitative data to support programmatic communications, including establishing best practices in research to describe, understand, predict and control. By examining developments and communication trends, targeted messages can be enhanced – surely made less distant or frightening – such as in engaging people in stem cell clinical trials, promoting better science journalism and encouraging scientific citizenship. There are numerous examples logged of how cartoons can aid in communications and knowledge transfer (available from the author) and cartoons can be constructed to suit any topic. Whether a practitioner thinks visual

literacy concerns are marginal, it is clear from how we practice that cartoons can be of help in a way that a 3,000 word article cannot. “Reading in a purely textual sense was mugged on its way to the twenty-first century by the electronic and digital media, which influenced and changed how we read” (Eisner, xvi). “As we know, complex concepts become more easily digested when reduced to imagery” (Eisner, xvii). Whether intricate images in the field of visualizing information or in a single cartoon image, images aid communication and knowledge transfer.

Conclusion

This thesis utilized a quantitative content analysis and a notion of temporal junctures to investigate how the socially constructed nature of cartoons is distinctly influenced by their context. This study investigated changes in cloning and stem cell cartoons over the past 15 years that these issues have been in scientific, government, media and public discourse. Findings indicate that there has been a noticeable increase in the sophistication of the scientific, political and cultural content in cartoons; as a cultural good, as response and comment to events in society and as artistic commentators in a scarcity of attention era. The research in this study strongly indicated that political agendas, scientific concerns and advances and social debate were all increasingly reflected over the period of study with distinct shifts. As briefly noted in *Future Considerations*, this may represent an opportunity for further study on the phenomenon of communicating with cartoons with purposeful use.

That microscopic human cells could be grown, species merged and life forms profoundly altered at cellular levels indeed leads us all into a brave new world. Stem cell research is entrenched and evolving daily with synthetic life forms, the competition for the prestigious Nobel Prize and in the ever-present hope and often forgotten offering of better health. This matters legislatively to governments, to funding agencies, to society and it matters to interpretation in culture and through the arts, and regardless, "the possibility for change in medical practice will regularly give rise to conflicts concerning whether innovations can be conceived as legal or ethical." In such issues as cloning, stem cell research and animal-to-human transplantation, "the list will expand indefinitely, and the outcome of these discussions will largely determine the future of medical practice" (Kenny, 17/18), perhaps in procedures as yet unimagined. If society remains intent on managing nature, this topic is a watershed as from we see here how humanities theory and data use can inform science as to the richness of concerns and discourse, particularly giving weight to "the art and science of" reality.

Surely, through all these scientific and technological changes with what is assumed to be progress, we come back to the humanities to explain it, to art to reflect it and to communications to translate it to the various publics. We return to Huxley's *Brave New World* and George Orwell's *1984*, which envisages "Oldspeak" will have disappeared, replaced by a homogenous listless language, much as we have recently witnessed the changes in language paralleling the increasing use of text messages and a Twitter universe with truncated thoughts and emotion through emoticons, missing the richness of discourse.

Shakespeare, in *The Tempest* written circa 1612, asked, "Oh wonder, how many goodly creatures are there here, how beauteous mankind is, oh Brave New World that has such people

in it.' We know, of course, that Shakespeare was not referring to cloning or stem cell research when he penned those lines. But now, 400 years later and just decades away from Huxley's and Orwell's imaginings for the world, Shakespeare's goodly and beauteous creatures have indeed become much closer to a brave new world even the best writers could never have possibly imagined.

Appendices

Appendix 1: Definitions[75]

Adult Stem Cell (somatic, non-reproductive) – A relatively rare undifferentiated cell found in many organs and differentiated tissues with a limited capacity for both self renewal (in the laboratory) and differentiation. Such cells vary in their differentiation capacity, but it is usually limited to cell types in the organ of origin. This is an active area of investigation.

Stem Cells – Cells with the ability to divide for indefinite periods in culture and to give rise to specialized cells. Also, Stem cells have the remarkable potential to develop into many different cell types in the body during early life and growth. In addition, in many tissues they serve as a sort of internal repair system, dividing essentially without limit to replenish other cells as long as the person or animal is still alive. When a stem cell divides, each new cell has the potential either to remain a stem cell or become another type of cell with a more specialized function, such as a muscle cell, a red blood cell, or a brain cell. Stem cells are distinguished from other cell types by two important characteristics. First, they are unspecialized cells capable of renewing themselves through cell division, sometimes after long periods of inactivity. Second, under certain physiologic or experimental conditions, they can be induced to become tissue- or organ-specific cells with special functions. In some organs, such as the gut and bone marrow, stem cells regularly divide to repair and replace worn out or damaged tissues. In other organs, however, such as the pancreas and the heart, stem cells only divide under special conditions.

Cartoons: a form of art and communication largely single frame or single panel, often as editorial cartoons, comics and line drawing images that may or may not include textual content and/or captions, usually communicating humour or irony and/or unique point of view and commentary on issues of the times (McLeod, Eisner). Also "originally, and still, a full-size sketch or drawing used as a pattern for a tapestry, painting, mosaic, or other graphic art form, but also, since the early 1840s, a pictorial parody utilizing caricature, satire, and usually humour. Cartoons are used today primarily for conveying political commentary and editorial opinion in newspapers and for social comedy and visual wit in magazines (accessed September 23, 2010 at www.britannica.com/EBchecked/topic/97515/cartoon).

Chimera*:* an imaginary monster compounded of incongruous parts, an illusion or fabrication of the mind; an unrealizable dream, an individual, organ, or part consisting of tissues of diverse genetic constitution (Excerpt accessed September 23, 2010 at www.merriam-webster.com/dictionary/chimera).

Clone (cloning): (v) To generate identical copies of a region of a DNA molecule or to generate genetically identical copies of a cell, or organism; (n) The identical molecule, cell, or organism that results from the cloning process. In reference to DNA: To clone a gene, one finds the region where the gene resides on the DNA and copies that section of the DNA using laboratory techniques. In reference to cells grown in a tissue culture dish: a clone is a line of cells that is genetically identical to the originating cell. This cloned line is produced by cell division (mitosis) of the original cell. In reference to organisms: many natural clones are produced by plants and (mostly invertebrate) animals. The term clone may also be used to refer to an animal produced by somatic cell nuclear transfer (SCNT) or parthenogenesis.

[75] Except as referenced within definitions (Cartoons, Scarcity of Attention, Xenogenics), excerpted from the National Institutes of Health, accessed September 7, 2010 at http://stemcells.nih.gov/info/glossary.asp and http://stemcells.nih.gov/info/ basics/defaultpage.asp.

Embryonic stem cell line: Embryonic stem cells, which have been cultured under ***in vitro*** conditions that allow proliferation without differentiation for months to years.

Human Embryonic Stem Cell (hES, zygote): A type of pluripotent stem cells derived from early stage human embryos, up to and including the blastocyst stage, that are capable of dividing without differentiating for a prolonged period in culture, and are known to develop into cells and tissues of the three primary germ layers.

Induced pluripotent stem cell (iPSC): A type of pluripotent stem cell, similar to an embryonic stem cell, formed by the introduction of certain embryonic genes into a somatic cell. **Multipotent**: Having the ability to develop into more than one cell type of the body. **Pluripotent**: Having the ability to give rise to all of the various cell types of the body. Pluripotent cells cannot make extra-embryonic tissues such as the amnion, chorion, and other components of the placenta. Scientists demonstrate pluripotency by providing evidence of stable developmental potential, even after prolonged culture, to form derivatives of all three embryonic germ layers from the progeny of a single cell and to generate a teratoma after injection into an immunosuppressed mouse. **Totipotent**: Having the ability to give rise to all the cell types of the body plus all of the cell types that make up extraembryonic tissues such as the placenta.

Metamorphosis from Greek "transformation, transforming", (meta-), "change, morphe, form," the biological process by which an animal physically develops after birth/hatching, involving a conspicuous and relatively abrupt change in the animal's body structure through cell growth and differentiation. In mammals are imprecise and colloquial. (Morphogenesis: genesis/creation, literally, "beginning of the shape" is biological process that causes an organism to develop its shape)**.** See www.websters-online-dictionary.org/definitions/Metamorphosis.

Regenerative Medicine: A field of medicine devoted to treatments in which stem cells are induced to differentiate into the specific cell type required to repair damaged or destroyed cell populations or tissues.

Reproductive cloning: The process of using somatic cell nuclear transfer (SCNT) to produce a normal, full grown organism (e.g., animal) genetically identical to the organism (animal) that donated the somatic cell nucleus. In mammals, this would require implanting the resulting embryo in a uterus where it would undergo normal development to become a live independent being. The first mammal to be created by reproductive cloning was Dolly the sheep, born at the Roslin Institute in Scotland in 1996.

Scarcity of Attention: The state of having too much information to make a decision or remain informed about a topic, this and attention economics is an approach to the management of information that treats human attention as a scarce commodity by applying economic theory. Herbert A. Simon first noted this phenomenon circa 1955, referring to information systems incorrectly representing design or operational problems as an information scarcity rather than attention scarcity. He determined that systems were needed to filter out unimportant or irrelevant information, rather than providing more information. Simon's theory moved into the public realm, referred to as "information overload" (Simon, 1971, p 42) expanded by Alvin Toffler in his publically successful *Future Shock* and the subsequent term "information anxiety" also by Richard Saul Wurman.

Somatic (adult) stem cells: A relatively rare undifferentiated cell found in many organs and differentiated tissues with a limited capacity for both self renewal (in the laboratory) and differentiation. Such cells vary in their differentiation capacity, but it is usually limited to cell types in the organ of origin. This is an active area of investigation.

Xenogenics: derived from, originating in, or being a member of another species (accessed September 23, 2010 at www.merriam-webster.com/dictionary/xenogeneic?show=0&t=1285252685).

Appendix 2: Coding Sheet & Codebook

Coding Sheet

Each of the 517 units was coded in one of four primary categories or as an Outlier (see below), identified with a distinct ID Number (MS Access "primary key") and fully cited in the database; see *Appendix 3: Database Citation Notes*. The full database is available in PDF format request to the author. As to category codes, the following guidelines were used for *image word sense*:

- **Culture**

mass media and/or social marketing issue, media vehicle portrayal within the semantic unit (e.g. newspaper), science fiction, education, propaganda, cultural references (e.g. literature, films), uncontrolled science, scientific misstep, gender, exaggeration, potential escalation from fear to horror, theology/religion, ethics, morality[76], recognizable or inferred cultural artefacts, settings and discussions.

- **Humanity**

health benefits, reproductive technologies,[77] disease, aging and/or knowledge for individual and/or society health benefit(s), human vs. human, group benefit or harm, non-fact/unscientific religious-based persuasion and/or point of view, medical tourism (i.e. to access egg donation), corporations, commercial, associations and non-governmental organizations as vested interests conducting research, profiteering, scientific knowledge and/or the acquiring.

- **Politics**

politicization of science, political figures interpreting science for personal, party and/or political gain, government policy, legislation, political discourse, election promises, administration and/or funding or lack thereof.

- **Metamorphose**

to undergo or cause biological transformation through cell growth and change, to morph form, xenogenics, anthropomorphism and/or chimera (attribution of human characteristics to animals, animal characteristics to humans), biomorphism and/or personification (resembling a living form, organism or abstraction, object represented as having human characteristics), animals or humans with body parts of other species, cloned animals as food.

- **Outliers**

For graphic representations, since the number per juncture (from zero to four) and total (nine) was incidental, outliers are not charted except in *Figure 1: Number of Units (517) by Code*.

Codebook

Primary Category Coding

In examining cartoon samples ID491 and ID492, the primary image word sense in ID492might first appear to be **Metamorphose**: the image and words refer to the 2001 suspension of federal funding of research. Although the image is biomorphic and personification – we see an embryo speaking from a lectern as if a human with words as spoken text, outstretched arms, bared teeth and what appears to be sweat or spit flying off in outrage – I would code this **Politics**. Sample ID491 (seen in Interpretation, Period C: Unit

[76] Although ethics and/or morality could possibly log under Humanity, I believe these to be largely culturally defined much like theocracies and in the social construction of reality.

[77] A semantic clarification: although vested interests attempt to situate reproductive technologies as an individual health issue for political, funding and semantics, reproductive technology is logged as a societal issue.

Sample C2) is more complex, a politically "conservative" cell in the "Grand Old Party"[78] not funding research and socially conservative; if cells had free will, these (Barb and Jim-Bob) would have choices in replication, not an option for cells[79] in research. The image word sense then is **Politics** as selected in a vehicle of **Metamorphose**. Similarly ID212, at first glance this might appear to be **Politics**. However, since the former president had Alzheimer's disease, with no possibility of gain from stem cell research, the position portrayed using his wife is more personal and general in commenting on funding issues; hence this could be coded as **Humanity**. To assist coding, I refer back to the image word sense concept in each semantic unit and reiterate that every item within a cartoon is there for a reason. As well, as per Neuendorf (133), the research question and/or hypothesis is not prescribing this investigation, nor did I have a vested interest in the outcome. However, due to such complexities, choosing a category necessitates a coder having a larger view of stem cell and cloning issues and no variables are extraneous. The coder here must be aware of societal discourse and events in the interrelated areas of science, politics, culture and health. But a semantic unit is merely a cartoon; it is not an academic or clinical tome: a cartoon is usually seen when flipping through a newspaper and it is doubtful it receives thorough analysis, has a material use or a staying power past being tacked to an office corkboard.

Consideration of a Secondary Category Coding

While one could ascribe a subcategory to each cartoon, in experimentation, the amount of data and subsequent interpretation was excessive and I deemed secondary coding to take the work along another path which could be done using the same data and semantic units as a separate study. For explication purposes only then as to interpretation to determine secondary coding, ID491 and ID492 used above are coded in the primary category of **Politics**. For ID492, the subcategory could be **Metamorphose**, but coding using the image word sense would be **Humanity**. For cartoon ID491, this is more complex given the laboratory setting and possible ethics, morality and/or theology query (also because of the question mark). The subcategory could then be **Humanity** or the personification though **Metamorphose**.

Chronological Junctures

The date each cartoon is first cited by a syndicate was logged and sorted into three like five-year time periods, further charted into six chronological junctures: cartoon dates are not shown chronologically. This format allowed for historical explanation and interpretations, summarized below. Although junctures might obscure other patterns, this is consistent with reporting statistical information in increments, such as surveys asking ages (i.e. 40-44, 45-49, etc.). We then look at frequency, the number within the intervals (junctures) so a frequency table such as a histogram can show data units within each juncture value.

Period A

A1: July 1, 1996 to December 31, 1998
A2: January 1, 1999 to June 20, 2001

Period B

B1: July 1, 2001 to December 31, 2003
B2: January 1, 2004 to June 30, 2006

Period C

C1: July 1, 2006 to December 31, 2008
C2: Jan 1 2009 to June 30, 2011

[78] See *The Birth of the Grand Old Party: The Republicans' First Generation* published by University of Pennsylvania Press accessed September 23, 2010 at www.upenn.edu/pennpress/book/13765.html.
[79] Another irony identified previously; it is cells that largely determine what they will be, perhaps teratocarcinomas.

Appendix 3: Database Citation Notes

Although standard cartoon citing was considered, given the number of units and since part of my interest was in using data to aid research in the humanities, the following Microsoft Access 2007 database structure was developed for logging data collection. Numbers prefacing the comments denote the column header in the database. Cartoon images used in the text for explication purposes are identified, in order, illustrating such aspects as the date tagged by the publisher (1.), primary key ID (2.), cartoonist's name (5.) and syndicate code (6.).Cartoon images replicated in the text for explication purposes are reprinted with permission, all rights reserved[80] as detailed in *References: Cartoon Samples*, following.

1. "Published" date field or closest estimated to first publication and/or accepted date used as/identified by a syndicate as being available. All cartoons noted are within the study period from July 1, 1996 to June 30, 2011. (Cartoons on cloning appeared prior to the period of study, see *Appendix 5: Sample Cartoons prior to July 1, 1996 & Considered Cartoon Citation Formats*).

2. A unique "ID" number consecutive number is used for each cartoon was logged; being the only unique identifier. This ID column is the database's primary key, numbered 1 to 517.

3. A cartoon title is the "Tag(s)" field identified by the syndicate as being in the "stem cell" search term. Although tags might appear in a syndicate's offerings in all upper and/or lower case combinations, unless the tag includes a proper noun, lower case format is used in logging. When a tag has not been applied to a cartoon for identification (syndicates often use an ID number, not noted here), the caption or word content is used extending into the description field, such as with Cartoonist Group cartoons. Some cartoons tagged as such do not specifically have "stem cell" in the cartoon or caption can be identified as relating and therefore have been included, e.g. ID59, shows George W. Bush as a doctor advising a patient to take a drug and pray to cure Parkinson's. Since this cartoon includes particular and multiple elements (such as Bush, faith, disease), it is clear this image word sense relates to stem cells. Conversely, when a stem "cell" tag was applied, but the cartoon did not include any "stem cell" image word sense, these were not included: although these might follow a media issue, there is little context to flag the cartoon unless historical linkages would be explained (e.g. in an image showing political opposition at www.politicalcartoons.com/cartoon/7f841794-4dc7-4034-a89e-a39714a61ad8.html), no mention of stem cells or cloning within the image of an elephant (Republican logo) and a Kicking Donkey (Democrat logo), the elephant with Rush Limbaugh figurine, the donkey with a John Kerry figurine). Cartoons tagged as "cloning" and/or "stem cell" by a syndicate were included when the image shows the term in a broader issue, as tenuous and/or gratuitous a relation. These latter images initially were not included in the database because of the lack of particulars or multiples: I initially felt the image word sense did not fully allow for a stem cell interpretation. However, upon review, this type of use does show public adoption of the word and/or term – for whatever reasons of the cartoonist and syndicate, and therefore were added. Although stem cells are the central issue, conducting a search by both terms was considered necessary. The term "stem cell"

[80] Universal Uclick (UU) Educational Use: "There is no need to request permission if you wish to use a cartoon for educational or classroom usage. Classroom use refers to public and private schools, home schooling, dissertations, thesis papers and other restricted college usage only." (Universal Press defaults to Universal Uclick, AMU access at www.amureprints.com is part of UU.) www.universaluclick.com/licensing_permissions/educational_use.However, to confirm use, permission was requested and received for up to seven cartoons from the Permissions Coordinator November 28, 2011.

emerged in the public realm later than emerging research and was not as shocking. Cloning emerged prior to stem cells, accounting for comedic potential as well as public confusion. There is likely still confusion in the public as to how "cloning" matched or did not match "stem cells." (The correctness or quality of cartoons is generally not examined, except for some illustrative purposes as to content and image word sense.) Given cloning emerged first onto the public and media radar, forming a part of what was communicated in the early years on a new public issue. This relates to a point of interest in the thesis' introduction, being the issues' timeframes and subsequently the junctures, examined in data. Cartoons appearing in the syndicates as being tagged as "cloning" were therefore included, duplicates removed if tagged also as "stem cell" by the syndicate. Cartoons tagged as "cloning" and/or "stem cell" that did not relate due to vagueness (e.g. just "science") were not included (i.e. an image showing "science" crawling out of a prison, following other issues that escaped since the George W. Bush years ended, at www.politicalcartoons.com/cartoon/3bcb9d04-acf6-4bb0-b507-e3e95c8d48bb.html). It bears noting there was no distinction made among images labelled as cartoons, comics, comic series and/or editorial cartoons: while historically there was, the printing of these is often dependant on a publication's format, i.e. editorial cartoons are largely single panel while cartoons and comics appearing in a comics section a mix, the strip format stacked for design and layout when many are in the same format, especially if received daily from a syndicate. Each such image, whether a single frame or panel is included, logged here as a "cartoon."

4. In similar format to the tag above, this "Description" field differentiated from common and/or potential duplicate tags. I entered a descriptor for each unit (not necessarily by image word sense) either in an extension of the tag/content in words or dialogue and/or signs included.

5. Identified as "Cartoonist" by LastnameFirstname and/or initials. Where a cartoonist is identified with a last name only by the syndicate and/or by the artist on the cartoon (i.e. Keefe), to ensure accuracy the cartoonist's full name was sourced (i.e., KeefeMike). While all items were sourced, attributed and reviewed with the best intent as to accuracy, it must be noted that as data was logged from other sources there may be discrepancy with the syndicate that currently holds permission to license a work and/or dates and tags. In most cases, copyright is maintained by the cartoonist and besides attribution, their names are logged also as being the final repository as to accuracy for any queries, including ID492 (of an embryo speaking from a podium with an illegible cartoonist's signature) that was not deciphered and where the syndicate did not clarify.

6. The "S" field identifies the syndicate licensing and distributing cartoons where I found access. The syndicates sourced are generally larger and/or merged entities representing numerous cartoonists, e.g., Universal Uclick is Universal Press Syndicate, gocomics.com, Atlantic Syndication, Universal New Media, Andrews McMeel Universal and as of 2011 became syndication manager for United Feature Syndicate, which earlier rolled in comics.com and the Newspaper Enterprise Association (www.universaluclick.com/about). While web-based businesses provide international access to cartoons and the UK-firm Cartoon Stock offers fitting cartoons, this study is based on cartoons that were available for syndication to newspapers in North America during the period of study; a US syndicate can represent international cartoonists (e.g. ID29, Vince O'Farrell from Australia). Otherwise, more cartoons could be sourced, however, as I approached 500 units, I felt the number seemed sufficient for a database and results. In Canada, The Simon Fraser University Library Editorial Cartoons Collection and Images Canada hold few (library collection models). Comics and cartoons archived at Torstar Syndication Services are at www.tsscontent.ca/comics/content__1/print_content and www.dailyink.com, a subscription-based service of King Features, distributed by Universal Uclick.

Given the relative newness of the Internet at the start of this research period (1996) not all syndicates log stock from then e.g. Daryl Cage's Political Cartoons are from January 1, 2000. It was considered if this syndicate's inclusion would skew data or interpretation: it was determined it would not given attrition, new cartoonists and that cartoonists may signed previously with another syndicate (as some were). Cartoon duplicates appearing on the same or competing syndicates were counted once, as were cartoons appearing in colour and black & white formats, e.g., on Universal Uclick, 79 of 88 of cartoons tagged as "stem" AND "cell" were distinct, on Daryl Cagle's Political Cartoons, 73 of 105 cartoons tagged as "stem cell" were distinct. While some such as Creators Syndicate and Tribune Media Services licenses cartoons, non-subscriber access to databases is not allowed by a search term (confirmed July 3, 2011 by personal correspondence). These syndicates, respectively www.creators.com and www.tmsfeatures.com/offerings/us-catalog identify offerings as Conservative, Independent or Liberal, the latter also identifying editorial cartoonists to provide such orientation. Universal Uclick offers political positioning under Left, Middle and Right and at go.comics.com; On the Left, On the Right, In the Middle. A subscribing newspaper can select a partisan cartoon suitable to their ownership, operation and *ergo*, readership; a topic suitable for a media studies paper. At Creators Syndicate, it is possible to search by a cartoonist but not key words of clone/cloning stem cells – a search for "health" and "medical" and "research" lists a few books by cartoonists and articles for purchase: this made the site onerous, if not impossible to use, although, e.g., ID492 was found to be in the period.

Syndicate	Website	"S" identifier
Cartoonist Group	www.cartoonistgroup.com	CG
Daryl Cagle's Political Cartoonists	www.cagle.com	DC
Universal Uclick group	www.universaluclick.com	UU
Simon Fraser	http://edocs.lib.sfu.ca	SF
Images Canada (ID487)	www.imagescanada.ca	IC
The Cartoon Bank	www.condenaststore.com/-se/cartoonbank.htm?AID=90277641	CB

7. Coding is logged (see *Appendix 2: Coding Sheet & Codebook*) for primary categories according to image word sense, being C=**Culture**; H=**Humanity**; P=**Politics**; M=**Metamorphose** and O=**Outliers**.

8. A cartoon's URL. Also noted on some cartoons by the URL: *(database). While all images exist on an electronic file and have been accurately cited in the database as to source, some cartoons were sourced prior to restrictions (Universal Uclick access restrictions by mid-2011) from mergers and acquisitions which can provide increased opportunities for dissemination with a bigger reach and larger clientele. Access to content and archives is by subscription fee for media and news organizations. Smaller syndicate and cartoonist organizations provide alternatives to large syndicate(s). Additionally, for cartoons such as Bizarro by Dan Piraro, accessing these are generally restricted through his personal website. All listings are as accurate as possible and were consistently checked and cross-checked: with advance apologies for any errors.

9. "Accessed" field is the date a cartoon was most recently accessed by the author.

Appendix 4: Cartoon ID Notes

Primary Key/ID	Published	NOTES
12 75 168	24/06/2007 03/01/2003 22/03/2002	Cartoons often used similar creative themes such as these three using a baby and bathwater concept. Although these use the same idea, using the image word sense to code, one is under Politics and two under Humanity.
47 60 73 212	27/02/2006 O1/06/2005 08/06/2004 10/06/2004	Again, using image word sense, although both cartoons show science being burned at the stake, one is coded Culture, one is coded Politics. Similarly, citing then US President Ronald Reagan 1987 speech in Berlin "Mr. Gorbachev, tear down this wall!" (addressing Mikhail Gorbachev, leader of Soviet Union), this event was the theme for two cartoonists, using Nancy Reagan.
85 86	26/08/2004 10/07/2001	Numerous cartoonists do series and/or sign their names; i.e. like series cartoons (85) Boondocks and (86) Doonesbury, all cartoons are logged by the cartoonists.
91	25/07/2001	An example of a possible coding under Humanity, yet given the date, it referred to the juncture's political peak in funding and research restrictions.
102 227	18/08/2004 29/11/2004	Series: LaCucaracha 143-145, also draws as Lalo. This is an excellent example of a viewer having to be aware of larger societal issues; also cartoon as it also depicts the sale of pharmaceuticals/drugs to the US from Canada, a rancorous issue in the US that some (including Canadians) might not be aware of.
301 460	30/12/2002 31/12/2003	As above (12, 15 etc.) for various reasons, cartoons can portray similar ideas and execution by different cartoonists as in these units. While these could be coded as outliers or perhaps Metamorphose if yearend/new year babies were "representations" or "objects," the 2002/2003 period does not seem to be a known period of *annus horribilis, ergo,* coded Culture for value in social construction in repeating the year.
316	02/07/2009	Cartoonist is "McCoryG" with no distinction of which, the series being Flying McCoys by McCoryGlenn and McCoryGary. Coded as an Outlier it wasn't deemed necessary to determine which. Other McCory cartoons are logged appropriately as McCoryGlenn.
323 324 325 437-451 354 355 356 357	(23/03/1991) 14/04/2001 26/03/2011 (12/10/1986 25/11/1991) 04/11/1996 16/10/2006 17/12/2001 (15/01/1990) 07/02/2000 (02/01/1990) 24/02/2000 04/02/2010	Series: Calvin & Hobbes. 1991 being prior to the study. Cartoons note "clone" yet tagged as "1986" when it was not related to health issues/in public discourse: 1996 is the representative date logged to respect the syndicate's tagging (as others) and alignment with issues that later became public and connected to the concept. This practice seems slightly disingenuous and lazy, since not original dates; the series was revived, perhaps due to cloning becoming public hence reprint fees for the cartoonist and syndicate. The 2001 date was logged since image word sense allows connection to the issue in the period of study. In all cartoons where animals are used as characters, image word sense does not necessarily produce a code of Metamorphose. Multiple releases are done perhaps in hopes viewers have short memories and "scarcity of attention," new readers are captured and/or to align with a media/public event. As noted in *Appendix 5*, this cartoonist's image logged as 13/10/1986 is not included. Dates for 437; similar with 438-451/ 449-451 shows three release dates. The 2000 date was grudgingly logged since the image word sense shows issue connection in that period. All this cartoonist's images fell under Period C: C2 with 22 of 48 in that juncture, possibly skewing it, which could be refined by limiting the study. See *Future Considerations*. Dates for 354 noted, similar with 355-357. As above, the 2000 date was logged since the image word sense allows connection in that period. Although regular readers might follow threads, one in this series period was not included because the image word sense was not strong enough to stand alone.
341	08/01/2003	"Raeleon" likely means Raelian (spelled correctly in other cartoons) perhaps due to due diligence and legal concerns or inconsistent fact-checking. As written by Robert Mankoff, cartoon editor for *The New Yorker* magazine, in his blog From the Desk of Bob Mankoff," dated February 1, 2012, entitled Cartoon Fact-Checking, "*The New Yorker* is known for its rigorous fact-checking. Every quote, every detail, every attribution,

		everything is checked for accuracy. What's less well known is that this process extends to the cartoons." Mankoff included seven cartoons, pointing out facts that were corrected. www.newyorker.com/online/blogs/cartoonists/2012/02/the-new-yorker-is-known-1.html (Accessed February 12, 2012). An interesting footnote is that fact checks did not "get in the way" of the last cartoon blogged, which Mankoff notes as "iconic," (Thurber) showing a fencing dual with a man's head being slashed off, that as "Touché" is said by the opponent to acknowledge a hit, the man beheaded should be saying it, the implication being he can't speak as his head was been sliced off a nanosecond earlier. Speaking might be possible after immediate decapitation – see Hillman, Harold. "An unnatural way to die." *New Scientist*. October 27, 1983. 276-278.
342, 406 426 to 428		Cartoonist Basset as prior to February 23, 2009 announcement former Big Top cartoonist Rob Harrell Adam@Home. http://dailycartoonist.com/index.php/2009/02/23/rob-harrell-to-work-on-adamhome
374	11/08/1997	Series: NonSequitor by MillerWiley, with the cartoonist for this date a guest cartoonist.
382 to 387, 389, 391 to 397		Series: OfftheMark licensed/distributed through UU, catalogue of cartoons with cartoonist. Numbers 382-392 show one URL, 393-398 show a different URL.ID398 was confirmed in correspondence dated 1991, noting severe restrictions with no educational use.
407	27/05/2002	Series: Baldo by Carlos Castellanos and Hector Cantu.
424	26/11/2003	Series: Real Life Adventure by Lance Aldrich and Gary Wise.
478-482	01/03/2003	Series: As others, although 482 does not note the word "clone" it is included because of the image word sense.
485	10/07/2002	Although the cartoon relates to the subject it is not tagged as such by Simon Fraser University (SFU).
486	N/D 1997	While SFU notes "no date" the cartoon is dated 1997. For the purposes of the database, and since it relates to Dolly/cloning, a date of 30/04/1997 has been arbitrarily applied to fall within the time period of the public announcement of Dolly in February 1997.
487	27/08/2002	Cartoon included date of "2001" within, no date assigned to release. "Updated" date logged as at www.imagescanada.ca/009005-118-e.php?&image_id_nbr=32041&& PHPSESSID= nu9k3rfb4nrcs1bjvdfhrt6v33.

Appendix 5: Sample Cartoons Prior to Study & Citation Formats

Sample Cartoons prior to July 1, 1996

Published	Tag/description	Cartoonist	Syndicate	Accessed
22/09/1989	May it please the court my client	OliphantPat	UU	08/07/2011

04/01/1991 The twins are just so cute/machine ParisiMark UU 09/07/2011
www.offthemark.com/searchresults.php?topic=none&keywords=cloning&resultsfrom=11&browseall=false
18/01/1996 Why don't you keep one little box GuisewiteCathy UU 09/07/2011
www.amureprints.com/Detail.asp?ImageID=3782
13/10/1986 Tomorrow we're going to discuss WattersonBill UU 09/07/2011
www.amureprints.com/Detail.asp?ImageID=17364 (with five additional "release dates", 1991, 1996, 2001, 2011)
16/02/1996 You lived your whole life preparing GuisewiteCathy UU 09/07/2011
www.amureprints.com/Detail.asp?ImageID=3807
12/03/1996 Joan- listen to this one! Dolly Parton EliotJan UU 09/07/2011
www.amureprints.com/Detail.asp?ImageID=66346

Citation Formats (considered)

From Chicago Manual of Style, 16th ed.
"A brief statement of the source of an illustration, known as a credit line, is usually appropriate and sometimes mandatory." Cartoon by John Leech. "Punch's Almanac for 1855," Punch 28 [1855]: 8. Photo courtesy of the Newberry Library, Chicago.

3.28 Sources and permissions, 3.29 Placement of credit lines
3.30 Crediting author as source of illustration, 3.31 Crediting material that requires permission
3.32 Crediting commissioned material, 3.33 Crediting material obtained free of charge
3.34 Crediting material in the public domain, 3.35 Crediting agency material

Comic Art in Scholarly Writing A Citation Guide: "The Comic Art and Comics area of the Popular Culture Association, having recognized and wrestled with these concerns for several years, has established the following criteria for citing comic art." www.comicsresearch.org/CAC/cite.html (Accessed July 4, 2010). "III. Editorial Cartoons: Example 15 – Editorial cartoons should be cited with the writer/artist's name, then the running title, if there is such (e.g., Borgman's World), underlined. Following as the title is the caption, or enough word balloon information for proper identification. Newspaper title, location, date and page complete the citation. If, to better identify a cartoon, the scholar supplies a caption, it should be bracketed. Cartoons and illustrations included in newspapers, magazines or other periodicals often represent the historical perspectives and opinions of the time of publication."

Reference style of SFU Library Editorial Cartoon Collection
Harrop, Graham. "Quite frankly, it's not much fun having a lion's head, a goat's body and a serpent's tail." *The Globe and Mail*. January 4, 2003. http://edocs.lib.sfu.ca/cgi-bin/Cartoons?CartoonID=3665. Accessed from the SFU Library Editorial Cartoon Collection June 11, 2010.

References: Cartoons

The total number of cartoons accessed and logged in the database was 517 samples: all cross-referenced to the images with every attempt made to source and attribute accurately. All images are copyright protected and the copyright owner reserves all rights. As such, permissions were received for use with syndicates confirming educational use permission. With US Copyright Law and Fair Use "to promote science and the useful arts," these purposes are supported (www-sul.stanford.edu/cpyright.html).Permissions were received for all cartoons reprinted herein, with appreciation to:

Barstow, Donna. January 1, 2009. All Rights Reserved by Donna Barstow© 2012 of OpEdCartoons. donnabarstow@gmail.com. Reprinted with permission by personal correspondence (April 2, 2012). Logged in the database as ID491.

Eliot, Jan. April 9, 2000. Reprinted with permission of Raegan Carmona, Permissions Coordinator, Universal Uclick (November 28, 2011). Logged in the database as ID400.

Guisewite, Cathy. April 27, 1997. Reprinted with permission of Raegan Carmona, Permissions Coordinator, Universal Uclick (November 28, 2011). Logged in the database as ID331.

Mankoff, Robert. September 3, 2001. *The New Yorker.* Cartoon Bank. Reprinted with permission by personal query (March 13) and correspondence (March 27, 2012). Logged in the database as ID510.

Miller, Wiley. September 10, 2001. Reprinted with permission of Raegan Carmona, Permissions Coordinator, Universal Uclick (November 28, 2011). Logged in the database as ID147.

Oliphant Pat, 1989. Reprinted with permission of Raegan Carmona, Permissions Coordinator, Universal Uclick (November 28, 2011). Logged in *Appendix 5: Sample Cartoons prior to July 1, 1996 & Considered Cartoon Citation Formats.*

Piraro, Dan. September 21, 2007. This image is copyright protected. The copyright owner reserves all rights. Reprinted with permission by personal correspondence (April 2, 2012). www.bizarro.com. Logged in the database as ID410.

Powell, Dwane. May 25, 2005. Reprinted with permission of Sara Thaves, Cartoonists Group. Personal Correspondence (April 2, 2012). Logged in the database as ID181.

Sargent, Ben. February 26, 1997. Reprinted with permission of Raegan Carmona, Permissions Coordinator, Universal Uclick (November 28, 2011). Logged in the database as ID339.

Toles, Tom. April 21, 2002. Reprinted with permission of Raegan Carmona, Permissions Coordinator, Universal Uclick (November 28, 2011). Logged in the database as ID405.

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