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As part of a nationwide study on the public acceptability of agricultural biotechnology, researchers performed a content analysis on two years of print news coverage of biotechnology (2000-2002). Qualitative analysis methods included examining text from selected national newspapers, regional newspapers, and trade publications for common issues, tone, and terminology. A team of three coders, trained to an acceptable level of agreement (Cohen's K = .80), examined and coded the articles. The relationship between the tone of the article and the terminology used in reference to biotechnology (e.g., "genetically engineered," "genetically modified," or "biotechnology") has practical applications for both public relations practitioners and communication researchers. "Biotechnology" was associated with the largest percentage of articles with positive tones. "Genetically modified" was associated with more neutral articles. "Genetically engineered" was the term of choice for authors of physical science articles, which were mostly positive. Understanding these relationships may help communication practitioners choose their terminology to achieve their communication goals, as well as opinion researchers, who, in developing survey instruments, may wish to choose a term that carries the least amount of bias.

Introduction

Mass media play an important role in the public's attitude about agricultural biotechnology. Hoban and Kendall (1996) advised that public communication and education are especially vital to public acceptability of agricultural biotechnology because people perceive the technology to affect the food they eat.

Researchers internationally in both academe and industry have been working on this communication dilemma since the mid-1980s. Survey and

focus group research to determine public opinion about biotechnology-related issues has been common and has served to guide public communication and education efforts about biotechnology in the food and agriculture industry. This body of research points to two important premises: (1) Mass media play a key role in developing public opinion regarding biotechnology (Gaskell, Bauer, Durant & Allum, 1999; Gunter, Kinderlerer & Beyleveld, 1999; Priest, 2000; IFIC, 2001, Marks, 2001), and (2) though both consumers and journalists are becoming more informed (IFIC, 2001; Vestal and Briers, 2000), they generally have limited knowledge about biotechnology, so they rely on peripheral cues to help in forming opinions (Wasnik and Kim, 2001). This second premise conforms to the Elaboration Likelihood Model (ELM) of persuasion developed by Petty and Cacioppo (Nai-Hwa, 2001).

The ELM is the theory of information processing and persuasion that when consumers can't or won't make decisions based on a sound understanding of a new technology, they resort to peripheral cues. These cues are not necessarily related to scientific facts about the technology but nonetheless are memorable and understandable to the lay consumer. The simplicity of the cues makes them easy to apply in the opinion-forming process.

In the case of biotechnology, a peripheral cue for consumers may be the connotations associated with the name of the technology. Wasnik and Kim (2001) suggest consumers may form opinions according to their linguistic evaluation of the word used to symbolize biotechnology and food products resulting from biotechnology. This poses problems for public communicators and educators, but it also causes potential problems for public opinion and public perception researchers who must ensure that the connotations of the terms used in their survey questions and focus group discussion schedules don't affect the tone of participants' responses.

Recent studies point to the importance of linguistics in determining public perceptions of biotechnology. In their analysis of biotechnology marketing, Wasnik and Kim (2001) concluded that: "Biotechnology is a branding issue. It is providing a clear, systematic, vivid, focused message that is potentially important to consumers … the powerful visuals that are associated with names such as FrankenFoods and Super Weeds leave little wonder why the public is able to latch on to such bumper-sticker philosophies of skeptics and be moved" (p. 10).

Wasnik and Kim also reported on a 1991 European survey that found twice as many respondents thought that "genetic engineering" would make their lives worse than those who thought "biotechnology" would (p. 18).

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Additionally, focus group research by Levy and Derby (2000) concluded that consumers in Maryland, Vermont, Washington, and Missouri found the terms "genetically engineered," "genetically modified," and "bioengineered" to be reasonably descriptive. However, the researchers also reported that connecting the concept of engineering with food had negative implications for some participants, that the term "modification" was seen as a vaguer, softer way of saying engineered, and that the "bio" sparked positive images for some participants. Terms such as "product of biotechnology" or "bio technology" had the least amount of negative implication, while acronyms such as GM and GE were unfamiliar to most participants and were not viewed favorably by participants. Most participants were unfamiliar with the term "genetically modified organism" and considered it to be an inappropriate name for bioengineered foods.

Also, in a recent survey of college students' perceptions, Sohan, Waliczek, and Briers (2002) found that students' unfamiliarity with technical terminology affected their responses to survey questions about biotechnology.

The results of these recent studies imply that inconsistent and unfamiliar terminology in public communication and in public perception survey instruments is problematic. Even a cursory glance at news articles, journal articles, and survey instruments related to biotechnology reveals that there is no agreed-upon lexicon for the concept of biotechnology and its many applications.

Context of the Study

A consortium consisting of researchers at Tennessee State University, University of Arkansas-Fayetteville, University of Arkansas-Pine Bluff, and North Carolina A&T University received a grant from the USDA-CSREES Initiative for Future of Agriculture and Food Systems in 2001 to organize a multi-institutional effort at describing consumers' and producers' perceptions of the social acceptability of agricultural biotechnology. Researchers conducted focus group studies in their respective states to develop an initial sense of consumers' and producers' understanding of issues related to agricultural biotechnology and to determine which issues were most important in helping them form opinions. Additionally, researchers at the University of Arkansas-Fayetteville performed the following media content study to describe U.S. print media coverage of agricultural biotechnology.

Purpose and Objectives

Because consumers lean heavily on mass media for information to help them form opinions about biotechnology, an analysis of the relationship between terminology and tone in mass communication efforts could lead to a better understanding of how terminology affects consumer perceptions. The purpose of this study was to build upon previous research about terminology related to biotechnology in working toward a common lexicon that can be applied more purposefully in public communications and survey research efforts. The study was guided by the following objectives:

1. Analyze textual content from agricultural biotechnology-related articles in selected national and regional newspapers and trade publications to determine primary issues addressed and overall tone of the article.
2. Determine the terminology used in the articles' first reference to biotechnology or biotechnology-related products.
3. Determine possible relationships between the various terms most commonly used in first references to biotechnology and the perceived tone of the article.

Methods

Initial Qualitative Analysis

Using the Lexis Nexis database and on-line archive databases of regional and trade publications, researchers selected 137 articles about agricultural biotechnology published between January 1, 2001, and July 1, 2002. The articles appeared in three national news publications—*The Washington Post, USA Today,* and the *New York Times;* one regional news publication—*The Des Moines Register;* three national agricultural trade publications—*Farm Journal, Progressive Farmer,* and *Soybean Digest;* one regional agricultural trade publication—*Delta Farm Press;* and one agricultural marketing trade publication—*Agri Marketing.* Articles selected contained some discussion of agricultural biotechnology or products of agricultural biotechnology. Various search strings were used with each of the databases to identify relevant articles. A common search string included biotechnology, GMO, gene, crops, or food. The selected articles included opinion pieces and commentaries, news reports, and feature stories.

An initial qualitative analysis, which involved a team of coders working to develop a visual hierarchy of major themes, characteristics, and definitions, led to development of a coding sheet to be employed by three trained

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coders. Emergent themes included tone (positive, negative, and neutral), balance (balanced or not balanced), length (number of words in article), section (e.g., news, business, real estate, agriculture), sources (people or organizations referred to or quoted in the article), central issues (socio-economic, political, and physical science), secondary issues (specific topics related to the central issue), and first-reference terminology (e.g., biotechnology, genetically engineered, or genetically modified).

This study reports on relationships between the central issues, tone, and first-reference terminology categories. Definitions for these characteristics agreed upon by the coders during the initial analysis were the following:

Central Issue: The overarching theme under which the majority of information in the article fits. The initial analysis resulted in four categories of central issues: (1) consumer costs and benefits, (2) producer costs and benefits, (3) agribusiness and industry issues, and (4) environmental issues.

Tone: The extent to which an article as a whole, through rhetorical stance, approves or disapproves of agricultural biotechnology. Tone was characterized as positive, negative, or neutral with respect to agricultural biotechnology.

First Reference Terminology: The words used to refer to agricultural biotechnology the first time the concept is mentioned. Popular terms and their close variations were grouped. For example, "genetic modification" was grouped with "genetically modified." In addition, the coders used an agreed-upon definition of agricultural biotechnology, adapted from Sohan et al. (2002).

Agricultural Biotechnology: Any technique, other than traditional selective breeding methods, that uses living organisms or their process to make or modify food and fiber products or to improve plants or animals.

Coder Training and Interrater Reliability

Articles were selected at random for coding in sets of 10 from the sample of 137. Three coders each read the first five sets. As each set was read and coded, the coders compared and discussed their characterizations at length, working toward consensus on the characterization of each article, until their characterizations reached an acceptable level of agreement ($k = .80$), according to Cohen's (1960) index of interrater reliability. Acceptable agreement occurred at the conclusion of the fifth rating session. With a clear understanding of the group's consensus, two of the three coders

characterized the balance of the articles. Frequent discussions and peer critiques among the coders helped to further ensure interrater reliability.

Frequencies of codes, including those related to tone, issues, and first-reference terminology, were recorded and analyzed with chi square tests to determine the presence of patterns and relationships. The chi square tests examined how closely observed frequencies fit theoretically expected frequencies (i.e., the expected results if there had been no relationship among coded items). The resulting probability (p) values reported below Tables 2-4 represent the likelihood that the results occurred by chance. The frequencies themselves and the p values resulting from the chi square tests represent the findings of this study.

Findings

Primary Issues Addressed

Socio-economic issues dominated the selection of articles. Nearly half of the 137 articles focused on a broad range of issues under this category. Among them were numerous articles related to consumer and producer costs and benefits, agricultural industry concerns and actions, and environmental concerns. Political issues were second in frequency and focused on regulation, public opinion, and international politics. A relatively smaller number of the articles fit into the physical science category, which included stories about genetic science methods and biotechnology products.

Overall Tone Characteristics

Though there were no significant differences among the number of positive, negative, and neutral articles, 70% of the 137 articles were positive or neutral in tone, with 36% coded as having a positive rhetorical stance with regard to biotechnology and 34% coded as neutral. Thirty percent were coded as having a negative tone toward biotechnology.

Table 1. *Overall tone of biotechnology articles (N = 137)*

	Positive	Neutral	Negative	Total
Tone Frequencies	50 (36%)	46 (34%)	41 (30%)	137 (100%)

Common Terms for Biotechnology

Three terms used to describe biotechnology and products of biotechnology were clearly used more than any others. "Genetically modified" was

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used in the first reference to biotechnology in 35% of the 137 articles. "Genetically engineered" was the first-reference term used in 30% of the articles, and "biotechnology" (including "biotech") was the first-reference term in 19% of the articles. Other terms and acronyms, such as "bio-engineered," "GMO," and "genetically altered" were used on first reference much less frequently.

Interrelationships among Issues, Tone, and Terminology

Issues and Tone

Issues and article tone appeared to have a definite relationship. The 66 socio-economic articles were noticeably polarized, with 39% having a positive tone and 35% having a negative tone. Political articles found the middle ground, with 46% being coded as neutral. Fifty-eight percent of the physical science articles had a positive tone.

Table 2. *Relationship between issues and tone in biotechnology articles (N = 137)*

	Socio-Economic	Political	Physical Science
Positive	26 (39%)	13 (25%)	11 (58%)
Neutral	17 (26%)	24 (46%)	5 (26%)
Negative	23 (35%)	15 (29%)	3 (16%)
Totals	66 (100%)	52 (100%)	19 (100%)

Chi square = 10.1920, p = 0.0373

Tone and Terminology

A clear majority (54%) of the articles employing "biotechnology" as the first reference to the technology had a positive tone; 23% were negative, and 23% were neutral. Articles using the term "genetically engineered" as the first reference to biotechnology also were predominantly positive, with 46% positive, 32% neutral, and 22% negative. Nearly half (48%) of the articles using "genetically modified" were neutral, yet 29% were negative and only 23% were positive.

Table 3. *Relationships between tone and terminology in biotechnology articles (N = 137)*

	Positive	Neutral	Negative	Totals
Biotech/Biotechnology	14 (54%)	6 (23%)	6 (23%)	26 (100%)
Genetically engineered	19 (46%)	13 (32%)	9 (22%)	41 (100%)
Genetically modified	11 (23%)	23 (48%)	14 (29%)	48 (100%)
Other	6 (27%)	4 (18%)	12 (55%)	22 (100%)
GMO	2	0	1	3
Transgenic	0	0	1	1
Cloning/cloned 1	0	0	1	
Bio-engineered	1	2	6	9
Gene-/Genetically altered	1	2	4	7
Genetic Technology	1	0	0	1

Chi square = 11.8483, p = 0.0693

Terminology and Issues

In articles that focused on socio-economic issues, "genetically engineered" was the most popular choice of first-reference terminology. Thirty-three percent of the socio-economic articles used "genetically engineered" upon first reference. "Genetically modified" was also a common first-reference term in socio-economic articles (30%). "Biotechnology" was used in 21% of the articles. "Bio-engineered" and "genetically altered," which were identified in only a few articles, were used most often in socio-economic pieces (7% and 6%, respectively).

Articles about political issues were more uniform in their use of terminology. Forty-eight percent of the political articles used "genetically modified" as the first reference to the technology.

"Genetically engineered" was the choice term by journalists who wrote physical science articles. Fifty-two percent of the physical science articles first referred to biotechnology with this term.

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Table 4. *Relationship between terminology and issues in biotechnology articles*

	Socio-Economic	Political	Physical Science
Biotech/Biotechnology	14 (21%)	9 (17%)	3 (16%)
Genetically engineered	22 (33%)	9 (17%)	10 (53%)
Genetically modified	20 (30%)	25 (48%)	3 (16%)
Other	10 (15%)	9 (17%)	3 (16%)
GMO	1	1	1
Transgenic	0	1	0
Cloning/cloned	0	0	1
Bio-engineered	5	4	0
Gene-/Genetically altered	4	2	1
Genetic Technology	0	1	0
Totals	66 (100%)	52 (100%)	19 (100%)

Chi square = 11.6875, p = 0.0693

Conclusions and Discussion

The findings point to some important preliminary concepts about the interrelationships among journalistic tone, issues, and terminology that deserve more thought and investigation. This qualitative study, performed from the perspective of inductive thought, could set the stage for further analysis with a larger, more representative sample and a more deductive approach.

The characterization of the tone of biotechnology coverage examined in this study is congruent with recent content analysis studies claiming that coverage by U.S. journalists has been neutral, if not positive (IFIC, 2001). During the analysis, it became evident that some publications—the regional news and national trade publications specifically—were more likely to publish biotechnology articles with positive or at least neutral tones. Though differences among publications in terms of tone and issues covered were beyond the scope of this study, more work will be done to describe this interrelationship.

The biotechnology lexicon among the authors of the articles in this study was not as disorganized as some may have predicted. The terms "genetically modified," "genetically engineered," and "biotechnology" were clearly the most common first-reference terms, and therefore are likely the most recognizable to consumers. Whether this represents consistent choices by copy

editors and/or authors is uncertain and could also be the focus of more investigation.

Terminology's relationship to tone is evident in the findings. However, the causality of the relationship remains unclear and will require more investigation. "Genetically modified" appears to have been the most popular term among journalists, and it also appears to have been the term of choice for journalists who wrote neutral stories about biotechnology. Meanwhile, "genetically engineered," the second most popular term, appeared as the first- reference term to biotechnology in the highest percentage of physical science articles, which were mostly positive. However, "biotechnology" was clearly related to the highest percentage of positive stories. This supports Levy and Derby's (2000) findings that "biotechnology" is the least negative term and that though "genetically engineered" is descriptive enough, "genetically modified" may be a gentler, less emotionally charged term. Because of its popularity in mass media and because it seems to be the most benign of the three most popular terms, "genetically modified" and closely related terminology should serve both communicators and survey researchers searching for a neutral term, recognizable by consumers, to use in reference to many types of biotechnology and biotechnology products. When the situation calls for a more positive term, "biotechnology" might be the best fit. Also, for those searching for a term with more negative connotations, the less popular and more negatively charged terms "bio-engineered" and "genetically altered" might serve as appropriate choices.

Differences in journalists' terminology choices among articles with focuses on socio-economic, political, and physical science issues also were evident. Physical science writers most commonly chose the term "genetically engineered," which was found to be less positive than "biotechnology." However, physical science articles were often supportive of the technology, which presents a slight contradiction and raises the question of whether science journalists are aware of the connotations of the terminology they choose. In political articles, which were relatively neutral, journalists used "genetically modified" nearly three times as often as any other term. This finding supports the description of "genetically modified" as a relatively neutral term. In socio-economic articles, which were obviously polarized, "genetically engineered" was used nearly as commonly as "genetically modified." Whether the use of these terms is directly related to the polarity of socio-economic articles is unclear and should be the focus of further analysis.

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Finally, because this study was preliminary and exploratory, some methodological lessons became evident during the data collection and analysis phases. Choices of keywords used to identify biotechnology-related articles in various databases possibly influenced the findings. It was apparent that journalists normally used a few different terms to refer to the technology after the first reference (though the first-reference terms hold the most rhetorical weight), so a more inclusive keyword search string would add reliability to similar studies of this nature.

This study indicates that relationships may exist among tone, issues, and terminology in journalistic articles about agricultural biotechnology. A better understanding of these relationships is necessary for journalists and public communicators in all facets of the issue as well as for public perception researchers in academe and industry. More studies on these relationships are necessary to support or refute the conclusions of this exploratory study and to help communication practitioners and researchers make informed decisions in their choices of terminology representing biotechnology and products resulting from biotechnology.

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References

Cohen, J. (1960). A coefficient of agreement for nominal scales. Educational and Psychological Measurement, 20 (1), 37-46.

Gaskell, G., Bauer, M.W., Durant, J. & Allum, N.C. (1999, July 17). Worlds Apart? The Reception of Genetically Modified Foods in Europe and the U.S. Science, 285, (5426).

Gunter, B., Kinderlerer, J., & Beyleveld, D. (1999, June). The media and public understanding of biotechnology. Science Communication, 20(4), 373-394.

Hoban, T.J. & Kendall, P.A. (1996). Anticipating public reaction to the use of genetic engineering infant nutrition. American Journal of Clinical Nutrition, 63, 657S-662S.

International Food Information Council Foundation [IFIC]. (2001, November). Most Americans can articulate expected benefits of food biotechnology. Retrieved March 15, 2002 from http://ific.org

Levy, A.S. & Derby, B.M. (2000, October). Report on consumer focus groups on biotechnology. U.S. Food and Drug Administration Center for Food Safety and Applied Nutrition, Office of Scientific Analysis and Support. Retrieved June 21, 2002 from http://www.cfsan.fda.gov/~comm/biorpt.html

Lien, Nai-Hwa. (2001). Elaboration Likelihood Model in consumer research: A Review. Proceedings of the National Science Council, 11 (4), 301-310.

Marks, L.A. (2001). Communicating about agrobiotechnology. AgBioFourm, 4 (3-4), 152-154.

Priest, S.H. (2000). U.S. public opinion divided over biotechnology? Nature Biotechnology, 18, 939-942.

Sohan, D.E., Waliczek, T.M., & Briers, G.E. (2002). Knowledge, attitudes, and perceptions regarding biotechnology among college students. Journal of Natural Resources and Life Science Education, 31, 5-11.

Vestal, T.A. & Briers, G.E. (2000). Exploring knowledge, attitudes and perceptions of newspaper journalists in metropolitan markets in the United States regarding food biotechnology. Journal of Agricultural Education, 41(4), 134-144.

Wansink, B. & Kim, J. (2001). The marketing battle over genetically modified foods: False assumptions about consumer behavior. American Behavioral Scientist, 44 (8), 1405-1417.

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Ideas into Words: Mastering the Craft of Science Writing

Elise Hancock
(Johns Hopkins University Press, Baltimore, Md., and London, 2003. 151 pp., $18.95 soft cover, ISBN 0-8018-7330-4)
Reviewed by Mary Ellen Bell

Books about writing–how to do it, what to write about, where to sell what you write, how to become a more creative writer–fill a lot a shelf space at my local booksellers. And as I started reading Ideas into Words, I wondered if we really needed another book about writing. But this new offering from Elise Hancock, focused on science writing, has enough good-sense advice and nuggets that any kind of writer would find useful–especially if you are a new or aspiring science writer.

Hancock, a science writer and editor, edited the Johns Hopkins Magazine for many years. She echoes a few tips we've heard before, such as making sure you do your homework before an interview and don't edit yourself as you write the first draft. And she provides us with the usual list of things we can do to try to bust up writer's block. But she's wise enough to understand that there are many reasons for getting stuck and presents a list of questions to help writers analyze their situation: "Are you trying to make it perfect?" "Are you tired or too buzzed on caffeine?" "Have you really finished the research?"

Hancock also provides some fresh pieces of wisdom worth searching out. For example, in the chapter titled "Refining Your Draft," she offers a useful guide for editing our own work–easily the most hazardous part of writing for most of us. In this section, she reminds us to let some time pass before starting the second draft and then pretend someone else wrote the manuscript. She recommends reading through the piece at a normal pace, jotting down short reactions to what you like (and don't like) in the margin, then going back to fix the problems one-by-one. My favorite technique also gets a mention: Read out loud so you'll notice when the writing gets awkward. Hancock continues with suggestions about where writers can go to look for story ideas; gives solid advice on how to prepare for and conduct

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an interview; and explains how to structure an article from the perspective of her keen editorial eye.

What's missing from *Ideas into Words* is some discussion of how science writers–the really great ones–manage to come up with those amazing metaphors and little pieces of pure poetry to explain a complex phenomenon simply and eloquently. Hancock has much to teach us about the "craft" of science writing but not the "art" of those writers who make me say: "Oh, wow! Now I get it!"

About the Reviewer

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