Images of Cloning and Stem Cell Research in Editorial Cartoons in the United States

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Through semiotic analysis of manifest and latent meanings in editorial cartoons, the author uncovers how cloning and stem cell research are represented in a popular mass medium. She identified 86 editorial cartoons published in the United States between 2001 and 2004 that referred to cloning and 20 that referred to stem cell research. Cartoonists portrayed people individually 224 times and 4 times in groups of more than 10. Men were portrayed in 64% of cartoons. Stem cell research was depicted as having a potential positive value, and cloning was depicted negatively. Some major messages are that cloning will lead to the mass production of evil, cloning creates monsters, and politics will influence who or what will be cloned. Analyzing popular images can allow access to public understanding about genetic technology and evaluation of public beliefs, preconceptions, and expectations as the public is educated on the use and value of services.

Keywords: *human and nonhuman cloning; stem cell research; mass media; cartoon; semiotics*

> The future of human therapeutic cloning in this country—the laws governing it, the knowledge to be gained from it, the ethical costs of doing it and the medicines it might eventually bestow—may hinge on how society views that question.
>
> —Stephen S. Hall (2004, p. F1)

The cloning of Dolly the sheep in 1997 (Wilmut, Schnieke, & McWhir, 1997) led to a crescendo of controversy on the use and value of one of several genetic technologies. When the governor of the state of California announced an initiative to invest U.S.$3 billion in stem cell research over the next decade, debate was rejuvenated on the use and value of stem cell research and its related science of cloning (Safire, 2004). Human and nonhuman cloning, and reproductive or therapeutic and adult or embryonic stem cell research are under critical review, although they hold great promise to contribute to our understanding of human biology. At the core of the formidable controversy lies the extreme difference in opinion on the meaning of being human and how cloning and stem cell research serves the good or evil of scientific endeavors.

There are two levels of debate on cloning and stem cell research: professional and popular. Debate in the professional arena is led by ethicists, scientists, and politicians (U.S. President's Council on Bioethics, 2004; Rothstein, 2004), who are the principal spokespeople in the community of policy makers. The other, less

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conspicuous, exchange of ideas is within popular culture. Images in mass media convey messages about the nature of the controversy in popular debate.

My purpose in this article is to describe how cloning and stem cell research are represented in the popular mass medium of editorial cartoons in the United States and to reveal some of the commonly held beliefs about cloning and stem cell research. This will be accomplished through the analysis of manifest (denotation) and latent (connotation) meanings found in editorial cartoons published in the United States from 2001 to 2004. The specific questions are how do editorial cartoons, published from 2001 to 2004, portray the social characteristics of gender, culture, and the social role of the users of the science, and how do cartoons present the consequences and value of cloning and stem cell research?

INTRODUCTION

Images and reports in mass media coincide with efforts to engage the public in the discourse on the use and value of genetic technology. Public understanding of science is mediated by life experiences (e.g., choosing to read editorial cartoons), as they condition a layperson's interest in and ability to understand technical information. Krippendorff (2002) asserted that contemporary society operates and understands itself through its texts. Symbolic representations in cartoons, as image text, might stand in as proxy for a kind of public opinion. Public discourse on biotechnology includes background information that precedes spoken opinions. These preconceptions, based on prior experience, are important to consider. Nonverbal manifestations of beliefs and expectations might hold the key to formulating persuasive health care communications to the public. Analysis of image texts allows inferences to be made about how the public thinks about and values the use of genetic technology such as cloning and stem cell harvesting.

BACKGROUND

Public acceptance of genetic science and technology is a prerequisite for the realization of its potential value. However, using genetic technology for health promotion and cure is a concept that is new to a public that struggles to understand the link between genes and disease. Ethical and legal questions about privacy and confidentially, discrimination, cost of services, and accuracy of testing continue to be the subjects of professional and public concern. These issues appear in mass media from time to time as interpreted by reporters, editors, and cartoonists. The messages delivered through mass media have not been described and are not well understood; consequently, the role and impact of these messages on public behaviors are unknown. There is, however, evidence that the creation of negative imagery related to biotechnology can affect public opinion. A 1999 survey of public perception of biotechnology in European nations found that menacing food images sensitized constituencies to potential dangers inherent in certain biotechnologies and, in turn, modified opinions (Gasgell, Allum, et al., 2000; Gaskell, Bauer, Durant, & Allum, 1999). Images found in cartoons published in the United States might also sensitize American constituencies. Advocates of the use of genetic technology for public

good can begin to understand how opinions are modified or can be modified once the message and the potential social impact of image text is known. Genetic science and technology, as applied to health care, is of special significance to the public.

THEORETICAL ASSUMPTIONS

Bruner, Goodnow, and Austin (1999) explored how people acquire information necessary for isolating and learning a concept, how they retain the information so that it can be useful later, and how they transform it so that it can be useful during new encounters with similar concepts. Concept attainment is a kind of decision making that relies on a pattern of choices in the acquisition, retention, and use of information that serves to meet certain objectives. Efficient learning of a new concept involves a minimum number of encounters with relevant instances to minimize cognitive strain (p. 102). Cognitive strain can be defined as the effort required for learning. To minimize cognitive strain, a learner refers to information previously acquired and retained. Thus, concept attainment (learning) is helped or impeded by what one already knows.

According to Bruner and colleagues (1999), attribute predilection is the cognitive process of choosing in advance the meaning of an idea to minimize cognitive strain and facilitate transformation. Attribute predilection influences a person's ability to acquire, retain, and transform information necessary to learn a new concept.

The use of genetic technology to promote health is a new concept in health care. Consumers must acquire accurate information about the technology to know its benefits, retain relevant and essential information about its benefit, and transform this information so that it can be personally useful. If the cognitive task is to accept that embryonic stem cell research, for example, can provide information to benefit humankind, then one's idea, beliefs, and expectations must be favorable to reduce cognitive strain. If a person's attribute predilection is unfavorable toward stem cell research, then cognitive strain will be greater. Unfavorable attribute predilections might impede concept attainment and reduce the likelihood of using a potentially beneficial intervention.

The representations in cartoons of the kind, consequences, and overall value of genetic technology might be proxies for the attribute predilections held by the public. The extent of unfavorable imagery and the degrees of negative value assigned to representations might increase cognitive strain and impede concept attainment. These theoretical assumptions will be the vehicle for discussing the association between the latent and manifest meaning in editorial cartoons and public acceptance of cloning and stem cell research.

LITERATURE REVIEW

The literature provides evidence that published cartoons reflect ideas held in common by the public and that they are a valid source of data on how the public understands science through metaphors and images found in mass media.

Using Published Cartoons as Data

Humor is a part of daily life that is considered to be a legitimate area of inquiry (Goldstein & McGhee, 1972), and cartoon humor is one channel for the communication of ideas about genetic science, technology, and their consequences. Mulkay (1988) asserted that humor is derived from and dependent for its meaning on the established pattern of serious political discourse. It is an inverted image of the serious world. It rises as a response to the difficulties that inevitably occur in the course of "socially coordinated production of the serious domain" (p. 197). Cartoons have claims to truth, as do other forms of art that attempt to represent and reflect reality and supplement the news presentations with statements of "meaning" (Streicher, 1967). Cartoons develop a subtle semiotic structure to generate a particular meaning that is humorous. The by-product is to gain support for an argument or point of view. Because cartoons are a printed record of American history, they reflect cultural attitudes and values, and record and perpetuate many commonly held beliefs (Berger, 1993).

In single-panel editorial cartoons, the appeal of humor depends on common knowledge or the reader's prior knowledge of the subject areas at the time of the cartoon. Cartoons are accessible to a large diverse audience because the views, actions, and even physical appearance of figures are already widely known. The prior knowledge is part of a broader social scenario selected by the cartoonist and rearranged to form the script for the humorous text (Raskin, 1985). Cartoons rely on current personalities and or events and some common understanding of issues for their content (Berger, 1993). Douglas (1975) proposed that a social structure can be organized in the form of a joke or visually as a cartoon. Thus, the examination of the joke can reveal common assumptions, dominant public values, and general public expectations.

Social Science Research Using Cartoons

Social science research has long established the utility of analyzing cartoon images to infer public belief and attitudes (Brabant & Mooney, 1999; Kasen, 1980), gender issues (Brabant, 1976; Mooney & Brabant, 1990; Orbuch & Custer, 1995), social trends (LaRossa, Jaret, Gadgil, & Wynn,, 2000), and cultural patterns (Brabant & Mooney, 1999; Chavez, 1985). Issues related to health care have been explored, including age and aging (Polivka, 1988), and safety behaviors (Potts, Runyan, Zerger, & Marchetti, 1996). Cartoon humor can be used as a tool to change social attitudes (Shultz & Germeroth, 1998). Condit and Williams (1999) interviewed 137 undergraduate students enrolled in a communications course about their understanding of genetics and concluded that the public might share a sophisticated understanding of the social role of genetics technology and bring an interpretation and counterinterpretation despite the message in written text. The authors stated that the sample was chosen on the assumption that college students were likely to be high users of medical genetic technology and have an above average impact on social policy. Although Condit and Williams demonstrated that the public is not ignorant, the study did not provide an analysis of latent messages in the mass media such as image text.

The method of delivery of a message is an important determinant of consumer acceptance of an idea. Frewer, Howard, Hedderley, and Shepherd (1999) explored

the impact of persuasive and nonpersuasive information on acceptance of genetic engineering of food substances as portrayed in advertisements in the local press in the United Kingdom. The study showed that source and force of argument were correlated with acceptance of the message. Negative thoughts about the technology were found with nonpersuasive information from consumer organizations and with highly persuasive information from government organizations. Studies of the public understanding of biomedicine have highlighted how images from popular culture might be part of social discourse (Richards, Hallowell, Green, Murton, & Statham, 1995).

The creation of the acceptance of the genetic science of cloning as fact might be as much a function of public debate as is the reporting of scientific research. A study of public perspectives on human cloning reported that research participants' concerns about the social implications of this science were often described in the context of popular imagery, and scientific coverage had a lesser impact on views (The Wellcome Trust, 1984). Neresini (2000) analyzed 95 articles published in two widely read Italian newspapers between February 22 and March 10, 1997. Over a relatively short time, media discussion of a wide range of subjects and the presentation of contrasting opinions concluded with the public acceptance of the cloned sheep Dolly as a scientific fact or state-of-the-world and therefore was a public reality. Neresini asserted that the acceptance of the idea of Dolly was facilitated by public discussion of the scientific achievement.

Opinion Polls and Surveys

Between 1987 and the 2004, more than 20 public opinion polls conducted in the United States by the U.S. Office of Technology Assessment (OTA), *Time Magazine*/CNN, U.S. Department of Agriculture, and others (Davison, Barns, & Schibeci, 1997; Hallman, 1995; Hoban & Kendall, 1992; OTA, 1987) have measured a number of concerns. Between 1987 and 1993, the level of public acceptance of biotechnology was high and correlated with understanding of developing technologies. In the 1987 survey conducted by the OTA, two thirds of American adults (N = 1,273) believed that genetic engineering would improve life for all people. In 2000, Priest (2000) recorded moderate declines in U.S. support for biotechnology and reported that opposition is on the rise. There has been a slight but steady erosion of public support for biotechnology in general from 49% in 1985 to 40% in 2001 (Program on International Policy Attitudes, 2003). This survey did not differentiate among biotechnologies but merely asked people to project whether biotechnology would provide benefits for them and their families over a 5-year period.

In summary, popular images of genetics have been explored in a wide-ranging historical context (Condit, 1999; Nelkin & Lindee, 1995; Van Dijck, 1998). The Neresini (2000) study suggests the need to study alternative means of public receipt of messages on scientific advances. The Frewer et al. study (1999) suggested that a nonpersuasive form of communication might be associated with negative attitudes about genetic technology, and the public opinion polls suggest waning public support for biotechnology in general. Moreover, the Frewer et al., Neresini, and The Wellcome Trust (1998) studies described and elaborated on lay views of genetics as held by publics outside of the United States. However, these findings are culturally bound and might not match the views or reflect common ideas held by U.S.

residents. There are no studies that specifically analyze cartoon images of genetic technology in general, or cloning and stem cell research in particular. Because cartoons are a way of constructing and shaping public discourse, they should be critically scrutinized as a way of studying ideas held in common by the public.

METHOD

In this descriptive study, I analyzed the manifest and latent content of editorial cartoons and answer the fundamental question of how cloning and stem cell research are represented in the popular mass medium of editorial cartoons. Semiotics was used for the visual analyses.

Sample

The sample comprises single-panel editorial cartoons published in 51 syndicated newspapers in the United States between 2001 to 2004 with references to cloning or stem cell research. The time frame coincides with the interval from the announcement of the near-complete mapping of the human genome through contemporary debate on stem cell cloning. Cartoons on the topics of interest were a small percentage of all published cartoons from 2001 to 2004 and typically appeared in bursts as a consequence of a media report of scientific advancement; therefore, an attempt was made to collect all cartoons on the subject.

There were 106 editorial cartoons that appeared in national publications (48%), in local or regional publications (40%), and on six World Wide Web sites (12%). The cartoons were distributed among 27 states, and there was comparable regional distribution. The majority of cartoons appeared in the years 2001 (30%) and 2002 (47%). Cartoons from 2003 and 2004 were 11% and 12%, respectively. Eighty-six cartoons referred to cloning (human and nonhuman), and 20 cartoons referred to stem cell research (Table 1).

Identification and Collection of Cartoons

Cartoons that appeared in nationally syndicated newspapers were accessed from the daily broadsheets and at Web sites. The syndicated newspapers were selected because they reach a large and diverse readership throughout the country. When a newspaper is syndicated, some content, such as editorial cartoons, is printed in innumerable newspapers nationwide and reaches hundreds of thousands of readers. Cartoons deemed appropriate for syndication are considered to be more appealing and marketable, and as such are more likely to have been chosen because they align with popular public attitudes or beliefs.

Instrument

I developed a coding instrument named the Genetic Technology Content Analysis Tool, consisting of seven coding variables, for this study. These variables were evaluated and refined for readability, clarity, and usability by a seven-member panel composed of two nurses, two students of communication, an English teacher, a

TABLE 1: Sources of Data

State	*Distribution*	*Name of Publication*
Alabama	National	Mobile Register, The Birmingham News
Arizona	Local or regional	Tribune Newspapers
	National	The Arizona Republic
Arkansas	Local or regional	The Dorney News, The Arkansas Democratic Gazette
California	National	The Los Angeles Times Syndicate
	Local or regional	Ventura County Star, The San Diego Union Times
Colorado	Local or regional	Colorado Springs Gazette
Connecticut	Local or regional	The Hartford Courant
District of Colombia	National	The Washington Post
Florida	Local or regional	The Orlando Sentinel, Daytona Beach News Journal, The Tampa Tribune, The Palm Beach Post
Georgia	National	The Augusta Chronicle
Hawaii	Local or regional	The Honolulu Star Bulletin
Illinois	National	Chicago Tribune
	Local or regional	The State Journal Springfield Register
Indiana	National	The Indianapolis Star News
	Local or regional	The Herald Bulletin
Iowa	National	The Des Moines Register
Kentucky	Local or regional	The Courier-Journal
Maryland	National	The Sun
Michigan	Local or regional	Detroit Free Press
Minnesota	National	Star Tribune
Nebraska	National	Omaha World-Herald
Nevada	National	Las Vegas Sun
	Local or regional	Las Vegas Review-Journal
New Jersey	Local or regional	The Times (Trenton)
New York	National	The New York Times
	Local or regional	The Buffalo News
North Carolina	National	Herald Sun, The Charlotte Observer
	Local or regional	The News & Observer (Raleigh)
Ohio	Local or regional	Cincinnati Post, The Cincinnati Enquirer, Akron Beacon Journal
Oregon	Local or regional	The Oregonian (Portland)
Pennsylvania	Local or regional	Pittsburgh Post-Gazette, Tribune Review
Virginia	National	Richmond Times-Dispatch
Wisconsin	Local or regional	Green Bay Press-Gazette
World Wide Web	National	http://www.CartoonWeb.com, http://www.Artizans.com, http://www.United Media.com, http://www.UniversalPressGazette.com, http://www.NationalSyndicated.com, http://www.Slate.com

NOTE: Regional distribution: western United States, 25%; midwestern, 22%; eastern/northeastern, 33%; southern, 19%.

business manager, and an expert in content analysis. No psychometric properties have been determined. The seven coding variables of the instrument assess for both manifest content, including kind of technology, gender, race or ethnicity, and social

TABLE 2: Coding Variables for Each Image

Denotation (literal meanings)
Is the cartoon about stem cell research or cloning?
What is the sex of each character?
What is the race/ethnicity of the each character?
What is the social role of the character?
Connotation (symbolic meaning)
What is the message or meaning of the cartoon?
What is the main consequence (social, personal, health, economic) of the use of the technology?
What is the value (good/positive, bad/negative or mixed) of the technology?

role of characters, and latent content, including the implied meaning of the cartoon and the implied value of the technology (Table 2).

Data Quality

As recommended by Giarelli and Tulman (2002), the images were reproduced using a laser printer and enlarged to a minimum of 5 by 7 inches (12.5 × 17.5 cm) to enhance viewing. The cartoons were scanned and stored in an image database for coding and reproduction. A packet of cartoons was reproduced for each of the coders.

Each cartoon was evaluated by two coders, who were instructed on the practical aspects of content analysis and on the use of the instrument (Hak & Bernts, 1996). To determine reliability on all coding variables, I randomly selected 10 cartoons for reliability testing. Coders collected data from each of the 10 cartoons using a recording sheet for each cartoon. Krippendorff's (2005) alpha (α) (reliability coefficient) was applied to measure the agreement between two independent observers who analyzed the nominal variables in the subset of 10 cartoons. Nominal variables are race or ethnicity, gender, social role, and value of the technology (positive, negative, ambiguous, or mixed). Agreement was $\alpha = .75$ on race or ethnicity, $\alpha = 1.0$ on gender, and $\alpha = .8$ on social role. Agreement on the main message was $\alpha = .8$.

Data Analysis

Data were analyzed both quantitatively and qualitatively. The sample is described as the number of cartoons by year, city, state, and names of the publication. Each cartoon was analyzed for a main message and linked to a critical event, if applicable. A critical event is a current social event that triggers or is associated with the content or purpose of the cartoon. For example, the cloning of Dolly the sheep was the critical event that was featured in editorial cartoons about cloning in 1997. Messages were collapsed into a main message if three or more cartoons contained the same message in the year. Messages were collapsed into a secondary message if fewer than three cartoons contained the message in a given year. When coders disagreed on the meaning of a cartoon, I analyzed the cartoon and decided on the main message.

TABLE 3: Example of Semiotic Analysis of Cartoon

Denotative Signifier	*Denotative Signified*
Wheelchair	Disability
Head only, person with beard	Male
Connotative Signifier	*Connotation*
Head only; bearded man looking down from cloud, frowning	God watching from above in disapproval
Wheelchair with name "Superman" on cloud next to bearded man	Christopher Reeve has joined "God" in "heaven"

Semiotics

Barthes (1977) has proposed a technique of visual analysis called semiotics. This process involves dissecting the bits and pieces within the images to uncover two layers of meaning. The layers of meaning are manifest (denotation), or immediately recognizable, and latent (connotation), or hidden. The first layer of denotation identifies what or who is being depicted. Denotation is the literal meanings contained in the image. Because cartoons rely on commonly identifiable representations, the researcher considers the use of stereotypes and exaggerations. Analysis of manifest content uncovers the most basic shared understanding of the observers. As is typical for semiotics (van Leeuwen & Jewitt, 2001), groups of individuals or objects are considered as one kind of individual or object, and individuals or objects in the distance are less prominent and thereby less important than objects or individuals in the foreground. The surrounding text or captions are included in the analysis. Often, in cartoons, the captions are quite explicit and direct the reader on how to interpret the image. For example, a cartoon that depicts a laboratory by the use of test tubes and beakers will add signage on the door saying "cloning lab."

The second layer of connotation identifies the ideas and values expressed through what is represented and the way in which it is represented. Connotation is the symbolic meaning of the image. Two elements of the content of the image are singled out as carriers of connotation, poses, and objects. The analysis of latent content reveals a deeper, unspoken layer of shared understanding of the meaning of an image. For example, a white-haired person with lines on the face who is stooped over symbolized a debilitated older man. In Table 3, I have illustrated an example of semiotic analysis.

FINDINGS

The findings of the study are presented in three sections: (a) sample characteristics; (b) denoted meanings, or manifest content, consisting of the representation of gender, race or ethnicity, critical social event, and social role; and (c) connoted meanings, or the latent content, consisting of the message of the cartoon and implied value of the technology.

Representation of Gender, Social Role, and Race or Ethnicity

People were portrayed individually 224 times and 4 times in groups of more than 10. Men were portrayed 64% of the time ($n = 187$) and were the only constituents of the four large groups. There were only 37 female characters in the editorial cartoons. This is 16% of all those who were characterized. The other 20% were not human, or else the sex could not be determined.

A male character wearing a dark suit and tie represented a businessman. When a cigar was added, this character was a politician. Men were portrayed as politicians, congressmen, scientists, doctors, laboratory technicians, salesmen, businessmen, news announcers, bartenders, garbage collectors, husbands, fathers, and consumers. When a character wore a dress and held a baby or pushed a shopping cart, this was obviously a mother or homemaker. Women were portrayed as mothers, wives, consumers, office workers, and nurses. Only two "scientists" were female. No women were cloned or were the users or beneficiaries of stem cell research. Children were depicted 10 times, and only 1 child was female. Several known public figures were used in the cartoons. Easily recognizable characters included actor and activist Christopher Reeve, former U.S. presidents Richard Nixon and Ronald Reagan, President Kim Jong Il of North Korea, businessman Bill Gates, U.S. President George W. Bush, Senator Strom Thurmond, pop singer Michael Jackson, Adolf Hitler, Osama Bin Laden, and Saddam Hussein.

Whenever a person was included in a cartoon (with only one exception of an individual with shaded skin in 2002), all were portrayed as White. Ethnic groups were portrayed using stereotypical caricatures. Ethnicity was recognizable only in the characterization of Osama Bin Laden, Saddam Hussein, and Kim Jong Il. Besides these, one cartoon panel depicted a social group; in it, two individuals were depicted with multiple body piercing and spiked hair as representative of the "punk" youth counterculture.

Critical Events

Social events are included in some editorial cartoon as critical focal points for the message and sometimes triggered the creation of a spike of cartoons. Some events were the death of Christopher Reeve, the attack on the World Trade Center, the Raelian group's announcement of the cloning of a non-earthling, and the cloning of a cat. The critical event was often used as a vehicle to present a latent message.

Metaphor, Message, and Value

In the second layer of connotation, or latent meaning, the researcher explores metaphors, which are often used in cartoons to deliver a specific message without wordiness, making an association between the cartoon and a familiar image or idea. Latent meaning is implied.

Several metaphors recurred in cartoons related to cloning. In the early years (2001-2002), cartoonists employed Frankenstein's monster, "mad" scientists, Pandora's box, and Eve taking the apple in the Garden of Eden. These images represent the creation of unnatural beings (monster and mad scientist) and the genesis of bad things to come (Pandora's box and Garden of Eden). The message contained in the

metaphor is negative, or that undesirable outcomes will result from the use of cloning. Only readers who know that Pandora's box released hope as well as social ills would assign a positive value to the meaning of the cartoon. The impact of linking ideas through metaphor is that the implied meaning of the metaphor is then presumed to be the meaning of the linked idea. For example, when cloning is linked to the metaphor of Eve picking forbidden fruit in the Garden of Eden, the observer is led to infer that cloning is an act inspired by "evil" forces, the product of cloning might result in the loss of humanity's place in "heaven," and so on. An inference, however, can be made only by one who understands the meaning of the metaphor and therefore restricts understanding to a subsample of the population with this specialized knowledge. Thus, cartoonists use well-known and popular metaphors as proxy for specific ideas or values.

During the latter 2 years (2003-2004), the cartoonists used images of clowns, witches, and aliens from outer space to represent the claims of the Raelians to have created the first human-alien clone as foolish and to suggest the use of trickery, deception, or supernatural powers in the name of science. Additional metaphors are listed in Table 4.

Implied Value of the Technologies

Each of 106 cartoons in the sample included an implied or explicit reference to the worth, value, or merit of cloning or of stem cell research. Regardless of year of publication, or if the appearance coincided with a critical event, the dominant inferred potential or absolute value of the technology of cloning was negative ($n = 98$). Several cartoons implied ambiguous or a mixture of positive and negative values associated with cloning ($n = 7$). Only 1 cartoon on cloning implied a positive value. For example, in 2002, 40 of the 53 cartoons were about cloning. The messages for these cartoons were as follows: Human cloning mass-produces evil, human cloning creates monsters, human cloning serves narcissistic ends, human cloning is uncontrolled experimentation, and cloning cats produces more unwanted cats.

In contrast, when stem cell research was the subject of the editorial cartoon ($n = 20$), the dominant value of the technology was depicted as positive ($n = 11$). The messages of these cartoons were stem cell research creates a chance for cure of diseases, stem cell research might save lives, and stem cell research is beneficial to society. Five cartoons on stem cell research implied that the technology brings a mixture of benefits and risks. Three cartoons implied a negative value. The main messages of these cartoons were that stem cell research has created an ethical dilemma, commercialization of stem cell research will overshadow the ethical debate, and stem cell research should be taboo (see Table 4).

DISCUSSION

Editorial cartoonists use metaphor for parallel imagery to link one idea to another. The presumed intent of the artist is to lead the reader to make the inference that because two things share some characteristics, they share all characteristics. For example, if a cloning scientist and the fictional scientist Dr. Frankenstein create life, then the outcome of both sciences is the creation of a monster. Although this claim

TABLE 4: Critical Events, Messages, and Metaphors

Year	*Critical Event*	*Message*	*Metaphor*
2001	Destruction of the World Trade Center, bioterrorism attacks	Main message: The technology is used to advance special interests or personal agenda; cloning is used to advance evil agenda, multiplication of evil; cloning is an extension of social practice to "be like others"; cloning is human experimentation that creates monsters, deformed body and mind; cloning produces unexpected, undesirable outcomes Secondary message: Cloning is science out of control; cloning, like other technologies, will be commercialized	Frankenstein's monster, mad scientist, mixed nuts, crooked politician, sleazy salesman, Nazi Germany, Hitler, terrorists, Pandora's box
2002	Debate on U.S. federal funding of stem cell research (SCR), Raelians' claim that humans are cloned aliens, cat cloned	Main message: Embryonic stem cell research (ESCR) values one kind of life over another, human sacrifice; not doing ESCR values one kind of life over another, sacrifice disabled; cloning is the mass production of evil; cloning creates monsters; cloning produces undesirable outcomes; cloned individuals are not as valuable as the originals Secondary message: Politics is intruding on science; SCR will lead to ruin of society; ESCR is the work of the devil; commercialization of SCR does not consider the ethical problems; banning cloning will save society; some groups Individuals are not worth cloning, resulting in social ills	Banishment from the Garden of Eden, forbidden fruit, clowns, Grim Reaper, sheep (followers), cat litter, cats
2003	Raelian claim of cloning of alien proven to be a hoax	Main message: Cloning is done by, and produces, freaks and clowns; cloning is human experimentation that creates monsters, deformed body and mind; cloning used to advance evil agenda, multiplication of evil Secondary message: Cloning is an extension of social practice to "be like others," loss of individuality; cloning of humans is science fiction; cloning is trickery and witchery	Clowns, alien spaceships, witches, and cauldrons
2004	Death of Christopher Reeve	Main message: The scientist who does SCR is the real "superman"; SCR has the power to do good and save lives Secondary message: Politics is responsible for unnecessary/untimely death and disease	Superman, kryptonite (substance that can kill Superman), wheelchair

might prove to be logically fallacious, such claims in mass media are rarely subjected to critical analysis. Editorial cartooning as a medium of mass communication is exempt from having to provide factual evidence to support claims. Rather than subjecting cartoons to this level of criticism, readers form quick impressions that either refute or support preformed assumptions. Quick impressions from editorial cartoons might help the public acquire and retain a certain point of view. Because most cartoons on cloning carried a negative value, one might suppose that the point of view that cloning is "bad" is confirmed. Furthermore, the term *cloning* might be used to explain a valuable and accepted health care process, for example the process of reproducing adult stem cells for treatment of leukemia. In this scenario, a reader might form a negative impression simply by association.

In addition, cloning is used in editorial cartoons as a vehicle to make comments about perceived negative social behaviors or events as a way to show guilt by association. For example, a cartoon that depicts clones of Osama Bin Laden is as much a condemnation of terrorists as of cloning. Similarly, cloning colonies of adult bone marrow stem cells might be unfairly and subconsciously linked to destructive acts. If this should occur, a prospective patient might find presumptions limiting his or her ability to make informed choices for health care.

Cartoons published during the time frame of 2001 to 2004 represented men as the dominant characters involved with cloning and stem cell research. The man in the social role of scientist, politician, or businessman dominates the characterization of who is using or abusing the technologies. Women were rarely depicted as scientists or physicians and therefore did not control the use of the technology. They were involved peripherally as observers or commentators. This enhances gender stereotyping for both men and women and perpetuates the already prevalent social presumption that men dominate fields of science.

Cloning was associated with negative consequences and values, and stem cell research was associated with positive or mixed consequences and values. With the exception of the cat, the science of cloning is represented by human cloning, and without exception, this science is portrayed as having no valuable use for humankind. Likewise, stem cell research is not differentiated as adult-versus-embryonic stem cell research and is presented as embryonic.

The condensation of all cloning techniques to one kind, that is, human cloning, condenses a range of emotions and reactions for the readers. If all cloning is characterized as human cloning, then the range of arguments about a diverse and complex technology can be avoided. Moreover, if the condensed image can be linked to a value, then the value (negative in the case of human cloning) can be linked to all kinds of cloning. There might appear to be a show of unity among the public opinion with regard to a diverse set of technologies when, in truth, the generalization is misleading. A consideration of the facts of the science, such as the differences among the kinds of cloning and stem cell research, is missing from this public discourse. This discussion is largely avoided, because it is technical and complicated, and requires sophisticated understanding of biology.

The condensing of multiple terms into one has been recognized as an obstacle to a frank scientific, ethical, and public debate on stem cell science and cloning technology. The International Society of Stem Cell Research (ISSCR) has prepared a position statement on nomenclature to address inaccurate use of terms in various public and scientific arenas with regard to the production of stem cell lines. The ISSCR members and leadership voted in 2004 to use the term *nuclear transfer* instead

of *therapeutic cloning* to diminish the negative connotations of the commercial term (ISSCR, 2004).

CONCLUSION

This study uncovered some of the ideas about the value of cloning and stem cell research that are being appreciated, and in many cases embraced, by the public. It provides an example of rhetoric in public discourse.

Findings from this study answer the implied question, What is the role of editorial cartoons in robust public debate? I propose that the role of editorial cartoons is to confirm attribute predilection on cloning and stem cell research and thereby minimize cognitive strain by omitting technicalities from image text and relying on preconceived ideas and opinions. Readers might think that they are unqualified to participate in the debate at a more sophisticated level. Editorial cartoons give discouraged or dissuaded readers access to an important social controversy. Editorial cartoons are a medium of public discourse that narrows the scope of public understanding of a highly complex field of scientific inquiry. According to the literature, published cartoons reflect common public understanding and therefore can be linked to the larger social contexts.

Editorial cartoons originate from the claims of the cartoonists and editors but end up as claims accepted by the readers. Thus, editorial cartoons can be considered one form of argumentation and therefore a way of knowing about a public controversy. Ultimately, the acceptance of the use of stem cell research or cloning for public good will be affected by what the public already believes and how these beliefs can be altered by the pro and con arguments.

Public opinion polls have indicated that negative reactions to genetic technologies, for example, might simply show cognitive deficit or lack of understanding (Condit, 2001; Einsiedel, 2000; Gasgell, Allum, et al., 2000). Seeing that this ubiquitous and enjoyable mass medium condenses cloning and stem cell research into generally negative symbols suggests that there is a need to educate the public on accurate terminology and the difference between real and imagined risks and benefits.

Mankoff, a cartoonist with *The New Yorker* magazine and former doctoral candidate in experimental psychology, wrote, "The core of all humor, the reason for it all, is unhappiness" (Collins, 2004, p. F3). This "unhappiness" might be relabeled as the cognitive strain that arises from the pool of conflicting unresolved social, political, and ethical claims in public discourse about cloning and stem cell research. Minimum cognitive strain is necessary to enjoy a cartoon. Each time a reader nods in agreement with the message, this individual minimizes the effort needed to acquire or retain an opinion. Finding an editorial cartoon that cuts to the core of the controversy relieves the strain and provides the moment of pleasurable agreement when one "gets the joke."

Comment on Humor

According to Collins (2004), toonologists try to find out what is so funny about humor. The humor in editorial cartoons is rarely laughable and mostly entices the

reader to reply with an acknowledging "Huh!" or a quiet, sardonic chuckle. To paraphrase the United States author and humorist E. B. White (2005), dissecting cartoons is like dissecting frogs: Nobody is much interested, and the frog dies. Semiotic analysis, by dissecting the content and process of the imagery, removes even the slightest humor from a mass medium that relies on a lighthearted approach to life. Even so, the analysis is valuable as a means to personal insight and a deeper understanding of popular culture.

Limitations

Editorial cartoons, as their title suggests, are selected by editors of newspapers based on the political leanings of the publication and the editor. As Giarelli and Tulman suggested (2003), the first priority of the editor is to appeal to the general sensibilities of the readership and to sell newspapers. It is possible that even though the sources of cartoons represent a wide distribution of local, regional, and national publications, the sample of cartoons might not be exhaustive and might not uncover the full range of messages, value, and depictions of gender, race or ethnicity, and social role of the characters.

Two individuals were employed to code latent and manifest content in each cartoon independently. There is always a possibility that bias is imposed by the coders, even though the investigator attempted to establish objectivity by providing explicit rules, training, and the pretesting coders prior to data collection.

Implications for Practice

This article uncovers what might be attribute predilections or the preconceived ideas held by the public about a potentially beneficial technology. If a health care professional is aware of attribute predilections concerning the consequences and value of selected genetic technology, he or she might anticipate patient questions and knowledge deficits and present supportive or alternative ways of understanding highly technical concepts to facilitate understanding. Health care professionals will need to explore how to address, overcome, or build on these notions if they wish to advocate for the use of any technology that holds promise but is presently controversial.

APPENDIX
Glossary of Scientific Terms

Adult stem cells (ASC) are pluripotent, multipotent, and progenitor stem cells found among the differentiated cells of a particular tissue or organ in the human body.

DNA cloning, recombinant DNA technology, molecular cloning, or gene cloning (all refer to the same process) is the transfer of DNA fragment of interest from one organism to a self-replicating genetic element.

Embryonic stem cells (ESC) are pluripotent stem cells derived from the inner cell mass of a blastocyst stage of a human embryo.

Embryonic germ cells (EGC) are embryonic germ cells derived from aborted human embryos or fetuses.

Multipotent means having the ability to divide and grow into several differentiated cell types within a specific type of organ or tissue. Multipotent cells can be found in many places in the adult human body, including the skin and bone marrow.

Pluripotent means having the ability to give rise to all the different cell types in the human body but do not contain the genetic information to make a placenta. Pluripotent cells are typically what people are referring to when one generically refers to stem cell research.

Reproductive cloning is the technology used to generate an animal that has the same nuclear DNA as another currently or previously existing animal. This is what is generally referred to when one generically refers to cloning.

Stem cell is a blank cell found in human beings that is capable of developing into many different kinds of cells found in the human body.

Totipotent means having the ability to differentiate into the widest variety of cells. Human cells are totipotent only during the first few divisions of a fertilized egg.

Therapeutic cloning (also called embryonic cloning) is the production of human embryos for use in research. The goal is not to create cloned human beings but, rather, to harvest stem cells that can be used to study human development and to treat disease.

SOURCE: ISSCR (2005).

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