



Lay readers in the Q&A column in a popular science magazine

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Abstract

Although studies on science popularization in recent decades have emphasized its difference from other science writings in its expert-lay configuration, and claim that the communication is not only a one-way simplification of knowledge but a two-way interaction, studies on this genre focus almost exclusively on the discourse of the experts. This paper bridges the gap by investigating how the lay public interact with expert scientists in order to explore how the public perceives their role and the scientists' role in science popularization. The data is drawn from the Q&A column in an influential science magazine in Taiwan, and linguistic strategies used in making requests for answers are analysed. Moves in questions over three decades are analysed, and the findings reveal that the changing attitudes towards science and scientist have had an impact on how the public interact with the experts and how the conventions of the Q&A column are understood and practiced by the genre users.

1 Introduction

This paper investigates how readers of popular science magazines interact with science experts in the Q&A column of the magazines. In the study of communication between scientists and lay people, the focus has always been on texts (oral or written) produced by scientists, especially in contrast with how they usually communicate with their peers, i.e. in academic science. The findings from previous studies suggest that in popular science, experts focus more on constructing solidarity with readers rather than preserving the negative faces of their audience (Myers, 1989; Parkinson & Adendorff, 2004), foregrounding people rather than events (Myers, 1994), and using more reader-friendly strategies such as second person pronouns, cohesive links, hedging, questions, etc. (Crismore & Farnsworth, 1990; Varttala, 1999; Hyland, 2005). Linguistic and communication studies on popular science have demonstrated that the genre is not simply a process of simplification of knowledge – for example, avoiding jargon, excluding complicated reasoning processes, as most people would have thought; rather, the genre has its own pattern of communication and genre schemas (Whitley, 1985; Nwogu, 1991; Myers, 2003). As argued by Myers (2003, p. 267), “popularization is a routinized social activity that has led to the creation of a number of fairly stable genres.”

While interaction between experts and lay public is often discussed in the study of popular science, the studies on readers' participation in science communication mostly investigate how they respond to experts' textual production, such as coverage in newspaper or science

policies, through survey, questionnaires or focus groups (e.g. Lowe *et al.*, 2006; Falchetti, Caravita & Speraduti, 2007; Lorenzoni & Hulme, 2009). However, there has not been any direct investigation on the texts produced by the lay public in their communication with the expert. This may be due to the difficulties in data collection. Voices of the readers of science books, magazines, or other publications of popular science are not often heard, let alone recorded. Identifying this gap, this study has selected the Q&A columns in science magazines as data, because they provide the most direct platform for interaction between scientists and readers, and are rich sources for the analysis of readers' voices. A corpus of readers' letters sent to the Q&A column in a popular science magazine in Taiwan, *Science Monthly*, over a period of three decades was compiled for the purpose of this study. The research question of this paper is: what linguistic strategies do lay readers in the Q&A column in this popular science magazine use to interact with science experts, and how do their choices of linguistic strategies reflect their perception of their roles and the roles of scientists? The analysis will be based on the model of move analysis proposed in genre studies (Swales 1990; Bhatia, 1993, 2004) and the act of making requests in pragmatic studies (Blum-Kulka, House, & Kasper, 1989). To situate the present study in its social context, the following section will consider the social changes in Taiwan during these three decades.

2 Science popularization in Taiwan in the late 20th century

This study is set in the late 20th century in Taiwan, from 1970 to 1999. These thirty years witnessed a significant shift in the relationship between scientists and the public, and the development of popular science writings is closely tied to the social and political background. When *Science Monthly* was published in 1970, the political situation in Taiwan was complex. For many intellectuals at the time, science was the only way to strengthen the country and to raise the status of Taiwan in the international community. It is against this background that a group of Taiwanese scientists studying in the U.S. decided to launch a science magazine for the public.

This group of scientists could be viewed as true intellectuals who intended to educate the public and to strengthen the country through science education, as the motivation behind this magazine was their love for the country (Lin, 2010, p. 20). The launch of the magazine met with huge success in the 1970s when scientists, especially those who had studied in the U.S., were viewed as elite members of society. In the seventies, only the top students with scholarships could afford to study abroad, so overseas Taiwanese students were highly privileged.

The success of the magazine did not last long, and very soon it faced financial problems, which forced the editors to reflect on the needs of the public and consider the best way for a science magazine to communicate with its readers. The anti-nuclear movement in Taiwan in the 1980s particularly enhanced people's doubts about whether science was neutral or a tool to meet political purposes. The authority of scientists seemed to be demystified. Against this background, there was a growing feeling of distrust in the scientific information disseminated to the public. The relationship between scientists and lay readers underwent even more significant changes in the late nineties, when Taiwanese people, as in other places of the world, gradually became aware of the negative impacts caused by the so-called science advancement, and lost their trust in scientists.

This developmental phase of popular science writing in Taiwan has seen changes in the way experts manage their relationship with the lay audience in order to achieve the purpose of

science popularization. The changes are particularly manifested in articles published in *Science Monthly* and in other media which argued that popular science writings in Taiwan were still not interesting enough, not easy enough to understand, and still did not appeal to readers. Solutions to these problems were suggested by editors, leading scientists, journalists, and even from readers. In the light of such significant changes in public attitude towards the value of science and the status of scientists, this paper examines how communication between readers of *Science Monthly* and its scientist-writers has evolved. To answer this question, this study has chosen to investigate the questions sent in by readers in the Q&A column of the magazine in this period.

3 Data

The data for this analysis are collected from questions sent in by readers to the Q&A column in *Science Monthly*. To explore how views have changed towards science and links to linguistic variation, we have selected the three decades from 1970 to 1999 for investigation because these decades mark one of the most significant changes in the attitude of the public towards science in Taiwanese society – from utter admiration to disappointment.

The Q&A column is used as a general term here, as the column has undergone several changes of name during the period covered by this study – which also interestingly reflect different perceptions of the notion of popular science. The Q&A column, named *Readers' Letters*, appeared in the first issue, but from 1975 to 1979 the column disappeared without explanation. In the March 1979 issue, the editor announced that the column would resume in response to requests from readers, but he did not explain why the column had been stopped.

In the 1980s, far fewer questions were published in the magazine. Both editors and other experts commented on the decline not only in the numbers of letters received, but also in the sales of the magazine. The *Science Monthly* editors linked this crisis to an increase in the number of other similar popular science magazines coming on to the market, especially well-presented translated foreign titles. For example, the Chinese translation of *Newton* had a glossy cover and contained colourful illustrations. Within *Science Monthly*, there was heated debate as to whether the magazine should be repackaged and the content made more appealing to younger readers, or whether, as most editors seemed to favour, it was important to resist such commercialization of science, i.e. to maintain all the formulaic and scientific terms in the magazine in order to present science knowledge accurately.

In 1985, the Q&A column was renamed *Readers, Editors, and Writers* to encourage dialogue between the three, but most of the letters sent into this forum were opinions from experts rather than questions from lay readers.

Owing to difficulties faced by the magazine, only a few letters were published in the 1980s and early 1990s. In 1997, a new column called *Science Talk* was launched. The purpose of this column, as stated by the editor, was to offer a platform for readers to pose questions and exchange ideas. One of the special features of this column was that readers were not only invited to send questions, they were also encouraged to answer other readers' questions. Moreover, the magazine provided prizes and rewards for those whose questions or answers were published. The new column was a success and the number of questions increased.

This study compiled three sets of data which roughly correspond to the three transition periods of the column: *Readers' Letters* (1970-1975, 1979), *Reader, Editors, Writers* (1980-

1985, 1996), and *Science Talk* (1997-1999). Our initial plan was to compare the changes of the genre across the three decades; however, the 1980s set only consists of 17 letters and is too small to be comparable with the other two decades. Therefore, we decided to focus on the comparison of the 1970s and the 1990s corpus in the following analysis. Table 1 below has the details of the two corpora.

	No. Questions	Word count
1970s	176	45,237
1990s	140	21,293

Table 1. Corpora size

A quick glance at Table 1 shows that although the number of letters in the 1970s corpus is only 26% higher than that in the 1990s corpus, the word count in 1970s is more than the double that of the 1990s corpus. This shows that the average length of the letters in 1970s is longer than in the 1990s. The analysis below will show that the difference is closely related to how readers in these two decades chose to interact with experts in different ways, and therefore through different linguistic strategies.

4 Features of Q&A columns

The study also bears in mind that interaction between writers and readers in our corpora are realized in the genre of the Q&A column. This means that the analysis of interactive linguistic features cannot ignore the potential generic constraints on the column. Society's attitude towards science and scientists influences how questioners perceive their relationship with science experts in our study. Questioners' writing is further constrained or influenced by the genre in which their questions are realized, i.e. the Q&A column in a popular science magazine. It is important to be aware that the questioners do not have unlimited linguistic resources to achieve the interactional goal because of generic conventions. Below, the Q&A column will be discussed in terms of the communicative goal, the generic conventions, and the relationship between genre users.

The most straightforward goal of the questioners in this forum is to elicit answers from their addressees. To be specific, each question carries out an act of request, which, in its broad sense can be defined as “an attempt by the speaker to get the hearer to perform some action by virtue of the hearer having recognized that such an attempt is being made (Jacobs & Jackson, 1983, p. 287).” In this sense, the act of request can cover from the weak illocutionary end of *invitation* to the strong illocutionary force of *order* (Bargiela-Chiappini & Harris, 1996, p. 640). Some letters in our corpus contain explicit linguistic expression of requests, whereas others do not. However, given that the purpose of this forum is to invite readers to send their questions to science experts to answer, we can assume that all the questioners who send in their questions to the magazine are at the same time asking for answers.

Second, the texts in the Q&A column are presented in a unique format (Kreuz & Graesser, 1993; Locher & Hoffmann, 2006). The most notable feature of these written Q&A forums in

the mass media is that the interaction only involves one exchange, i.e. one question followed by one answer, both of which are usually restricted in length. This generic constraint may contribute to some interactive features in our corpus which are against the norms of request which are often found in other studies. For example, previous studies on requests or interaction in general all point out that deductive patterns are preferred in Chinese (Hong, 1996; Scollon & Scollon, 2001; Dong, 2008). Before making explicit the interactional goal, it is common to have pre-grounders (such as apology, compliment, justification, etc.) which pave the path to the request acts. However, in our corpus, it is found that request acts are often presented at the beginning of a text, usually just following addressing and greeting. One of the reasons accounting for this unconventional interactional pattern may be related to the fact that the questioner only has one opportunity to make the request and does not have the opportunity to explain or develop the writing. Therefore, it is important to make the intention explicit enough for the answerers to notice it. To effectively achieve the communicative goal, text participants are required to be familiar with the generic conventions of a Q&A column, and to textualise their letters in a way that is acceptable in the genre.

Another feature noted by the studies of advice columns is that the letters sent to such forums are open letters, and this feature has an impact on how genre users construct a mutual relationship. The letters may be addressed to a specific person, but both questioners and answerers know that the letters are read by many people, including the addressees, editors, and all readers¹. The influence of this feature on interactants is that they are clear that their private interaction is seen by others (or even participated in, such as by the editors). Therefore, their choices of interactive strategies are not only based on how they perceive each other as individuals, but even more on how the community (the scientists' community, the public, etc.) perceives each other. This feature of interaction further justifies our choice to investigate the social role of the public and the scientists through the study of exchanges between individuals.

5 Analytical framework

To achieve an effective communication, participants need to make assumptions about their addressees or any people involved in the context, and how the addressees or others may perceive them (Scollon and Scollon, 2001, p.35). These assumptions on respective roles can be encoded in a wide range of linguistic resources from which a speaker can choose to perform the most optimal communication with their target audience. Address terms, for example, are one of the most easily recognized devices of such kind. However, the interpersonal assumptions can also be realized in larger linguistic units, such as move structures, which, according to Swales (1990) is the basic unit of a genre. The analytical framework of this paper is based on move analysis, while also consulting the model of requesting strategies by Blum-Kulka, House and Kasper (1989).

¹ This audience can be understood as "referee group" in the model of audience design (Bell, 1984), which in a written context can be defined as "any third-party group (or discourse community) whose attributes, including their speech/writing style, are valued by either the addresser or the addressee or both" (Mason, 2000, p. 6). Although other readers of the magazines may not seem to be direct participants in interaction in the Q&A columns, they may still have an influence how text producers select their communication strategies.

5.1 Moves analysis

From the perspective of genre studies (Bhatia, 1993, p.13), we can see texts in our corpora as instances of structured and conventionalized communicative events with their own communicative purposes identified and understood by the genre users. Thus, texts can be analyzed into a series of moves, each "serv[ing] a typical communicative intention which always subservient to the overall communicative purpose of the genre" (ibid, p.30). Move analysis has been widely used as an investigating tool in genre studies to capture the macro-level text pattern in various professional settings (e.g. Zhu, 2000; Vergaro, 2005; Ding, 2007; Ho, 2011).

Moves in this study are defined as units of the texts performing a particular pragmatic function which are related to the communicative goal. In genre studies, it is maintained that shared communicative goals among genre users give rise to the conventionalized features of the genre, including the move structure. Therefore, we can hypothesize that since the social context of our selected data has changed over the three decades and resulted in different relationships between the genre users, these changes will also lead to different patterns of moves. The analysis below aims to investigate the interaction between experts and lay people by identifying what rhetorical moves are involved and how they are structured to achieve different communicative goals in the 1970s and in the 1990s.

5.2 Making requests

To assign the rhetorical functions of moves in the Q&A column, we have reviewed various studies on the act of requests, mainly based on Kulka, House and Kasper (1989), but also others who have applied the framework of request moves to various written genres, such as Kong (1998), Dong (2008), and Ho (2011).

Requests are often achieved through a sequence of moves, such as alerters (such as address terms), head moves and supportive moves. A head move is "the minimal unit which can realize a request" (Blum-Kulka, House and Kasper, 1989, p. 18), and can in itself perform the act of requesting. However, text producers often employ other moves to mitigate the potential threat of making requests to other people. Supportive moves are defined as those units of texts which do not form part of the core act of requests but help to realize the goal (ibid, p. 17). Some supportive moves identified in previous studies include attention getters, preparators, grounders (giving reasons for the request), disarmers (indicating awareness of a potential offense), promises of reward, imposition minimizers, etc². In our corpus, we will identify the function of each move by considering what roles they play in achieving the overall communicative goal of requesting an answer.

Based on this analytical framework, in the following, we will first identify the moves used by the questioners to request an answer from the experts, and compare the percentages of these moves in the 1970s and the 1990s. Next, we will explain how different patterns of moves in the two decades are related to the social changes discussed in section 2.

² A comprehensive list can be found in the CCSARP coding manual in Blum-Kulka, House & Kasper (1989).

6 Findings

6.1 Moves identified in the corpus

Based on the key studies mentioned above along with some other studies which apply labels to their analysis, we went through the corpus and identified 12 moves. Apart from the statement of questions, not all the moves appear in every question. These moves are labeled and explained in table 2:

Moves	Explanation
Addressing	Address terms include the names or titles of the addressees, and usually occur at the beginning of the questions. The questioner may address the editors, the magazines, the general (e.g. everybody), or a particular person (e.g. Professor Li).
Self-introduction	The move involves information about the questioner besides their name in the signing off, for example, their occupation or age.
Compliment	This move may include a compliment on the quality of the magazine in general, or on the achievement of a particular scientist.
Head acts (Request proper)	This move is the minimal unit required in making requests. Questioners express their intention to request a response explicitly through specific syntactic structures (e.g. imperatives), verbs (e.g. <i>ask</i>) or modal verbs (e.g. <i>must</i> , <i>have to</i>).
Questions	This can be regarded as an information-oriented move and describes the scientific questions of which the answer is requested. This is the only move which is included in every letter in our corpus.
Proposed answers	After the description of questions, some questioners proposed what they thought might be the answers. When this move is included, the questioners often request for correction or confirmation.
Convincing strategies	Some questioners further explain why they need an answer from the magazine, in an attempt to persuade the addressee for a response. For example, a questioner may emphasize that he/she has been given different answers from various teachers and really needs an expert who can give him/her a definite answer.
Acknowledgement of trouble	The move shows acknowledgement to the time and efforts spent by the answerers in advance.
Self-denigration	In this move the questioners lower their status

	and thus elevate the status of the answerers, which is a typical feature in Chinese politeness (Pan and Kádár, 2011). For example, “ <i>I am only a high school student, and naturally have only limited knowledge and understanding. Therefore, there must be deficiencies or mistakes in my proof.</i> ” ³ The move is commonly used when proposed answers are given in the letter.
Wishes	This move is conventionally used in the ending of letters. Formulaic expressions of wishes are commonly used in formal Chinese letters, which usually indicate the relationship or hierarchy between the addressers and the addressees.
Thanking	The move expresses gratitude towards the addressee and in the corpus they often appear at the end of the letters as a closing move.
Sign-off	In this move, the questioners give their names, followed by ending verbs such as <i>jìng shàng</i> , similar to the expressions such as <i>yours truly</i> in English, but often embodies indication to the relationship or hierarchy between addressers and addressees.

Table 2. Request moves in the corpora

6.2 Frequency of moves

Based on the thirteen moves listed, all questions are manually checked for labelling of moves which perform the identified pragmatic functions. The percentage of letters which contain a certain move in a corpus is then calculated. The quantitative findings of the two corpora are presented in table 3.

³ All the examples taken from the magazine *Science Monthly* were originally written in Chinese, and were translated into English by the author.

	1970s	1990s
Addressing	94%	94%
Self-introduction	16%	11%
Compliment	6%	4%
Request	78%	67%
Questions	100%	100%
Proposed answers	23%	0.7%
Self-denigration	6%	0.7%
Inconvenience	3%	1%
Convincing	13%	5%
Wishes	21%	7%
Sign-off	94%	91%
Thanking	1%	31%

Table 3. Frequency of moves in the corpora

Table 3 shows some interesting figures which are worthy of further exploration. First, "question" is the only moves that all letters have, which suggests that other moves all seem to be optional in this genre, for the communicative goal of requesting an answer. Second, the 1970s corpus has a same or higher percentage in all moves than in the 1990s corpus, except in the move of "thanking". In particular, the 1970s corpus has much higher percentages than the 1990s corpus in proposed answers, self-denigration, and wishes. The next section will further discuss these salient quantitative differences by considering the co-text and the social-historical context.

7 Discussions

The implication of these moves on the interaction in the two decades will be analysed below in terms of the communicative goal, the generic convention, and relationship between genre users, to explore how the nature and function of the Q&A column has changed.

7.1 Communicative goal

As we have pointed out, the communicative goal of the Q&A column is to request answers from experts. The first observation made from table 3 is that in order to achieve the interactional goal, the only move which seems to be compulsory and therefore used in all

questions in both corpora is the description of questions. This may be explained by the fact that in the context of the Q&A column, all genre participants are aware of this shared communicative goal, and therefore, to request an answer in this column, the readers do not need to make their request explicit, or to necessarily follow the convention of a letter (i.e. addressing, signing-off, etc.).

If the description of the question itself is enough to request an answer, i.e. to fulfil the generic conventions as shared and understood by the community members (the editors, the experts, other readers, etc.), it can be argued that the other moves should all be considered as interaction-oriented rather than information-oriented. The function of such interaction-oriented moves is to contribute to the establishment of an interpersonal relationship with the addressees, which may then persuade them to provide an answer. Example 1 illustrates how a high school student presented his question to the editor.

Example 1 (1970s corpus)

Mr. Editor:

I have a question in the field of biology to ask you. I hope that you can grant me an answer. I am a second-year student in Provincial Kee-Lung High School. Last year when I was in the first year, we had a biology class...[followed by a long description of how he wanted to test a theory but failed in the experiment]...I almost lost my confidence. By accident, my teacher introduced me to your publication "Science Monthly". After I had a quick glance, I was so excited. I have finally found the science magazine I have dreamed for; and I have found a column where my question can be answered – "Readers' Column". Therefore, I would like to ask for your advice.

Chen Yi-De, respectfully

In this example, the text producer uses a series of moves to collectively achieve the communicative goal of requesting an answer. The letter begins by an explicit head act of requesting (*have a question to ask you*), followed by an expression of wishes (*I hope that*), and raising the status of the others by self-denigration (*granting me an answer*). Then, the questioner introduces himself and presents his question in a long story of his experience in the biology class in the school. The letter writers' personal background and the story of problem-encountering may not seem directly relevant to achieve the goal of the communication, but they help construct an interpersonal relationship between the questioners and the answerers – and may be considered by the letter writer as a way to persuade the science experts to answer the question. Finally, the letter closes with the moves of compliment and another clear act of request. This example demonstrates how interaction-oriented moves are built by the letter writers into the communication. The example below presents a much shorter letter which contains fewer moves.

Example 2 (1990 corpus)

Everyone must have the experience of passing through a tunnel in a car. Why is that when inside the tunnel, the car window becomes like a mirror? Outside the car (i.e. in the tunnel) it is supposed to be dark. Why does light reflect but not transmit?

In example 2, the first sentence can be considered an implicit interaction-oriented move, which appeals to the experience that is assumed to be shared by all readers. However, the letter can be read as a description of question without any other explicit interactional moves, such as addressing, signing off, or expressing gratitude. This is in contrast to example 1, and

shows how the communicative goal of requesting an answer can be achieved with only one move.

Table 3 has shown that in the 1970s corpus, the percentage of all moves, except for the move of thanking (which will be discussed in 6.2), is equal to or higher than those in the 1990s corpus. It is clearly reflected in table 1 that the 1970s corpus has a much higher word count per letter than in the 1990s corpus. The finding suggests that in the 1970s, readers adopted more interactional strategies to request answers than those in the 1990s did. In other words, the 1990s readers simply present the information of the science question when requesting their answers, whereas the 1970s readers expended more effort negotiating their relationship with the addressees, presumably in the hope that the experts would therefore be more willing to provide answers. The different strategies for making requests may be explained by the fact that making a request is generally seen as a “face-threatening act” (Brown & Levinson, 1987), and making requests involves consideration of the relative position of requesters and requestees, in terms of power, social distance, and the weight of imposition. In this case, taking the social context into consideration, we may explain that the privileged status of scientists in the 1970s was perceived by readers as powerful and socially-distant, and therefore they felt the need to use more interactional moves to avoid potential offence to their addressees; whereas in the 1990s, the more direct requesting acts suggest that addressees did not perceive their answerers to be as powerful and distant as those did two decades ago. In other words, lay people's perception of experts has a clear impact on the generic structure of the Q&A column in a popular science magazine: to achieve the same communicative goal, moves to mitigate face-threatening acts by making requests are understood and practiced by most genre users of the 1970s corpus as an essential generic feature, but not by those of the 1990s corpus.

7.2 Genre conventions

Although the 1970s corpus features an equal or higher percentage in almost all moves in making requests than in the 1990s, the exception is the move of thanking. As a commonly used politeness strategy, it is only used 1% in the 1970s corpus, but has a much higher percentage of 31% in the 1990s corpus. The move was used most before the signing off. The reason for this might be that in the 1970s corpus the most common move before signing off is the move of giving wishes (21%), whereas only 7% give wishes in the 1990s corpus. The difference between performing the moves of wishes and thanking can be related to the generic conventions, that in which questioners chose to embody the act of request. Wishes are more often associated with letter writing in Chinese, especially those formulaic wishes which indicate the relationship between letter writers and addressees; whereas thanking as a closing move in written interactions is more often seen in quick exchanges of information and the register is usually less formal. Examples 3 and 4 show the contrast.

Example 3 (1970 corpus)

Mr. Editor

I have several questions and would like to bother the honourable magazine to solve them.

[Question]

Best wishes for the publishing company.

Reader Du He, respectfully.

Example 3 shows the format of a formal letter in Chinese, which is particularly featured in its closing remarks: a standard expression of wishes, and a conventional form of signing off. In formal Chinese letters, the choices of such closing remarks are highly standardised and are strictly governed by interpersonal relationships, for example, according to different family members (grandparents, parents, elder or younger family members), or different occupations (businessman, teachers, etc.). These features, however, disappear in less formal exchanges. Example 4 represents a more informal writing style, showing the features of a quick exchange of message.

Example 4 (1990 corpus)

Science Monthly:

The photos of the moon show clearly dark and bright zones. May [I] ask, what are the names of the two zones, and what are the substances that form the two zones? What are the causes? Thanks!

Cheeky Pig from MiaoLi

The formulaic closing remarks are replaced by just a word *thanks*, and the closing-off phrases which indicate interpersonal relationship are omitted in this example. A close investigation of self-reference may also show similar features to those in advice columns or pen pal letters, which were popular among youngsters in Taiwan in the 1990s, as shown in example 4 (Cheeky Pig).

The different moves to close the letters also tell us how the Q&A column was perceived by the questioners in the two corpora, and therefore influences the generic conventions they chose to follow. In the 1970s, most questioners chose to present their questions in the format of letters, and to follow the conventions of letter writings. A set of moves are therefore expected, such as the formulaic opening and closing of the letters, and wishes towards the end of the letters. More formal linguistic expressions are used to construct a socially distant relationship. On the other hand, the format most often adopted by the questioners in the 1990s tends to be shorter and less formal.

In terms of written convention, we can argue that because questioners chose the genre of short messages, their language was inevitably less formal and more straightforward. However, the choice of genre should also be regarded as a reflection of how questioners perceived their relationship with their addressees.

7.3 Genre users

Next we would like to further explore how questioners perceive the lay-expert relationship. This relates to the two most significant differences in the moves of proposing answers and giving wishes.

The move of proposing answers features in 23% of the 1970s corpus, but in only 0.7% of the 1990s corpus. In the questions containing this move, the questioners presented a question first, and then proposed the solutions they had in mind to the answers. This move may not seem directly related to the interaction between questioners and answers, but they often changed the type of requests being made. It is found that in such letters, questioners tend to make requests for corrections or directions (e.g. *That is how I reasoned. Please correct it*). Presenting one's own answers are also related to more uses of other interactional moves, such as being humble, as illustrated by example 5.

Example 5 (1970 corpus)

I am a high school student, and have not received strict training in physics. There must be many mistakes inside. Please [you] direct and correct [me]. Thanks.

A letter like this resembles very much a teacher-student interaction. Further evidence of the classroom discourse embodied in interaction in the 1970s corpus is supported by analysing the calls for letters made by the editors of the magazine. Below is a typical message from the editors in the 1970s.

We particularly welcome readers to raise questions over which they have thought. Your letter will preferably present the process of reasoning and the difficulties encountered, in order to provide a reference for answers and joint efforts in solving the question. The scope of this column excludes those exercises in the textbooks or those with answers which can be easily found in the high school textbooks - excepting those questions of particular value or beyond the level of the textbook.

The editors made reference to the classroom setting, such as "high school textbooks". The authoritative tone was also clear throughout this announcement, specifying what was expected and what was not accepted, reminiscent of how a teacher talks to students about an assignment submission. The editors' words indicate the power of the answerers over the questioners. On the other hand, questioners also constantly refer to their science education, demonstrating how they applied the textbook knowledge in their attempts at solving science questions. Many described experiments they carried out in school and discussions they had with peers or teachers. All these rhetorical moves and lexical features suggest that popular science in the 1970s seems to be perceived by the genre users as an extension of classroom science education, and this understanding is jointly shaped by different genre participants – firstly initiated by the editors (through the call for letters), and then consolidated by questioners through following the same classroom terms. Therefore the teacher-student interaction was used as a model by the genre users in the 1970s. Moreover, respecting the answerers as teachers also reflects the prevailing admiration for scientists in society. The public attitude towards scientists in the 1970s influenced how readers chose to interact with the answerers in a public forum in a magazine.

Following changes in society (i.e. the crisis in the reputation of scientists) and in the magazine (a drop in sales), a different relationship between genre users was shown in the call for letters made by the editors in the 1990s:

“Science Talk” is a forum provided to readers for questions and exchange of knowledge. Please [everyone] dig out some interesting questions from your life and process of learning. Exchange your thoughts through the method of group discussion. Do not worry that your questions are ignorant; do not worry that your answers are not professional enough. We sincerely hope that readers can react passionately and join together to help the seeds of science bud and grow. [...]

Prize: Those who send in questions can receive one A1 poster of astronomy or one copy of a book on science topics. If your opinions or thoughts are published, the publisher will pay rewards.

The classroom discourse from the 1970s has shifted to a promotional discourse. The call for papers in this period read like an advertisement with the purpose of attracting customers, by persuading them not only linguistically but also materially (with rewards offered). The role adopted by questioners and answerers in this decade resembles the relationship between customers and service providers. The questioners were no longer powerless, because the magazine needed questions as much as or even more so than the questioners needed answers, in order to increase sales, for example. Also, by inviting readers to participate in answering questions, the boundary between the answerers – being high up in the social hierarchy whereas the questioners were low on the ladder – was also blurred. Therefore, the power relationship between genre users changed.

Questioners are released from the classroom interaction with teachers high up, and are engaged in a promotional activity launched by a commercial magazine. Compared with the 1970s corpus, the 1990s corpus features shorter questions (as indicated in the corpus word count), less interactional moves, less proposed answers, and a more informal style, and sometime even challenge the role of scientists, as shown in example 6.

Example 6 (1990 corpus)

All editors, please allow me to ask another troublesome question:

Regarding the HIV viruses which are difficult to tackle, since scientists already know that they are mutations to fight against medicine or other substances, can [scientists] not find out the ways to control the genes or to amend them? I know this may be easier said than done, but someone must have thought about this, no?

[...]

Duck from YiLan, who even goes to sleep with Science Monthly in her arms

This question seems to move away from asking about scientific knowledge to asking about the capability of scientists. In the 1990s, readers show more interest in the practical uses of science or its impact on society rather than simply pursuing science as pure knowledge. Readers' perception on the value of science therefore leads to a change in the generic structure of the Q&A column, and this has an impact on all genre users. Not only has the readers' understanding of what moves are necessary in the genre changed, the editors and the experts' management of the Q&A column has also changed.

8 Conclusion

Although this study is restricted to the context of the late 20th century in Taiwan, in this set of data we have demonstrated that the way genre users perceive each other can have a significant impact on the generic features. Our data covers a period in Taiwan when the public attitude towards scientists shifted greatly, and the analysis of request moves in the two corpora (1970s and 1990s) has shown that generic features of the Q&A column were understood differently by genre users, and therefore led to different generic features.

Although the analysis in this section is divided into three genre aspects, they are actually all related to and influenced by one another. For example, because a reader saw the interaction as a student-teacher interaction, he/she would use more interaction-oriented moves to soften the face-threatening acts of making a request, and the generic format he/she chose would be more formal. On the other hand, a reader who felt they had the right to ask a question in the magazine, would probably think it unnecessary to build up an interpersonal relationship with the answerers, and a quick message a more suitable form for this communicative purpose.

Overall the different profiles of moves in the two corpora reflect the impact of the social changes on how lay readers chose to interact with science experts in a public forum. In the 1970s, the questioner modeled the communication with scientists on classroom interaction, and therefore chose a formal genre (letters) and adopted more interactional strategies to build up a relationship with the answerers. Moves which function to value science and scientists and to mitigate face-threatening acts were perceived by genre participants as a norm, and were shared practice in most letters in the 1970s. In the 1990s, we notice that texts produced by both editors and readers show features of promotional genres and we argue that the relationship between genre users seems to have shifted to the model of service providers and customers. This is reflected in shorter questions with far fewer interactive moves, and the choice of messages as the communicative vehicle. Although still aiming to achieve the same communicative goal as in the 1970s corpus, the generic conventions understood and practiced by community members have changed significantly.

Overall, this study presents the picture of the other side of expert-lay interaction in popular science. While scientists have gradually moved from information-oriented and detached interaction to more involved and interpersonal style in their writing to the public, as suggested in previous studies on popular science (e.g. Crismore & Fransworth, 1990; Hyland, 2005). This study shows that the lay public has moved away from building up interpersonal relationship to a more direct and information-oriented styled in their writing to the experts. It seems that this trend of doubt on the value of science or trustworthiness of scientists continues to prevail until now. However, the nature and functions of the Q&A genre can also be influenced by other factors, such as the mode of communication. Many science magazines now have interactive forums on their websites or other social networking platforms. It would be interesting for further studies into the interaction between experts and lay science readers to investigate whether the generic features of the Q&A column have continued to change in the past decade under the influence of these new modes of communication.

9 References

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