

Newspaper representation of anti-aging cell and gene researches in Taiwan: problems of popular science writing

Yu-Ming Chen^{1*}, Chia-Hsuan Lien²

¹The Master Program of Long-Term Care in Aging, Kaohsiung Medical University, Kaohsiung City, Taiwan

²Department of Sociology, Tunghai University, Taichung City, Taiwan

Abstract

We researched science report samples from two of the biggest Newspaper databank in Taiwan: "Apple daily" and "United Daily News Group (Include United Daily News, Economic Daily News, United Evening News, World Journal)", collected 59 articles about anti-aging cell and gene researches. Content analysis was employed in this study to analyze those reporting stereotypes and mistakes. To sum up, our study pointed out that there were some problems in newspaper media representation in Taiwan: 1. Lack of Basic Information of the Researches that made readers doubted about value and authenticity of these anonymous research reports; 2. Inexplicit explanation of experiment method and research mechanism that confused readers with improper and unreasonable expectations to scientific discovery processes and complexity of practical application of science; 3. Editing vision and news resources were too limited within mainstream news agencies of developed countries or relatively unauthoritative resource of the Western world.

Keywords: Newspaper representation, Anti-aging cell and gene researches, Popular science writing, Scientific news.

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Introduction

Why is media representation of scientific research important?

Nowadays, there's almost nobody would deny or ignore the importance of science and technology researches, its functions and impacts also changes shapes and ways of operating of our world. The common people enjoyed the convenience and effects come from scientific and technological research, but how do the common people understand, interpret, and value its influence and importance? How detail they understand about its mechanism and translation into application? That's a key issue to overcome the language and comprehensive gap between the scientific communities and the common people for the real acceptance of science and applied technology. Because the result of social communication for knowledge of science and technological researches, not just only product positive and constructive social function to promote practical application for knowledge, but also misunderstanding, misusing and distortion, if there were some information communicators with bad intentions, the most dramatic examples are "internet pseudoscience rumors" and "fake news on community website" [1]. So, "Scientific and technological knowledge communication is too important that could not just leave it behind to the scientists" said Huang and Jian [2], but who have the ability to deal with it and how? That's the key focus of this article. There were two challenges at least to help the common people to update progressing situation of science development now, in order to understand meaning and influence of scientific researches for their life: 1. Improve bias of media representation for scientific research achievement updating, about ways that media filter, package and combine scientific developing messages into a

report; 2. Deconstruct ingrained complex of social ideology to scientific image. So there are two main dimensions to research and analyze it: 1. Media literacy improvement; 2. Education for scientific literacy. After a person's graduation from formal education system, News media, like Newspapers and News Programs become most popular and convenient way of receiving scientific information, Cheng [3] and Lee [4] pointed out that news media is an important social education tool system and public opinion exchange system, so that the content of news media may influence the country significantly, in this sense, the news media is in fact a social public instrument for education and communication as an important social control tool system, therefore, for scientists, if we want our research results be understood by the society, the news media is a very important tool. But there was not only positive function of media but also negative impact that may cause misunderstanding, like former leader of POCTA (biggest USSR news agency before 1992) Nikolai Palgunov said: "News is agitation by facts [5]", so the reporting content of news media should be noticed and researched, to prevent miscommunication and its relative negative effect.

Therefore, Lu [6] and Ruo [7] refer that popular science writing faces several main challenges nowadays:

1. Interest Groups influence writing objectivity and justice.
2. In order to earn more "click through rate" and attract reader's attention for profits, many popular science writing reports were exaggerated and overstated about the impacts of scientific researches, and influence its rightness.
3. Many reporters or editors have jumped on the bandwagon and are choosing similar topic to be fashionable, that make variety of popular science news become limited.

4. Research achievement of underprivileged culture was often ignored by mainstream media.

5. Compare to clinical research or applied science research, achievement of basic research or unpopular subjects usually get less and less concern by the society.

Xu [8] claimed those problems may relate to the nature of science, because:

1. Theories of science are not always easy to be understood by the common people, unless they received some basic scientific training or education, or it will be quiet hard to know the mechanism or background knowledge. So, it's difficult to predict reader's reading interest.

2. Division of scientific work became more and more meticulous, even the scientists cannot claim they understand all scientific topics, not to mention the common people; it's very hard to write a popular science article that suitable for everyone in the society with different level of knowledge.

3. Science of civilization being didn't know 100% truth of the world, science represent just the best level of knowledge and application of human being, so essentially, science has its limitation. But in the real social interaction and in the media representation, people tend to ignore the gap between objective real reality and the realty we thought, to tell a so called "complete story" of our world. That may stop us from understanding defect of modern science; limit our imagination to improve science and technology better, deny our curiosity to make progress.

However, there were relatively less researches that tried to analyze how scientific knowledge be understood and communicated by the media to solve problems above, so that many scientific researches and researchers could not get deserved social concerns and public resources. From our perspective, "how to make our research result get more deserved appropriate attentions and emphasis from the public and the media" is an important direction for scientist that we should put more and more efforts. To help the common people know deeper and more about science, then realize appropriate meaning of scientific development and practical application, let the government and the society notice scientific development properly, and be willing to invest proper resources and concern to scientific research development.

Nowadays, medical researches, especially anti-aging cell and gene researches are undoubtedly the most attractive reporting objects and focuses in the mass media. Throughout history, numerous passionate and creative scientific pioneers, like alchemists, herbalists, and scientists of course; all tried various ways to prevent people being aging, to keep people's energy and beauty for longer time, delayed cell and organ aging and death, and make people be immortal eventually. So, those cell biology and genetics researches related to anti-aging therapy were more likely to be media sensations. But it's totally different between "to be noticed" and "to be understood, interpreted, represented and disseminated appropriately". If there were some misinterpretation, distortion, or conjecture out of context for the reports about

cell and gene researches, it isn't just a serious loss of the meaning of science that help the progress of civilization of human being, but also do a great disservice to our society and people's recognition to related professions. So, in this article, we tried to make a brief review of the situation of media representation of anti-aging research in Taiwan, point out mainstream report type and typical focus for anti-aging studies, referred to some common problems and gaps, and give some suggestion for reference.

Sampling cases and research method

1. Cases: We researched science report samples from two of the biggest Newspaper databank in Taiwan: "Apple daily" and "United Daily News Group (Include United Daily News, Economic Daily News, United Evening News, and World Journal)" collected 59 articles about anti-aging cell and gene researches.

2. Research method: Content analysis was employed in this study to analyze those reporting stereotypes and mistakes, the authors examined the reliability of content analysis through the percent agreement formula by authors of this study, the result of our reliability examination is 0.92, should be regarded as acceptable [9]. We generally analyzed these reporting samples into several dimensions to deconstruct bias of media representation of popular anti-aging cell and gene research news: (1) Basic reference information of research (ex. authors, organization, journals, and sponsor); (2) Ways of interpretation and representation for research content (ex. experiment method; mechanism of research finding or clinical suggestion; pharmacodynamics; meaning of the research result); (3) response and comment of reader online to these reports.

3. Analyzing result: Through analyzing samples of Newspaper databank in Taiwan: "Apple daily" and "United Daily News Group, we found there were some problems may influence the rightness and precision of communication, public recognition and social value for scientific knowledge. Lack of basic information of the researches. In this study, samples from two databank show high percentage of basic information loss, see Table 1, totally there were 39.0% samples that lost their basic information. So reader cannot tell where the news resource was from, even didn't know who created this knowledge or know how, which organization or journal reviewed about the research, which provide founding for the research team. That kind of reporting mistakes and errors will result in a significant doubtful and suspicious cognition of the readers: were these reports of cell and gene research for anti-aging trustworthy? Another problem was: in order to cut cost, many foreign science research reports actually were just directive copies after translation from foreign news agency, some Taiwanese newspaper editor may not read the original research paper, then just wrote as: "A British research said that..." or "An American study showed that...", so once there were some communication errors or mistakes in reports of the foreign news agency, local reports copied the mistakes also, and moreover, in Taiwan News TV

Table 1. Samples that missing basic information.

Newspaper	Missing in basic research information (ex. authors, organization, journals, and sponsor)
Apple Daily N=33	8 (24.2%)
UDN Group N=26	15 (57.7%)
Total N=59	23 (39.0%)

programs often copied news resource from newspapers, this phenomenon made information of mistakes and confusion kept copying in the mass communication system, decrease respect and confidence of the common people to science research [10]. Like this sample, after reading this report, we got nothing about the scientist of the research, which journal did the article be published? How they did it? Or who were the guys that ask question and comment? It's not surprise that many reader think this wasn't a trustworthy report "There was a team successfully transplanted organ-like tissue in to rat brain...Some scientists questioned...Some people have pointed out that the nightmare story of "Frankenstein" may come true International News Center (2017, November 13). Science monsters come true? Human-like Brain Tissue Transplantation Rats Controversy. Apple Daily. In Taiwan's media sub-culture community (ex. Facebook group of news discussion and comment), there were even a lot of internet user like to tease news report errors or important information missing (ex. citation information) to show off their own intelligence, associatively, make people start to doubt about value and authenticity of these anonymous research reports, once they read an article in public reading material according to foreign research result, they didn't trust these report anymore and feel uninterested, even some of them were actually real and correct. This kind of atmosphere was a great hurt to credibility and reliability of mass media and science [11,12]. So, we thought that provide proper citation information is meaningful for readers and editors to increase possibility for check for possible errors and get original correct information, could also strengthen social respect to the mass media and honor proper reputation and credit to the scientist.

Implicit explanation of experiment method and research mechanism

We mentioned in "Introduction", mass communication system is not just an information spread system, but also a very important social education tool for most adults for receiving new scientific knowledge. So, popular science report is the important bridge between professional thesis and folk community that could help the society know science progress better. Purposes of production of these reports were to introduce precise and aright scientific information by metaphor metonymy and analogy in terms that are readily understood, to make people could understand the situation of scientific progress and its meaning to the society nowadays in their view of world and way of knowing (include knowing-

how and knowing-that); and moreover, help the scientific community communicate to the civil society. But in our samples, see (Table 2), almost half (45.8%) of these anti-aging cell and gene research reports didn't introduce the research mechanism, there were only 15.3% of the samples made interpretation for research mechanism in plain words that fit the standard of popular science writing principle, but 100% of the samples mentioned of result of the research and possible clinical application, that kind of representation and writing content could not help readers to receive more knowledge, just see them see the result and finding but did not know why. Just like this typical report representation Prof. Tsai Li-huei and her research team published a paper in the "Cell Report" journal, claimed they found a new ways to break through the brain's genetic barriers that may cause memory loss, the research result brought hope to Alzheimer's patients and families from United Daily (2017, November 8). Amazing Research Breakthrough, Make Dementia Patient gets their memory back. There were actually many detail and significant information missing in this report, for example it was the result of an animal experiment, there may be still a lot of advanced researches to do to reach the final goal to cure dementia or Post-traumatic stress disorder, the publication on famous journal is a good first step to the whole research plan, but it still need more time, effort, and adjustment to advanced human body researches, then if everything is going well, perhaps we human being could overcome memory loss of dementia in the future, not now. But if the reader just read this news report to know the information of this research, it's impossible for him/her to understand it. Compare to other news report to Prof. Tsai's same valuable and honorable research discovery, use the term like "may reverse memory loss" or "suggests a new approach to developing treatments" [13] in our sample, it became affirmative sentence and claimed the therapy have already done, like "Make Dementia Patient get their memory back", and even did not seek for other clinical expert consultation for the second opinion and clinical suggestion, that may cause people's misunderstanding. Apparently, reporting focus and direction of these reports in Taiwan were "funny", "interesting", "new", "surprise" elements of the research [14], just tried to tell the readers there were some new creation in the field of science and technology, not to try to educate readers because a lot of basic information and mechanism explanation missing, their reporting hypothesis and target of representation to the result and achievement of the research was something like: "Blind optimism." Although we all knew, progress of science is just like a long and uncharted journey, scientist have to proceed forward step by step, and there

Table 2. Reporting representation details of samples.

Newspaper	Without research mechanism explanation	Interpretation for research mechanism in plain words	Without explanation to proper nouns in plain words
Apple Daily N=33	12 (36.4%)	5(15.2%)	3 (9.1%)
UDN Group N=26	15 (57.7%)	4 (15.4%)	7 (26.9%)
Total N=59	27 (45.8%)	6 (15.3%)	10 (16.4%)

is no such thing “certainty” or “guarantee” for success of researching exploration. But in these samples, their ways of representation often just connected the first step of success to the final great achievement, may cause people have improper and unreasonable expectations to scientific discovery processes and complexity of practical application of science data resource: Analyzed by this study. In this part of analysis, we found that Taiwan newspaper often quoted those research findings out-of-context and exaggerated their current effect, through self-imagination or over-generalization, extended the basic exploratory research results to the possible great achievements and changes to the civilization of the distant future. Jiang [15] and Hung, Liao and Lin [16] referred that this phenomenon in fact reflects that when journalists interviewed science and technology news, they only wanted to look for fresh examples that did not explore the knowledge content, expressed their sensationalism orientation of the news coverage.

Misunderstanding for the progresses and steps of scientific research

As we mentioned above, true science is actually a long process of problem solving development and exploration to face the challenges of uncertainty. Generally speaking, cell and gene researches or new clinical treatments development have to go through these steps: 1. treatment discovery 2. pre-clinical toxicological tests 3. Clinical trials [17]. But in our samples, see (Table 3), many report seemed know nothing about the processes we mentioned above, a lot of scientific research reports translated the original research results as an eventually successful achievement and claimed the research result could soon become new useful clinical treatment, ignored that many researches were important basic researches and still have long way to get the final target “successful clinical application development”, that may mislead the public and make them excessively unsatisfied with the new research results.

Where did our scientific knowledge resource come from?

There is no blinking at the fact that western civilization and ideologies dominate almost the whole world nowadays, included scientific development and cultural linguistic rights, just like a cultural hegemony [18]. This trend make “periphery states” have less power to speak to the world and always be less noticed and expected by “core strong state” according to “world system theory [19]. So, in this study, besides local Taiwanese researches, we only got 3 samples that the reporting original research was from non-OECD (Organization for Economic Co-operation and Development, also known as a group of developed countries) country. See (Table 4) over 58% reporting original research were from OECD countries, most of them were from USA or UK or Russia; only 5% reporting original research were from non-OECD countries, all of these 3 samples

were from our neighbour East-Asian Countries: Malaysia, India and People’s Republic of China. The result showed that our anti-aging cell and gene research news reports actually ignore scientific development and their influence from “non-Western countries” like East-European, African, Oceania, Middle-Eastern, and Latin-American world, imperceptibly make people believe that OECD countries were strong and respectful power in scientific development and chronically regarded researches of non-OECD countries as worthless and non-deserved noticed ones, weaken people’s confidence and recognition to culture and nation of their selves, formed a vicious cycle of alternative culture and knowledge colonization. Data resource is analysed by this study this “Exclusive Westernization” trend should be changed, our news agencies and journalists should increase their resources of quotation from various cultures and areas, unless we could claim that there were nothing worthy to be noticed and expected in the field of scientific development in developing and undeveloped countries. Actually, this trend reflected that scientific news resources of Taiwanese newspapers agency were very limited and with a very narrow vision of the world. Many former researches pointed out that because of rapid changing of the global system and characters of the internet era, news agency and journalist were actually under the pressure of rapid producing processes of news interviewing, data collecting, and writing, so journalists and editors often just copied or rewrote slightly news report from other famous foreign news agencies or websites, like British Broadcasting Corporation (BBC), Cable News Network (CNN, U.S.A.), L Agence France-Presse (AFP), Rossiya Segodnya, that’s why the news we read on newspapers always reflected the value and focus of Western world; sometimes the situation got worse, for producing funny and quick real-time news to earn more click view of website immediately, some journalists and editor even adopted relatively unauthoritative resource of the Western world, like “The Onion (a famous media in black humor and irony style)”, took ironic joke or fake story as real and authoritative news report, confused the boundary between fiction and reality, and also relatively ignore information from other corners of the world [20,21].

Conclusion and Suggestion

Rethink social responsibility and educational role of media in a globalization and information explosion era.

To sum up, our study pointed out that there were some problems in newspaper media representation in Taiwan:

1. Lack of basic information of the researches that made readers doubted about value and authenticity of these anonymous research reports;
2. Inexplicit explanation of experiment method and research mechanism that confused readers with improper and unreasonable expectations to scientific discovery processes and complexity of practical application of science;

Table 3. Samples that misunderstood for the meaning of progresses and steps of research.

Newspaper	Did not indicate the correct stage of research significance	Mentioned of result of the research for possible clinical application	Not mentioned of still need some follow-up researches and development process to make a new treatment.
Apple Daily N=34 (there is a sample that quoted two researches)	16 (47.1%)	100%	15 (44.1%)
UDN Group N=26	12 (46.2%)	100%	11 (42.3%)
Total N=60	28 (46.7%)	100%	26 (43.3%)

Table 4. Nationality of original researches resource.

Newspaper	Reporting original research was from local Taiwanese research	Reporting original research was from non-OECD country	Reporting original research was from OECD country
Apple Daily N=34 (there is a sample that quoted two researches)	12 (35.3%)	2 (5.9%)	20 (58.8%)
UDN Group N=26	9 (34.6%)	1 (3.8%)	15 (57.7%)
Total N=60	21 (35%)	3 (5%)	35 (58.3%)

3. Editing vision and news resources were too limited within mainstream news agencies of developed countries or relatively unauthoritative resource of the Western world, which confused the boundary between fiction and reality, and also relatively ignore information from other corners of the world. These problems may cause news information could not produce proper influence to the society, and these problems could remind us rethinking social role and function of the media in such a globalization and information explosion era.

Since the 1990s, because of development of internet and World Wide Web, promote the rapid spreading and exchange of global information, According to Goodluck [22], from 1960 to 1992, the amount of global information was only doubled every five years; however, with the popularity of smart phones these years in the internet era, the amount of global information will be doubled only within 73 days; McIlroy [23] pointed out that the amount of information in a newspaper today, is much more than the amount of information people needed in the 17th century, the information produced in the past 5,000 years is far less than the sum of the past 30 years. In an information explosion era nowadays, people worries about lacking of information no more, but don't know how to tell facts from error propagation. Especially in the era of a content farm and gossip news dominated, people perhaps have no time, knowledge background and energy to identify what should trusted, that why people still need the public media nowadays, through newspaper and TV news program, people could receive relative precise and correct information and update knowledge and understanding to the world and civilization that edited and reviewed by trustworthy journalist, editor and news agency, so that readers would not be alone to roam in the sea of information. So, at the final part of this study, we provide some suggestions according to our analyzing result; hope to help the media to keep their important adversarial and investigative reporting role and media's responsibility as a watchdog.

Suggestion to newspaper agency

1. Committed to improving news quality and stringency, this is exactly the difference between public news media and content farms or non-trustworthy web media, instead of rushing to grab real time news updates and exclusive news, otherwise when the reader is always in contact with the bombardment of low quality fast news, they will lose their confidence to the media.

2. Increase news sources and widen international vision, value media's social responsibility and social influence to people, instead of focusing only on the news wed click rate, realize media's role as a watchdog and social education

functions, and gain the trust from the society and the people. To keep the important market for deep readers, there'd be justifiability of communication between the civil society and the authority.

3. Pay more attention to the scientific research news, increase the coverage and frequency of scientific research news reporting, make scientific news have more opportunities to be known by the public, realize media's function of promoting readers' access to new knowledge and technology updating, and enable the scientific community and society to communicate with each other, and promote scientific research development and achievements to be understood more by the public, also helps scientists gain public support.

Suggestion to journalist of scientific news

1. Correctly indicate the reporting source of scientific research. So that could help readers interested to search more information for advanced reading, and also show deserved respect and credit to the research team.
2. Increase interpretation for research mechanism in plain words, to fit into the important social role of scientific knowledge education and science popularization. By using metaphors and metonymy, example of daily life, making scientific news reports more readable and understandable, shorten the distance between the public and knowledge, make knowledge more popular, and bring science closer to life understanding and social values. For unfamiliar issues or subject of knowledge, journalist should recheck with professional books, and try to invite authors of the research to express their opinion for news report writing for their research, or consult to other expert, strengthen cooperation and contact between the press and the scientific community, if possible [24].

Come to 21st century now, the scientific knowledge known by mankind is vast, even the smartest person could hardly go it alone. We human beings need superior popular science writers and reporters to interpret everything of nature and science for us. In addition, the popularization of education also makes people more accustomed to and more likely to see the world from a scientific perspective, many people are eager to know how the brain works to influence emotions, what the mechanism of viral infection is, the effects of cell and gene research on lifespan extension, like what we read in this study. Of course, this scientific literacy also includes an honest attitude to the limitations of science, in order to enable the public to have pragmatic expectations of scientific research. Taking "Research on Anti-aging Cells and Genes"

as an example, besides the exploration of biological sciences and medical applications, we also need to understand many other significant aspects such as philosophy, religion, and anthropology to get closer to the real picture [25]. After all, science news is not only new information releasing, but also spreading knowledge as a kind of social and cultural education tool [26]. Quality of scientific news does matter to science development and the world. How to promote newspapers to become a media that is more respected and recognized by the public? And to help scientific knowledge and its application to be more understood by the public is an important issue that needs cooperation of the scientists and journalist for this generation.

Conflict of interest

The authors declare that they have no conflicts of interest to disclose.

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*Correspondence to:

Yu-Ming Chen
The Master Program of Long-Term Care in Aging,
Kaohsiung Medical University, Kaohsiung City,
Taiwan
Tel: +886-7-312-1101
E-mail: yumingchen@kmu.edu.tw