Is Science Communication For Scientific Literacy?
Iodine Salt Rush-Purchasing Tide in China

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Abstract

After the 3.11 earthquake and nuclear accident in Japan, a big panic arose suddenly among many Chinese people who crashed into every shop to buy iodine salt, which looked like a real disaster happened in China too. On the basis of description of this iodine salt rush-purchasing tide, this paper analyzes the relationship between scientific literacy and science communication which disagrees the main opinion that Chinese people have so low level of scientific literacy that they couldn't judge the right way to face this emergency. However, general people showed their own rationalism: got a psychological sense of safety by a relative lower cost—several bags of salt. Scientific literacy is often not enough for concrete needs of individual person. The relative lower level of scientific literacy of Chinese people is not the reason for the rush-purchasing tide in China, and the orientation of science communication should be changed from an education model for improving scientific literacy (in fact it hardly does) to a service one for meeting the need and expectation of public.

This paper mainly divides into four parts, first simply portrays the general development of the iodine salt rush-purchasing in China which just followed with the tsunami and nuclear accident in Japan 2011, second describes the various response of media and expert opinions during and after the iodine salt rush-purchasing, third makes an analysis and discussion about the scientific literacy and science communication on the

basis of many news and reviews concerned with this issue especially from the perspective of communication study, and last part draws some conclusions and gives suggestions.

1

After the 3.11 earthquake and tsunami in Japan 2011, especially when the Fukushima Dai-Ichi nuclear accident happened, there were mainly two news on internet communicated very quickly in China, one was the iodine could be helpful to deal with nuclear radiation as Japanese government had distributed drug tablets of isotope iodine 131 to local residents around nuclear plants, the other was the nuclear radiation from Japan would pollute the East Sea of China and the salt in market which is produced from sea water will be unsafe and more expensive later on, if you don't buy iodine salt immediately you can't get it in the future--at least the quality of iodine salt won't be good as usual and will be more expensive. As a result, a dramatic panic arose suddenly and communicated so fast to each other among tens and thousands of Chinese people who then crashed into almost every shop, store and supermarket in different provinces, cities and towns to buy iodine salt, which looked just like a real nuclear radiation disaster also happened in China too.

This iodine salt rush-purchasing tide first appeared in Zhejiang province and Shanghai city which are along the east coast of China facing Japan directly on March 16, then spread quite fast to almost all over the country until to March 18 such as Yunnan, Gansu and Sichuan provinces which are the inner lands of China and thousands of kilometers away from the East Ocean side of China. During the climax of iodine salt rush-purchasing tide, a lot of people bought from several, to dozens of kilograms, even tons of salt to their homes, and when the iodine salt were sold out temporarily in a supermarket people then rushed to purchase right away such as iodine wine, iodine soy sauce, iodine tablets, and masks etc. A citizen in Wuhan City bought 6.5 tons of iodine salt to his home which could be eaten by him for 3561 years according to the calculation of a local newspaper. [i]A man in Zhejiang province even ate too much iodine salt in once time as he had planned to prevent the forthcoming "nuclear radiation" and died at last in

the emergency department of a hospital, becoming the first victim outside of Japan during its nuclear accident as reported. [ii]

As time went on, due to both the proficient providence of iodine salt on national market and limitation of individual purchase (two bags of salt which is about one kilogram for each person) by government, and also popularization of more rational information by mass media, new kinds of media and relative experts, the iodine salt rush-purchasing tide weakened gradually and almost disappeared on March 19 at last, and some people began regretting their purchasing action on impulse and asked to return back the more iodine salt they had bought home to supermarkets which caused another relatively smaller tide again of returning back iodine salt especially in the big cities of Guangzhou, Zhengzhou, and Shanghai ect.

2

During and after the iodine salt rush-purchasing tide, different media and experts gave various analysis and reflections. The main opinion was Chinese people have so low level of scientific literacy that they couldn't judge the right (scientific) way to face this sudden emergency.

Other opinions include such as public didn't trust on both government and experts; the information of mass media was a big mess and led to more confusions among general people particularly at the beginning of iodine salt rush-purchasing tide; usually ordinary people are irrational and just follow others blindly, etc. A very famous review on national media and those relative experts on internet was as following:

"The China Central TV (CCTV, the only national TV in China) said the Japanese Fukushima Dai-Ichi nuclear plant would not explode, then it exploded. The experts said immediately those two nuclear generator machines would not explode, then they exploded too. The experts said again that even nuclear plant exploded, its shell would keep it safe and sound, as a result there would be no nuclear radiation pollution at all, but the plant shell was blown away. The experts comforted us kindly that small radiation would not pollute environment, then Tokyo government announced that local nuclear

radiation level is much higher than safe standard! Just now CCTV broadcast again that China is surly safe and sound! My tears come down: should I believe it again?"[iii]

From this hot and famous review on internet, we can obviously understand that on one side, how the mass media and experts lost their both public and academic authority and on the other side, how the general people could not trust them again. And, one of the most interesting things is: how could this happen during the iodine salt rush-purchasing tide which continued only in a couple of days in China?

3

The iodine salt rush-purchasing tide in China is a very good case of science communication study of public concerning disaster. At the beginning of rush-purchasing tide public couldn't get right and enough information from government, mass media and experts, during the tide there was various and conflicted information which just caused more confusion, and among which no one had enough authority to comfort the public calm down. For example, in the announcements of many local governments (who usually collected professional suggestions from experts and controlled the local mass media) there was no information that iodine salt in fact couldn't prevent the nuclear radiation of isotope iodine 131, which showed that the governments (including traditional experts and mass media) didn't know the urgent need of ordinary people and basically lost in the science communication in some degree.

On the other side, from the public behavior of iodine salt rush-purchasing, general people also showed their own rationalism: got a psychological sense of safety by a relatively lower cost—several bags of iodine salt with only a little money; it's obvious that public had their own ways to deal with emergency situation which maybe not scientific but really work, they learned and imitated from each other and got both confidence and comforts from each other.

The governments (including traditional experts and media) "lost" in communication and the public "went" their own ways during the iodine salt rush-purchasing tide just show that the real problems both in "science" (literacy) and "communication".

3.1 Science communication did not improve scientific literacy and should not?

Many experts drew conclusion that the government and media should pay more attention on science popularization (SP)[iv] to improve the scientific literacy level of Chinese people. However, on one side science popularization has not improved the general people's scientific literacy level according to several national investigations first by Ministry of Science and Technology (MOST) and second by China Association for Science and Technology (CAST), on the other side, the aim of improving the scientific literacy level in fact never match the concrete needs and different expectations of people especially at an emergency.

The 8 investigations of Chinese civil (from 18 to 69 years old) scientific literacy (SL) have held individually in 1992,1994,1996, 2001, 2003, 2005, 2007 and 2009/2010, but only the three reports of investigation in 2001, 2003 and 2009/2010 were published. As the questionnaire of 2009/2010 is different from 2003 and 2004, so here we just cite and analyze the latter two reports. From the results of these two investigations we can see that the Chinese civil scientific literacy level increased obviously with the increasing numbers of formal education years of the public in school:

Figure 1, The SL percentage of Chinese people with different formal education stage[v]

Investigation Year / SL / education grade	Under primary school	Primary school	Middle school	High school or prof-school	College	University and above university
2001	0.1	0.0	0.3	1.6	7.0	11.5
2003	0.0	0.0	1.5	6.2	10.7	13.5

In China the general public accepting the systematic science formal education in school is only beginning at middle school stage, which means Chinese people who have just primary or under primary education in school could not get the science education experience, and these kind of people in China are more than 100 millions. The SL level of these people, which is contributed mainly by SP during their life span from 18 to 69, is nearly zero according to the investigations in both 2001 and 2003. So, SP in fact

contributes very little to the improvement of scientific literacy level of public especially compared with the formal science education.

Science communication now implies to respect, understand, negotiate with, cooperate with, and provide services concerning science for public. General public is not like the school students, first they have not enough time and energy to continue to learn so huge amount of scientific knowledge in this science and technology age and society, second the interests and needs of public concerning science are so various and also change frequently during their life span that just to improve the scientific literacy level of public is definitely not a cure-all.

And science communication does not mean communication scientist's science itself—the scientific knowledge, data, facts, theories are far from enough for various, concrete and urgent needs of every individual person, it's why we could observe that some people in Hong Kong, USA, Russia, Finland who are thought have much more higher level of scientific literacy than Chinese people, also crashed to buy iodine tablets, iodine salt and masks during the same days. [vi]Residents in Sakhalin Oblast (east of Russia) ran to purchase iodine wine, and any agent which has iodine, even general red wine was sold out too.[vii] In China, people both in Zhejiang province and Shanghai city which the iodine salt purchasing tide initiated are also at the higher level of scientific literacy compared with other provinces.[viii]

As a result now we'd better get a new orientation of SP today which means instead of asking people to get to master more and more science knowledge from scientists, it's quite suitable for SP nowadays to meet various needs of public such as material benefits, recreation expectation, and democracy right etc. concerning science issues in modern society.

3.2 Science communication: scientist, media or others?

During the iodine salt rush-purchasing tide the new media such as blog and "new experts" ---- professionals with expertise such as science communicators' websites and expert individual's blog played a different and more efficient roles than scientists in their uni-directional SP, which again asks us to rethink the relationship between traditional scientists and media.

Among the several classical theories of mass communication there is a basic model, which includes four elements:

Zhu Figure 2

information sender → information → communication channel → information receiver

Figure 2, model (1)[i]

[i] Denis McQoail and Sven Windahl(1981). *Communication Models for the Study of Mass Communication*. Longman Inc., New York. Chinese version(1997), p5

Figure 2, model (1)[ix]

From model (1), we can see that the information sender sends the information through the communication channel to the information receiver. But, in this traditional model there is a tacit premise which means that information producer is also the information sender, they are the same one. This is the case that in the early time of SP scientists played as both the scientific information producer and the scientific information sender, the most representative figures were such as Galieo, Michael Faraday in history.

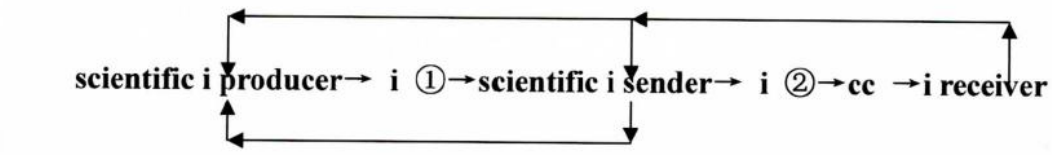
However, nowadays the popularization of science has been showing new characteristics. First, especially due to the appearance of television and internet, the media is playing an increasingly prominent role in the SP as media has become the first choice for public getting scientific information on one side, and scientists also have to rely on various media today to do some popular science works on the other side. Second, SP is also becoming a professional area, the content and style of SP also changed too which maybe a bigger challenge to scientists. Take the content for example, according to an investigation by Royal Society of UK on the attitude of scientists and engineers to science communication to public, “three quarters of the scientists feel able to communicate their own research, whereas slightly less than half of them feel that that

they are able to communicate the social and ethic implications of their research ".[x] These new changes will surely affect the ways and traditional role of scientists in the popularization of science.

In the modern activities of SP, we can often see that the scientific information producer and the scientific information sender have been separated. Scientific journalist, as the scientific information sender, more and more faces directly to the public than the scientist, and the latter as the scientific information producer, is often behind the journalist and provides various professional helps to him. So today it's not difficult to see both diversity and specialization trend of subjects of SP.

And then the author suggests a new model of scientific communication as following:

Zhu Figure 3



i: information
cc: communication channel

Figure 3, model (2)

In model (2), we divide "information sender" of model (1) into two parts: scientific information producer and scientific information sender; and divide "information" of model (1) into two parts too: information①and information②. And from model (2) we still can see the feedback from information receiver to both scientific information producer and scientific information sender, and feedback from scientific information sender to scientific information producer too.

From the new model of scientific communication, we can conclude that media workers (including scientific journalists, scientific editors, popular science writers, organizers of popular science work, scientific bloggers and twitters, etc.) who as the

scientific information sender will be the main, direct and professional subject of SP. Scientists, while as the scientific information producer, will be the indirect and unprofessional subject of SP.

So, the both diversity and specialization trend of subjects of SP are unavoidable especially due to the media development in this scientific and democratic society, during the iodine salt rush-purchasing tide we can see if the information from scientific experts or main media didn't meet the need of public, the latter would get and exchange information by other different media especially by new kinds of media, in which almost everyone can be the information producer.

4

In conclusions, the relative lower level of scientific literacy of Chinese people is not the main reason for the so called "crazy" and "stupid" iodine salt rush-purchasing tide in China. Nowadays science communication does not mean just to improve the so called scientific literacy of public which in fact has not been proved especially in the situation of China, and then every thing would be fine. In fact, science communication not only could not but also should not improve scientific literacy because today's science communication is a mutil-directional and interactive feeding back communication which should be between all the stake holders such as government, scientist, media, public, individual…

In suggestions, The orientation of science communication should be changed from the traditional top down propaganda / education model for improving scientific literacy to a service one for meeting the need of public: instead of asking public to improve so called scientific literacy, it's quite suitable to establish an efficient feeding back mechanism of meeting practical needs and various expectations of public from material benefits, recreation expectation, to democracy right concerning science issues in modern society.

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[ii] March 18, 2011, http://www.zaobao.com/zg/zg110318_004_1.shtml
[iii] May 18, 2011, http://www.science-weekly.cn/skhtmlnews/2011/4/1402.html
[iv] In China now, the government often use science popularization as an official term, the academic community usually use the term of science communication, however they mean almost the same thing.
[v] Data resource: 1 The Chinese civil SL investigation project team, The Investigation Report on Chinese civil Scientific Literacy in 2001, Beijing: Publishing House of Science Popularization, 2002, P60; 2 The Chinese civil SL investigation project team, The Investigation Report on Chinese civil Scientific Literacy in 2003, Beijing: Publishing House of Science Popularization, 2004, P20
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