Chapter 5

(Medical) commercial communication (advertising): theoretical principles of advertising applied to biomedical science communication on predictive DNA diagnostics

'Making a decision on medical issues is often too complex to be left to the lay person.'

(Mol, 2006a)

This chapter is submitted as:

Contents

Preface

This chapter on (medical commercial communication (advertising) differs in its morphology from chapter 3 and 4, although there is no difference in analysis. This chapter is a prelude to practical instruments, like the questionnaire in chapter 6. Practical instruments bridge the gap between theory and practice. Fundamental to bridging this gap is the availability of relevant and validated research information that is easily accessible to the biomedical science communication professional. In the medical domain the Cochrane Library is such a database, containing relevant, validated and available research for medical personnel. We make a case for the development of a similar database for science communication, in particular for biomedical science communication on predictive DNA diagnostics. This chapter is written as an example of a review article on the subject of the comparison between commercial communication and biomedical science communication on predictive DNA diagnostics. In the future, a select committee from the international domain of science communication should be enabled to write such review articles. Though there is no healthy life at stake, there is a lot of (taxpayer) money wasted on ineffective communication campaigns on science and biomedical science developments. The practice of biomedical science communication could be supported by: 1) a database with reviews with the highest convincing power (relevant and valid)[1]; 2) an instrument that poses questions about the design of an effective communication process.

As we did for the other chapters, for this chapter we consulted two specialists on commercial communication (advertising), Dr. Bob Fennis (Twente University) and Dr. Enny Das (VU University Amsterdam), for guidance in finding a proper starting point on this subject. We have validated 30 articles, as described in chapter 2.

Abstract

Nothing in communication makes sense, except in the light of cultural and basic notions.[2] This is the main issue and aim of this article on theories of commercial communication translated and applied to biomedical science communication to a lay audience on predictive DNA diagnostics. The research is based on systematic literature research. We found that as in medical commercial communication, medical communication should use irrelevant information rather than factual information in order to reach a target audience. Contextual information, emotions and fears are the elements that matter in all phases of an effective biomedical communication process. Commercial communication distinguishes between brand and product, and this can be applied to biomedical communication, distinguishing between brand (genomic based health protection) and product (preventive DNA diagnostics). We conclude by proposing a dynamic model for analysis, using a pair of scales with multi levels in which these theories and notions from commercial communication are applied to biomedical science communication. However, as we found theories from commercial communication cannot be directly translated to biomedical science communication due to ethical constraints.

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[1] These databases are different from sites such as DISCERN and ACCE, as described in chapter 1. The literature review database is on the design of an effective and/or manageable biomedical science communication process, whereas DISCERN and ACCE do not provide insight into the development of a process or strategy of effective communication with an audience on this issue. A process or strategy in wich for example the notions of the audience are taken into account

[2] Taken from the idea of Dobzhansky (1962): 'Nothing in biology makes sense, except in the light of evolution.'

5.1 Introduction

The practical connection between developments in genetics and commercial communication is new, though the pharmaceutical industry has a long tradition of commercial communication (Pieters, 2004). Pieters writes from the historical point of view:

> In 1903 Bayer as well as Merck had a special research and development department which made thoroughly medical commercials. This was about brochures, advertorials, and magazines. But also lectures and letters to medical doctors were implemented. By using a direct marketing system the pharmaceutical industry tried to differentiate themselves from other medicine suppliers. They tried to create a medical scientific image (p. 8;15).

Over the years the pharmaceutical industry modernised and expanded its commercial communication activities as other industries did. A new and special form of commercial communication has arisen: the communication on the possibilities of predictive DNA testing. There are already several 'do-it-yourself –kits' which can be obtained from the drugstore and are then analysed in the lab. For example, Myriad Genetics in the US started a commercial campaign for a BRCA-1 and BRCA-2 mutation test. These new developments have been critically followed (Gollust et al, 2002).

In a recent article, Mol (2006) has written that making a decision on medical issues (like the possibilities of predictive DNA diagnostics, mvds/fm) is often too complex to be left to the lay person. The logic of making choices may be different from the logic of care. Despite the constraints concerning the impact on society and the individual, the theory of medical commercial communication that has developed over the years might provide a basis for effective biomedical science communication.

The aim of this article is to link theoretical developments in advertising research to the development of biomedical science communication on predictive DNA-diagnostics, while considering the ethical constraints described above.

This comes close to the literature on social marketing. Social marketing is often discussed and researched within the domain of health communication (Kotler et al, 2002; Van der Sanden, 2007). Kotler et al (2002) write:

> Social marketing is the use of marketing principles and techniques to influence a target audience to voluntary accept, reject, modify, or abandon a behavior for the benefit of individuals, groups, or society as a whole (p.5).

However social marketing, based on the 4P´s (Kothler et al, 2002) like: price, place, product, promotion differs from commercial communication. Advertising, according to our opinion, belongs to the communication domain whereas social marketing is attached to the marketing domain. The translation of theories from a communication domain (commercial communication) to another communication domain (biomedical science communication) is more ´safe´ than translation from a marketing domain to a communication domain. Therefore we focus on commercial communication as a communication domain. Off course the P of promotion (marketing communication) bridge these differences between marketing and communication and commercial communication could be considered as a tool of marketing communication. The comparison between those fields however is not subject to this article. Comparison between social marketing and biomedical science communication in particular and science communication in general could be carried out in the future research.

In this paper, we will address the following question: which theories and concepts from commercial communication could be useful to improve the effectiveness of biomedical science communication in general and biomedical science communication on predictive DNA diagnostics in particular?

First, we address shortly the developments in genetics and predictive DNA testing according to societal developments. Then we describe our findings obtained from the systematically searched and validated consolidated literature (mainly textbooks) on commercial communication and the systematically searched and validated unconsolidated literature (mainly research articles from scientific journals). As explained in methodological remarks in this article, the literature used is ranked by its validity and relevance regarding the research questions of this article. We conclude by presenting a model for biomedical science communication based on a multi-level pair of scales.

5.1.1 Medicalization

With or without commercials directed at consumers, the rise of DNA diagnostics means that many people will get in contact with predictive tests, for example for Alzheimer's disease (McConnell et al, 1999), for which a test has become available. Conrad (2005) argues that genetics has become a cutting edge of medical knowledge and has moved to the centre of medical and public discourse about illness and health. The biotechnology industry has had its ups and downs, but it promises a genomic, pharmaceutical and technological future that may revolutionise health care (Fukuyama, 2002). Predisposition is a malleable concept that changes when transferred from clinical genetics to social policy (Nelkin and Lindee, 1995). This may eventually even lead to what has been called medicalisation. According to Conrad (2005), medicalisation is a complex of social forces, whose essence is definitional: defining a problem in medical terms, usually as an illness or disorder, or using a medical intervention to treat it. Due to medicalisation for example the doctors role changes. Conrad (2005) writes:

> Doctors are still gatekeepers for medical treatment, but their role has become more subordinate in the expansion or contraction of medicalisation. Medicalisation is now more driven by commercial and market interests than by professional claims-makers (p.8).

Within this social-medical complex, one can distinguish the non-patient, not-yet-patient and the patient (Nelis, 1998). These groups of patients could be further segmented as the socio-medical position of the target audience is related to their fears and basic notions (Van der Sanden and Meijman, in press). Basic notions like their attitude regarding technology or the way they prefer medical treatment based on natural and artificial drugs. Gollust et al (2002) claim that the public understanding of genetics is characterized by misconception and exaggerated expectations. These preconceptions are mainly a matter of social context both at the individual level and that of the society (Nelkin and Lindee, 1995). One of the constraints to communication therefore is the cognitive and emotional connection of the lay audience with genetic tests, which may limits the effectiveness of the biomedical science communication process.

5.1.2 (Biomedical) Science Communication

The theoretical basis of science communication, and biomedical science communication in particular, has not been widely investigated (Dierkens and Grote, 2003; Gregory and Miller, 1998). However in a transactional, negotiable world of ´modern´ biomedical science communication, knowledge of the receiver's context is necessary for example. What does medicalization mean to the science communication process? The communicator needs to know the audience's basic notions about such things as health, illness, and medical care.

Some segments of the public may be afraid of new developments in medical care and wish to limit them. On the other hand, others may have the basic notion that all developments in science and technology are

useful. Such a target group will see developments in science and technology as a panacea. However, to convince a public that is not involved in the issue that they should use a predictive DNA-test in a certain way, an informative text will not be effective. Even telling the public how to find information might not be of any use. Eurobarometer research (Miller, 2004) has even shown that television documentaries about genetic developments do not improve science literacy about genetics. An article in a Dutch newspaper told about a woman who had her nose corrected before she had children, just to be sure that her children would not have a nose like hers. Lamarck revisited.

As many authors have already stated, the complex social psychology of scientific knowledge, where notions, emotions and cognitions interact, requires that (biomedical) science communication develop new theoretical concepts and instruments. Commercial communication may show us some of these concepts. Not only are communication targets like informing, convincing and motivating an audience comparable to those in science communication. The cognitive and affective aspects of advertising (attention, interest, etc.) are also important in biomedical science communication, and the mass communication character of both fields has a similar structure and process. Similarly, providing a target group with their first information on, for example, predictive DNA diagnostics, could theoretically be seen as the introduction of a new product. However, introducing such a product might be very complex due to psychological, ethical and societal constraints.

5.2 Methodological remarks

The results of our research are obtained by a systematic literature search of the consolidated (mainly textbooks obtained from library catalogues) and unconsolidated (mainly research articles obtained from scientific journals in databases) literature categorized according to structure, process and outcome of the communication process as described by Donabedian (1980). We added the aspect of context. From the consolidated literature, we will give a small overview of the main socio-psychological theories (as we have found) concerning commercial communication. Finally, we will look at the unconsolidated literature to validate, expand and adapt the theories found in the consolidated literature.

Before searching the literature we interviewed two researchers in the field to get an idea of new developments and the ´main´ literature. Searching catalogues and databases we used the following strings of keywords:

behaviour / behavior
consumer behaviour AND predictive DNA diagnostics AND effectiveness, consumer behaviour AND genetics AND effectiveness, consumer behaviour AND genetics, consumer behaviour AND effectiveness, consumer behaviour AND medical, consumer behaviour, consumer behavior AND predictive DNA diagnostics AND effectiveness, consumer behavior AND predictive DNA diagnostics, consumer behavior AND genetics AND effectiveness, consumer behavior AND genetics, consumer behavior AND effectiveness, consumer behavior AND medical, consumer behavior[3].

consumer psychology
consumer psychology AND predictive DNA diagnostics AND effectiveness, consumer psychology AND predictive DNA diagnostics, consumer psychology AND genetics AND effectiveness, consumer psychology AND genetics, consumer psychology AND effectiveness, consumer psychology AND medical, consumer psychology.

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[3] The differences between *behaviour and *behavior are substantial. For example, in the same library catalogue consumer behaviour leads to 126 hits, whereas consumer behavior leads to 47 hits. This may lead to a different number of hits in chapter 3 and 4. In future research this should be taken into account.

advertising psychology

advertising psychology AND predictive DNA diagnostics AND effectiveness, advertising psychology AND predictive DNA diagnostics, advertising psychology AND genetics AND effectiveness, advertising psychology AND genetics, advertising psychology AND effectiveness, advertising psychology AND medical, advertising psychology.

innovation (recommended by one of the interviewed researchers)

innovation AND advertising AND predictive DNA diagnostics AND effectiveness, innovation AND advertising AND predictive DNA diagnostics, innovation AND advertising AND genetics AND effectiveness, innovation AND advertising AND genetics, innovation AND advertising AND effectiveness, innovation AND advertising AND medical, innovation AND advertising.

The consolidated literature is chosen on face value on its relevance according to the research question. The books are ranked as relevant (+++,++ or +) based on 7 items. The findings obtained from the (+++) literature have more convincing power according to the conclusions obtained from the analyses of the consolidated literature. The unconsolidated literature is chosen on face value by its title according to the relevance of the research question. After reading the article again the relevance but also the validity (based on 10 items) is described. The literature which scores positive on relevance (+++, ++ or +) and validity (+++, ++ or +) is considered to have more convincing power regarding the conclusion. Using this systematic approach the literature research and use of its results becomes more transparent and obtains more convincing power. This is needed when theories and concepts obtained from the literature on commercial communication are used as a fundament for new theories and concepts of biomedical science communication. In this way biomedical science communication becomes more evidence based as in evidence based medicine (Van der Sanden and Meijman, 2004).

5.3 Results consolidated literature

We found no books devoted to genetics and advertising. Of course it is possible that there are chapters in books that are dedicated to this subject. Most of the hits in the databases occurred for terms like consumer behavio(u)r, consumer behavio(u)r AND medical , and advertising AND effectiveness. Unfortunately, these key terms are less relevant (++ or +) than when the term genetics is incorporated. From the selected literature we obtained the following theories and concepts.

5.3.1 Structure

The structure of the communication process concerns the actors involved in the communication, the sort of information which is sent and received and the means of communication. Kuyer (1996) distinguishes five target groups as actors in the commercial communication process: 1) brand loyal users; 2) loyal users of another brand; 3) brand un-loyal users; 4) potential users; 5) persistent non-users. These distinct target groups can be either high-involved or low-involved (Sutherland and Sylvester, 2001). Those who are high-involved (e.g., patients) have other information needs than those who are not. Effective biomedical science communication on predictive DNA diagnostics therefore needs to use different message content to communicate with distinct low- and high-involved audiences. In this case, high and low involvement depends on whether one is: 1) not a patient; 2) not a patient yet, 3) a patient. Non-patients may be low involved unless they are close to someone who is involved with predictive testing. The non-patient compares to a potential user or a non-user in Kuyer´s category.

The group of non-patients (potential users and non-users of predictive DNA testing) probably are not interested and do not need information about the possibilities of DNA testing or detailed information about DNA. According to the Elaboration Likelihood Model (ELM is explained in the section on process) this information will not reach the central route. Therefore information on genetic testing might include issue-irrelevant information like affective information dealing with fears for new technological developments. As the audience pays attention to different aspects, advertising can be effective at different levels.

In his research on commercial communication, Fennis (1999) found that issue-irrelevant information is important when the consumer knows little about the product, caused by low level of motivation due to low personal relevance. This information favours the advertising-liking process (peripheral according to ELM) instead of the product-liking process (central according to ELM). Issue-irrelevant information is needed to get attention in the first place.

To research different messages Fennis (1999) started from the idea that a message consists of an event, a scene and a program. In (biomedical) science communication, these different aspects of the message have not yet been addressed. For example, information on DNA diagnostics needs to be coupled to an event, with a certain sequence, scene and programme. In other words, there must be something to hold the audience, such as the use of metaphors and examples. Narrative communication could be very useful in biomedical science communication on predictive DNA diagnostics (Nisker and Daar, 2006). In the Netherlands a pilot test for colon cancer is going to start soon, using the Faeces Occult Blood Test (FOBT). As this is not a very valid test due to indirect measurement and possible false positives (Gezondheidsraad, 2005), the audience might lose their confidence during the project (Van der Sanden and Meijman, 2005). To improve the image of testing and medical doctors and to improve social basis for testing, communication (i.e. dialogue or narrative communication) should emphasise trust, truth, truthfulness and credibility, rather than medical information. Considering biomedical science communication on predictive DNA-diagnostics, we may conclude from the literature on commercial communication that - contrary to current science communication beliefs - in the case of a low-involved target group, relevant information does not matter at all. In this case it is the context, the issue-irrelevant information, which matters. Moreover, ELM not only structures the message but also gives way to the different phases in the process (first use irrelevant information to gain trust and credibility, followed by relevant information to gain understanding) and forms a link between communication structure and process, making it a process element as well.

5.3.2 Process

One of the main issues in advertising is obviously how to get the consumer's attention. Early theories present simple attention-getting-steps like the AIDA (Attention, Interest, Desire and Action) model (Fennis, 1999). Such a theoretical model, however, is rather static and do not, for example, explain which processes are behind attention. This led to new complex and dynamic models such as Petty and Cacioppo's (1986) ELM (Elaboration Likelihood Model), which depicts the distinct but related levels of cognition and affection (Fennis, 1999).

This model shows both the central route by which consumers receive information, as well as the affective, peripheral, route. Issue-irrelevant information can be obtained via the peripheral route and issue-relevant information via the central route. Cognition and cognitive elements prevail in the central route, whereas emotion and affective elements are important in the peripheral route.

In this theory, both routes lead to a change in attitude but on the basis of different processing of information. The literature on science communication views public awareness, public understanding, public engagement and public participation as the main communication goals (Auweraert and Van Woerkum, 2003). Applying ELM to biomedical science communication, a peripheral route might be the way to establish awareness and engagement, and the central route might help to establish understanding and participation in, since a stronger involvement is needed in this case. For example - as explained in the FOBT test - a role model of Kylie Minogue

for breast cancer is much more important for an effective campaign than a brochure that only contains factual information. The story of Kylie Minogue reached a world public.

The ELM is frequently referred to in research on commercial communication, but in the literature on science communication in general and biomedical science communication in particular we did not find any studies addressing ELM. Applying the ELM to biomedical science communication can make the communication process dynamic.

The processes in the practice of advertising are complex and dynamic. Sutherland and Sylvester (2001) use the metaphor of a pair of scales loaded with little, light weight feathers. According to this way of thinking, there is no single strong element in the process of advertising. The process is built on small steps (feathers) which accumulate, eventually leading to great changes. As Sutherland and Sylvester (2001) state that the biggest behaviour effect is normally induced by lots of small changes in the balance, we view the change of the balance as multileveled (see Fig.1).This multi-level pair of scales will eventually lose its balance on one side or the other, leading for example, to the decision to purchase a product or not, or form the basis of a behavioural change on an issue like predictive DNA testing. The new equilibrium is similar to the so called indifferent balance in mechanics, where a distorted balance will stay in a new equilibrium which is (completely) different from the previous situation. This shift of equilibrium is mainly caused by small changes in affective aspects (i.e., issue-irrelevant information), and not by bits of information presented to the target group. As we see in fig.1 knowledge is only a small element in the multi-level pair of scales.

5.3.3 Outcome

For commercial communication, different outcomes are possible on distinct levels (Fennis, 1999; Percy and Woodside, 1983). According to Fennis, both attitude to the brand and attitude to the product can be affected. When applied to science communication, the target of awareness would be comparable to attitude to the brand, and the target of understanding comparable to attitude to the product. The strategies described in the previous section could be applied to these outcomes of science communication.

This means for biomedical science communication that first of all, the audience needs to get acquainted with the meaning of genetics, its impact, history, and the story behind. Genetics as a brand. Biomedical science communication does not tell medical customers about the technique but a story on biomedical science communication is for example about lifestyle. A story on predictive DNA diagnosis could be about staying healthy and in charge of one's life, and sharing it with one's spouse and children.

5.3.4 Context

One of the main issues mentioned in the literature on commercial communication is the level of involvement of the target group. This involvement, whether high or low, may be one of the main branches in a dynamic balance. Involvement is caused by a broad range of aspects. According to the literature on medical psychology (Sorenson et al, 1981), an individual's context and the seriousness of the genetic disease strongly influence the way they perceive a message. This context is determined by socio-economic factors like income and status, as well as health situation and family history (Miller and Kimmel, 2001). Intrinsic factors like self-efficacy, health locus of control, health literacy, motivation, and degree of empowerment lead to an individual perception of low or high involvement. Therefore, health communication should target such things as self-efficacy or health locus of control. Considering the ELM and the distinction between the affective peripheral route and the cognitive central route, peripheral communication targeting feelings of self-efficacy may be more effective for a low involved audience.

Though the process of commercial communication is a complex way of communication, the clear target of getting the customer to purchase a product makes the different phases of the process more clearly chronological than in biomedical science communication. As we have seen the ELM is central to the process of commercial communication, and Sylvester and Sutherland's (2001) image of the pair of scales where

small changes in balance can represent gradual shifts in behaviour, makes the ELM more dynamic. Fig.5.1 shows a pair of scales with all the elements of ELM, including outcome and context. At the lowest level (left and right) we find knowledge - as said before - which ultimately plays only a small role in the equilibrium and is counterbalanced by the scene, the program, and the event which is the vehicle for knowledge transaction. Knowledge and its popularisation only make a small difference to a lay audience for whom notions and cultural themes form the main issues.
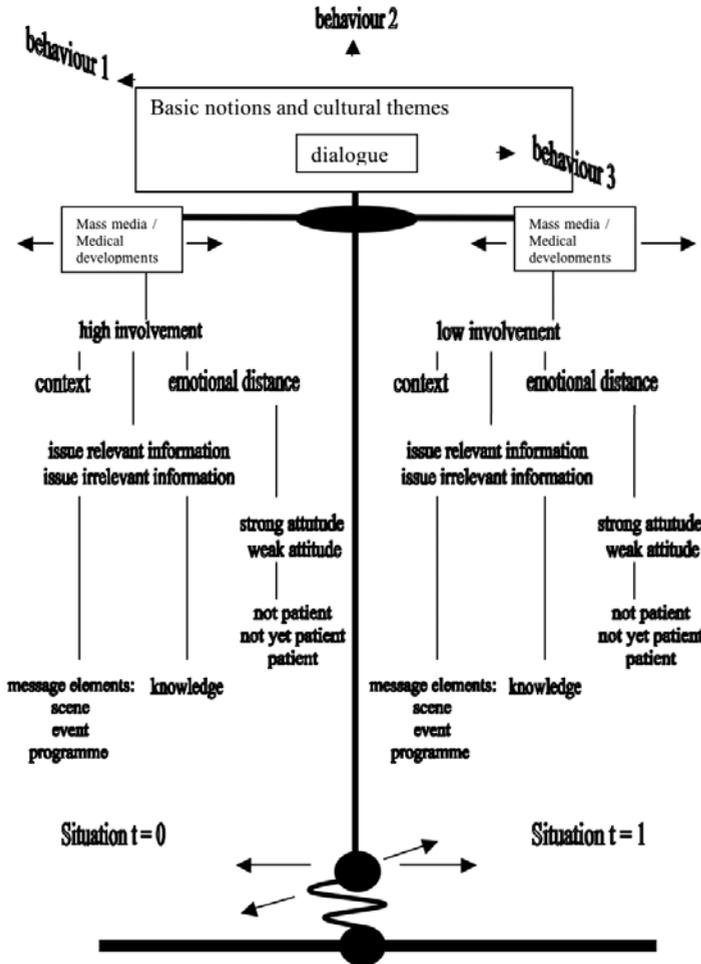

Fig 5.1.: The pair of scales of biomedical science communication. This balance not only moves sideways but can also swing freely in all directions. The moving and swinging of the scale is mainly a result of the cultural themes and basic notions of the target audience, shown on. This weight moves the balance forwards, backwards, to the left and the right. Next, high and low involvement are the main weights on the balance, which can in turn be moved by the individual's context and a strong and weak attitude. The context itself can strengthen the cultural aspects and notions of the target audience by counterbalancing the interaction between these factors. At the bottom of the balance we find knowledge, which ultimately plays only a small role in the equilibrium and is counterbalanced by the scene, the program, and the event which is the vehicle for knowledge transaction. Taking all these factors into account, the balance may change leading to different behavioural changes, depicted by behaviours 1, 2 and 3.

In the next section the results obtained from unconsolidated literature will be described. The idea of the multi-level pair of scales will be broadened or tightened by the results obtained from the unconsolidated literature.

5.4 Results unconsolidated literature

We searched the databases Web of Science, PsychInfo Communication Abstract, and The Cochrane Library using the same search strings as we used for the consolidated literature. The terms advertising AND effectiveness and advertising AND medical yielded the most relevant hits, though the terms advertising AND genetic testing and advertising AND genetics also yielded a few articles in the ++ category.

As before, we categorized the results according to communication facets: structure, process, outcome and context, 30 relevant articles were chosen and read of a total 128 selected for the research project. Of these 30 relevant (+++, ++ or +) articles, only 12 were valid (+++, ++ or +), according to our criteria for systematic literature research (Van der Sanden and Meijman, 2004). A ++ relevant article for example is: Hull, S. and Prasad, K. (2001). Reading between the lines: direct-to-consumer advertising of genetic testing in the USA. Reproductive Health Matters 9 (8): 44-48. An example of a less relevant article (+) is: Russell, C.A., Clapp J.D. and De Jong, W. (2005). Done 4: Analysis of a failed social norms marketing campaign. Health Communication, 17(1): 57-65. In the latter genetics as key term is missing.

5.4.1 Structure

As mentioned above, the structure of the communication process concerns the actors, the institutions involved, the sort of information being communicated, and the structure of the message. The main focus of this section is message and means of communication, both of which aspects were found in the unconsolidated literature.

Message

Taking the most valid and relevant literature into consideration, it is possible to develop guidelines for an effective message as an element in the structure of the communication process. These guidelines can deal with content and context.

Russell et al (2005) (+/+) found that the target group of an anti-alcohol advertisement did not identify their behaviour with that depicted on the poster, as the visual elements mostly dealt with the negative consequences of drinking. In their survey research, Russel et al received such comments as ´gross',' distasteful,' 'sick,' and 'guy puking´,. So a message must relate to the target group's world, and be connected to the target group's context in a positive way. Although cognitive dissonance can be a success factor in communication, it needs to be used carefully. The affective or cognitive information in a message should present a challenge.

As far as the content of the message, relevant and valid results from the unconsolidated literature show that target groups, consumers, want to learn about (Young et al, 2005) (+/+): 1) adverse reactions; 2) alternative treatments; 3) costs; 4) dosing; 5) drug interactions; 6) drug related research; and 7) efficacy and safety. McConnel et al (1999) (+/-) state that the commercial availability of genetic tests should be determined within a regulatory framework requiring at least: 1) proof of ability to accurately detect a genetic trait with a significant link to the existence or risk of a condition or disease in a defined population, and 2) a long-term data collection component to prove medical efficacy and psychological safety. Young et al (2005)and Mattila (1999) (+/-) add that participants (focus groups, mvds/fm) reported information needs (prescription medications, mvds/fm) including drug purpose, risks, benefits, cost information and treatment options, and service availability. In short, taken the most relevant and valid literature into account, a message must cover efficacy, cost and safety: Does it work? What does it cost? Is it safe medically and psychologically? Are there any alternative treatments? Credibility of the message also plays an important role (Russell et al, 2005). One of the respondents in Russell´s research said: ´I highly doubt that 3/4 of students drink less than 4 drinks when they party. (p.62)´ As is was part of the message in the Done 4 campaign.

In addition to the contents of the message, the relevant and valid literature also pointed out that the images used - for example, on a poster - are important as well. Some respondents commented on the design of the advertisement, in particular the dominance of the photograph over the message. For example, one respondent in Russell´s et al research wrote that it was hard to see the real message. Another noted, bottoms up as an expression from drinking, was emphasized too much and the important message is in small print.

Means of communication

Surprisingly, though, in this Internet age, many participants still turned to their physicians and pharmacists for information about prescription drugs (Young et al, 2005). So the use of web-based or computer aided communication might be a part in the communication process, but it can not support the whole process. According to Russell (2005), future research is needed to evaluate how such media might be combined to produce optimal exposure to campaign materials. Hull and Prasad (2001) (+/-) state that the message should be more tailored to the context of the target group. As they write, information must be both accurate and pertinent in order to be empowering.

Furthermore, in the relevant and valid literature we found that the use of Direct to Consumer Advertisement (DTCA) is questioned in relation to genetics. Supporters of DTCA point to the potential for patient empowerment through health education (Jardine, 2004) (+/+). The constraints of DTCA as a process element will be described in the sections on process and outcome.

There are, however, constraints to DTCA, described in the literature (+/-). For example, Gollust et al (2002) (++/-) and Hull and Prasad (2001) (+/+) identified three factors that limit the value and appropriateness of advertisements: complex information, a complicated social context surrounding genetics, and a lack of consensus about the clinical utility of some tests. Most important, the advertisements described failed to balance risk information with claims of effectiveness. They neglected - according to Gollust et al - to mention the potential risk of genetic discrimination, whereas the advertisement for breast cancer testing provided incorrect information about the comprehensiveness of current statutory protections against genetic discrimination. DTCA promotions will only have limited educational value when materials are inaccurate or misleading. To provide more useful information, pharmaceutical advertisements should convey both the risks and potential benefits of testing, as standard practice.

In summary, if we compare the message element - as a part of the structure of the communication process - with the balance in Fig. 1, we can refine the different aspects of the message elements. Aspects such as scene, event, programme, and knowledge could be filled in with elements like alternative treatments and costs. The most relevant and valid (+/+) are first mentioned and underlined (See Fig. 2). The elements which are nut underlined do need more research or should be implemented carefully into the biomedical science communication practice.

Message parameters:

costs of adverse reactions / *alternative treatments* / *dosing* / *drug interactions* / *drug related research* / *credibility* / *efficacy and safety* / *availability of alternatives*

scene / event / programme/ means of communication: web based. DCTA is one of the possibilities in which complex information should be avoided / context and content of message/ negative/positive content/ visual elements / proof of ability to accurately detect a genetic trait with a significant link to the existence or risk of a condition or disease in a defined population, and / a long-term data collection component to prove medical efficacy and psychological safety / showing risk and benefits of genetic tests / use of tailored message / service availability.

Fig. 5.2: Message parameters: see text for explanation.

5.4.2 Process

We found a few new theories on advertising in the unconsolidated literature. As in the ELM, the main focus of these theories is the difference and synergy between affective and cognitive process-parameters. Coulter and Punj (2004) (+/+) mention the Dual Mediation Model (DMM). The authors suggest that DMM constructs between affective and cognitive process parameters - as well as links among these constructs - are moderated by the match between cognitive resource requirements and availability. The possibility of reaching the target audience is moderated by where they can get the information and whether they can comprehend it. The DMM therefore draws a connection between physical and social barriers and the possibility of ´learning´ something. Coulter and Punj (2004) mention moderating effects as one of the parameters which will determine argument quality.

The Cognitive Resource Matching (CRM) hypothesis, described by Coulter and Punj (2004) predicts that any message (strong or weak) will enhance persuasion if there is a match between required and available cognitive resources. For example, research shows that individuals have greater awareness and higher recall of a drug advertisement that is associated with a medical condition for which they are being treated. This finding supports the idea that consumers selectively attend to advertisements that promote products relevant to their personal circumstances. Previous research has also proposed that drug advertisements contain cues that attract consumers and allow them to identify with the promoted product (Young et al, 2005).

From these models (DMM and CRM), it is clear that emotional distance is, as we already know from the consolidated literature, a leading concept. Emotional distance, however, depends on the social and physical barriers related to the process (DMM) and the difference between the required and available cognitive resources (CRM). So in the balance of Fig. 1, the factor emotional distance needs to be expanded (see Fig. 5.3).
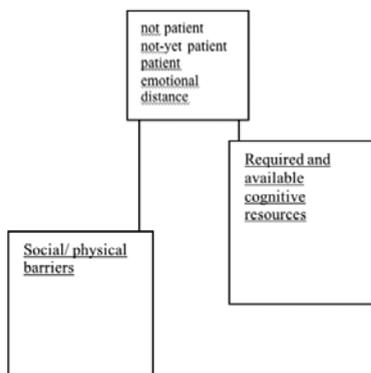

Fig. 5.3: The parameter of emotional distance extended. Social and physical barriers, and required and available cognitive resources balance the emotional distance (relevant/valid).

Together with the ideas of social and physical barriers, and differences between required and available cognitive aspects, Coulter and Punj (2004) present the idea of strong and weak messages. Message discounting may be linked to the nature of the message arguments (i.e., strong versus weak) as well as to the cognitive resources allocated by the message recipient.

Coulter and Punj found that increasing processing motivation (elaboration) enhanced persuasion when the message was strong and diminished persuasion when the message was weak, but only when available resources matched resource requirements. The more positive brand attitudes associated with the strong message occurred as a result of both an increase in the mean level of positive brand cognitions and the increase in the strength of the relation. The less positive brand attitudes associated with the weak message occurred as a result of both an increase in the mean level of negative brand cognitions and an increase in the

strength of the relation. Although both of these results are consistent with ELM theory, the latter finding of less positive brand attitudes at moderate processing-motivation levels is inconsistent with the ELM theory (Coulter and Punj, 2004). The ELM does not distinguish between physical barriers and cognitive resources. DMM, CRM and ELM could therefore be used to triangulate a biomedical science communication problem (see Fig. 5.4).
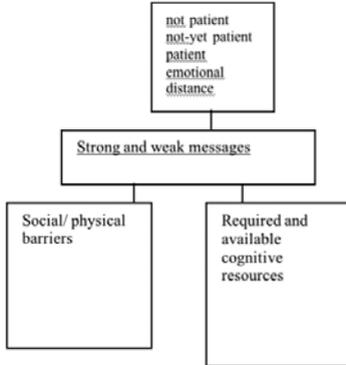

Fig. 5.4: The strength of the message has been added to Fig. 5.3. A strong or weak message can influence the emotional distance, and in turn depends on social/physical barriers and the required and available cognitive resources (relevant/valid).

Weak and strong messages are not only established by their content, but also depend on the way they are disseminated to the consumer. For example Reijmersdal et al (2005) (+/+) found that the image of a brand integrated into a television programme is depended on the image of the programme. A message is, so to speak, weak or strong by process. This could be seen as a strong process with a weak message. Fig. 5.5 shows the connection.
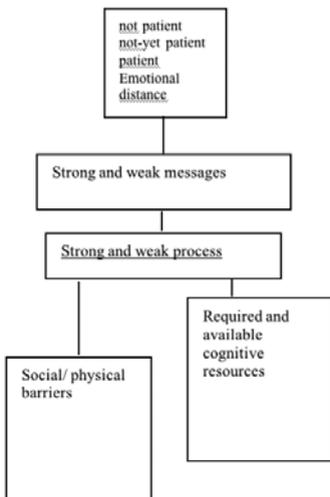

Fig. 5.5: A weak or strong process depending on a strong or weak message (relevant/valid).

The Human Associative Memory Theory (HAM) plays a role in the process described by Reijmersdal et al (2005). This theory explains changes in specific associations and judgements of the target audience. The HAM theory describes how associations which are part of a network in the individual's brain are connected when several stimuli come together. In this way, the image of the television programme is connected to the brand

image, and even when the brand is not seen in the programme, the association still connects the product to it. Regarding to biomedical science communication this could be used as an indirect form of communication to find trust and credibility for genetic testing within a broad audience: a strong process with a weak message. There are however ethical constraints which are similar to those attached to the use of DTCA.

Advocates suggest that DTCA both informs and empowers patients as consumers. But from a wider sociological perspective, DTCA is premised upon and extends aspects of lifestyle choice, self-responsibility, and risk assessment. As a result, DTCA promotes a medicalised view of society, where everyday issues are defined as medical problems that require the input of medical specialists and medical technology (Jardine, 2004). Thus, DTCA could be useful, but it also has many constraints. Direct-to-consumer promotions of pharmaceutical products regularly include a suggestion that consumers discuss the product with their personal physician, consistent with American Medical Association guidelines. Even with such language in place, however, critics object that this kind of advertising manipulates the public and undermines the physician's role (Hull and Prasad, 2001). The same arguments could be used for the use of strong processes and weak messages.

In summary, the unconsolidated literature on the process of commercial communication shows that making use of the difference between weak and strong messages is a useful instrument for reaching the target audience. This helps us to understand the position of the target audience in the communication process. Moreover, it allows professionals to design a more sophisticated message, which may be more effective. However, the relevant but less valid literature presents the problems related to the use of DTCA in the case of genetic diseases. Obviously, clear ethical constraints must be part of the biomedical science communication process. Though the latter should be more fully researched.

5.4.3 Outcome

One of the main outcome issues the consolidated literature addresses is the difference between a consumer's brand attitude and their product attitude. Regarding genetic research, a consumer's brand attitude would relate to the nature of research, as Cline (2003) (+/-) argues in an essay. In this essay, he states that the audience needs to understand the nature of research and evidence-based medicine, and that the audience needs to be more media literate. The audience needs to be aware of and understand the subtle yet influential messages embedded in drug advertising.

Mattila (1999) (+ /-) writes about a level of service that is perceived by the target audience. Service level is a well-defined subject in the consumer market, but is also relevant in other communication processes. So the perception of the service level in biomedical science communication (e.g., the way questions are answered, the possibility of getting information, the tone of voice) could be an issue-irrelevant aspect of this communication. The nature of genetic research could also be an important element in biomedical science communication on predictive testing. (See Fig. 5.6).
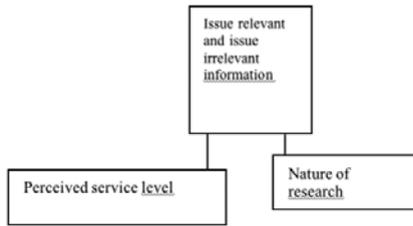
Fig. 5.6: The difference between issue relevant and issue irrelevant information is balanced by the perceived service level and the nature of the genetic research conducted.

In summary, though we see that the audience is empowered by information, such communication may make consumers independent of scientific medicine, which leads to the ethical constraints concerning commercial communication on genetics. The perceived service level also plays an important role in this communication. In other words, if the audience is already subject to medicalisation, a low service level may increase the feeling of discomfort and helplessness. Both extensions to the model however are not valid and should be implemented carefully within biomedical science communication.

5.4.4 Context

Besides meta-aspects like medicalisation, some more concrete aspects of context are to be found in the literature. Robinson et al (2004) (+/-) found that patients with a lower socio-economic status were more likely to say that DTCA had motivated them so seek medical care. But this process may be troubled by the public´s ambivalent beliefs about genetics, characterized by powerful hopes and fears.

This complex social context makes it easier to manipulate the public´s vulnerability to sell a product (Gollust et al, 2002). Jardine (2004) refers to the idea that the social construction of illness is being replaced by the corporate construction of disease. This agrees with what we have already seen in the unconsolidated literature: DTCA is yet another means of communication that furthers the medicalisation of society.

In summary, this aspect of medicalisation should appear in our pair of scales within the aspects of basic notions and cultural aspects. Aspects like socio-economic status are part of this context. Although commercial communication is an effective instrument and an interesting frame for developments in biomedical science communication, due to ethical constraints and the medicalisation of the society, commercial communication and its theories cannot be translated directly from commercial communication to biomedical science communication. Though this addition is not valid and therefore should be implemented carefully in the process of biomedical science communication.

Combining all these aspects obtained from the unconsolidated literature into our initial pair of scales (Fig. 1), we get the pair of scales presented below (see Fig. 5.7). The left side of the balance is not changed, which allows us to see the additions from the consolidated literature.
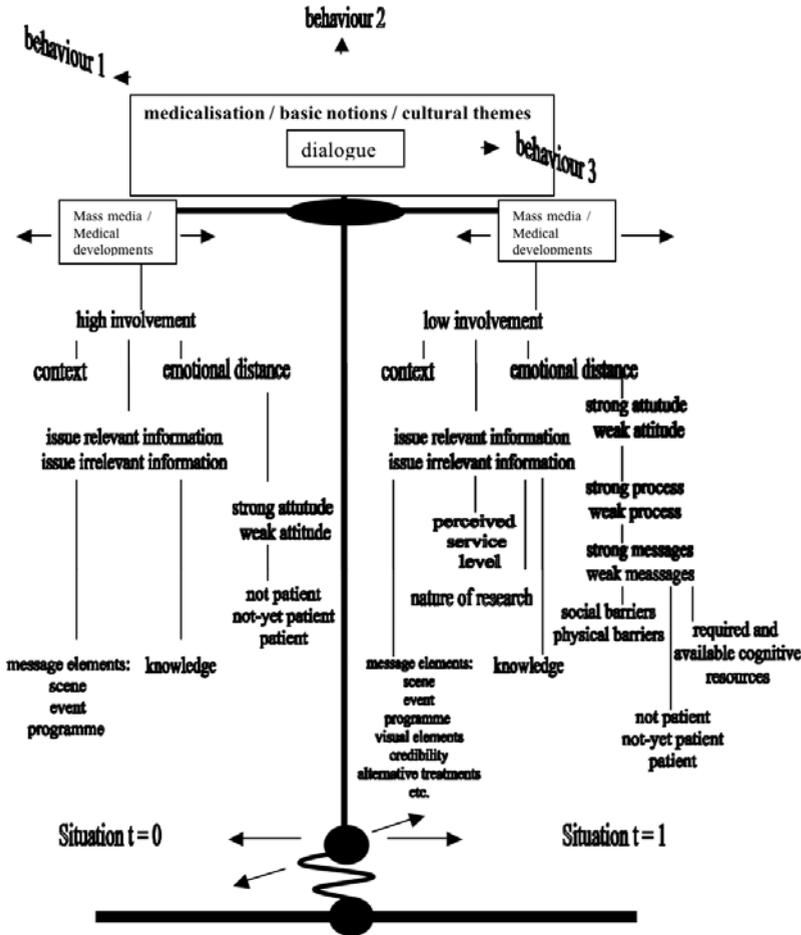
Fig. 5.7: The indifferent balance for biomedical science communication on predictive DNA diagnostics. An indifferent balance moves to a position (behaviour 1, 2 or 3) at t = 0 and stops in that position at t = 1. It swings to another indifferent state of balance. So there is no fixed point to which the balance returns. The left side of the scales is the same as in Fig. 1, showing the additions from the unconsolidated literature. At the right side, the balance gets more complex. One of the main conclusions is that far more factors need to be considered to achieve a behavioural change. Moreover, the main moving element at the top of the scales has been extended with the term medicalization.

5.5 Discussion

One of the main conclusions (though not valid) of this systematic literature study of the use of commercial communication in biomedical science communication is that the theories in commercial communication cannot be directly translated to biomedical science communication, due to ethical constraints. The public's attitude towards medicine and medical development is complex. Commercial communication can lead to the medicalisation of society (at top of the balance in Fig. 5.7). Therefore, the different elements of commercial communication - structure, process, outcome, and context - should be discussed again when they are used in biomedical science communication on predictive DNA diagnostics.

The other additions to the model (except from service level and nature of research) are relevant and valid. So these elements could – according to the literature read - be implemented within biomedical science communication. Starting at the top of Fig. 5.7, we learn that an intervention depends on context, emotional distance, and the availability of issue relevant and issue irrelevant information. The emotional distance is mainly dependent on the stronger or weaker attitudes of the target audience towards genetic testing. Stronger or weaker attitudes depend on the social and cognitive resources of the lay audience. Issue relevant and issue irrelevant information relates to perceived service level and the nature of research. The choice for issue relevant or issue irrelevant information is also the basis for designing a message. As described in the abstract: *nothing in communication makes sense, except in the light of cultural and basic notions.*

Medical communication works on many levels, which means that it should be used carefully. A discussion of the potential of a genetic test is useful in biomedical science communication. For the message to be effective, not only does it need to explain what a test is, it also has to explain the test's potential to address the medical issue. Factual knowledge appears at the bottom of the scales, and we can now see that just popularisation of facts will not be enough for effective science communication with a lay audience on a subject such as predictive DNA testing.

Costs are also important to a lay audience. But how can we handle all these parameters (as depicted in Fig. 5.3)? Which one is the most important and should always be part of the message?

Not only should issue relevant information be used in an ethical way, but especially issue irrelevant information. Many people believe advertisements, and though they may have a low interest in genetic testing, they could be strongly influenced by advertising or a message including advertising elements. Therefore advertising elements should be used in a 'safe mode' when it comes to biomedical science communication on genetic testing. For example, issue irrelevant information should not only deal with emotional aspects like health and risks, but also with ethical constraints and credibility, to prevent medicalisation of the target audience. The result is a complex message, including issue-irrelevant information, but which leaves the decision to the audience.

Several authors mentioned perceived service level. As this service level could reassure the audience in their attitude towards genetic testing, it should be an element of biomedical science communication on genetic testing. Communication on service level can lower the credibility threshold for the target audience. To reach the target audience in an affective way, the emotional distance must be shortened.

5.6 Conclusion: theoretical framework step 3

We can conclude that the concepts, theories, models, constructs and variables of commercial communication are certainly relevant for biomedical science communication. The theories provided a deeper and broader view of the structure, process, outcome, and the influence of context regarding the science communication process. This greater theoretical perspective provides possibilities of designing a communication process and of making better and more explicit choices about which variable of the process should be emphasised. However one should be careful with relevant but not valid additions to the model as it is the same for ethical constraints obtained from commercial communication.

Moreover, this article shows that a systematic literature research method in the field of the comparative communication sciences leads to new, relevant and valid insights which may or may not be implemented carefully.

Here ends the review article which could be an article in a database supporting evidence based science communication.

Theoretical Framework step 3

In answer to both of the research questions posed in this thesis we can respond that concepts, theories, models, constructs and variables can also be obtained from commercial communication and be translated to the domain of biomedical science communication on predictive DNA diagnostics. These theories, as seen in the indifferent balance, deepen and broaden the structure, process, outcome and context of biomedical science communication on predictive DNA diagnostics. This leads to step 3 of the framework for biomedical science communication (see Fig. 5.8), which is different from the framework described in chapter 3 and expanded upon in chapter 4. In this framework the different phases, the most important domains and the different levels and aims become clearer since they are emphasized. The framework as such is a dynamic and functional one, in which different psychological and sociological concepts, theories, models, constructs and variables are integrated into a framework for effective biomedical science communication. The model is a composite theoretical framework for biomedical science communication.

On the question of the relation between biomedical science communication and commercial communication, we see that there is much to be shared on the process level, but that one must be alert to ethical constraints, which could come into play when using advertising techniques. The context of the communication process, once again, is of great importance, and it is evident that, for a non-attentive public, all registers (except information) should be used to develop an effective science communication process. See Fig. 5.9.

If we take the fields of health communication and health psychology into consideration as well, we see that health communication (HC) and biomedical science communication (BMSC) are closely related, as concluded in chapter 3, and that health psychology is fundamental to both communication domains. Commercial communication (CA) is not specific to health or biomedical science communication but it is a source of new theories and concepts. Health psychology could also be a foundation for CA. The four presumptions of integration of the domains, as proposed in chapter 1, are not verified by our findings. The integration as proposed in Fig. 5.9 is closest to a crossover between options C and D of the four options described in chapter 1. The relationship between HC and BMSC is contextually dependent; the relationship between HP and BMSC is theoretically dependent; the relationship between CA and BMSC is mostly practical and goal-dependent.

On the basis of the dynamic and functional theoretical framework a questionnaire was compiled to test the constructs and variables obtained from chapters 3, 4 and 5 in practice, as well as to determine the distance between theory and practice. This is described in chapter 6.
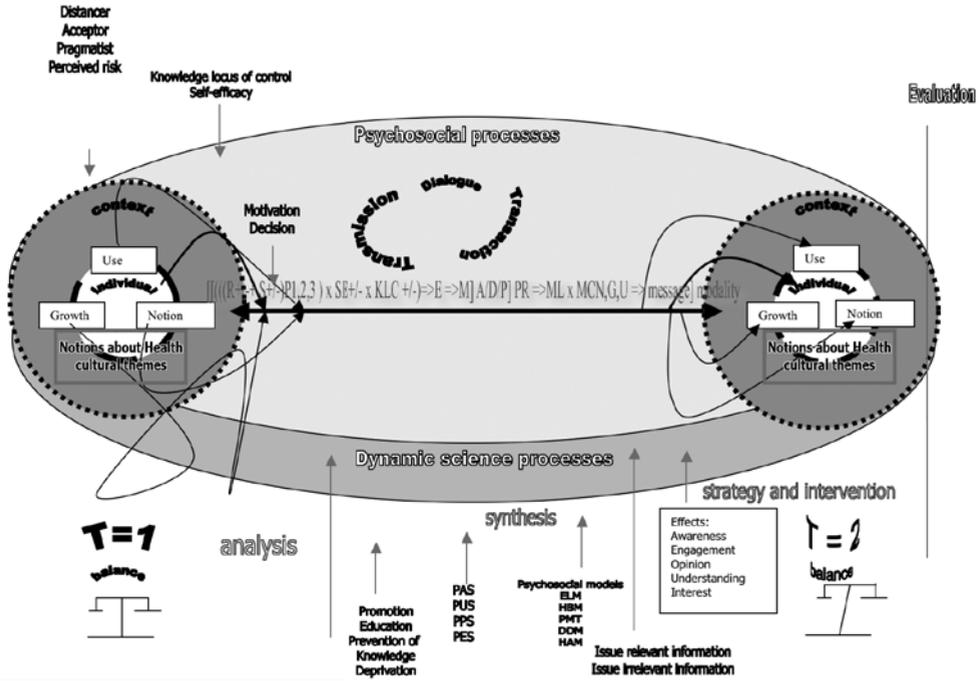
Fig. 5.8: Theoretical framework for biomedical science communication on predictive DNA diagnostics. At the left side of the figure the analysis of the target group is described. This leads to insight into the target audience´s basic notions about technology, cultural themes, and the way the target audience uses knowledge, which is the context that makes them a distancer, acceptor or pragmatist (balances at the lower right and left of the figure). This information (in accordance with Fig. 3.14) could be generated by the research liaison officer. Then we come to the synthesis of the process and content. From the elements of the metric formula in the middle of the figure we know which questions we have to articulate to make an educated guess about, for example, which modality should be taken into account, depending on the level of urgency and concreteness of the message. In the right side of the figure the strategy and intervention needs to be developed. Which model is going to be most helpful in achieving the communication goals? Do we need issue-relevant or issue-irrelevant information?
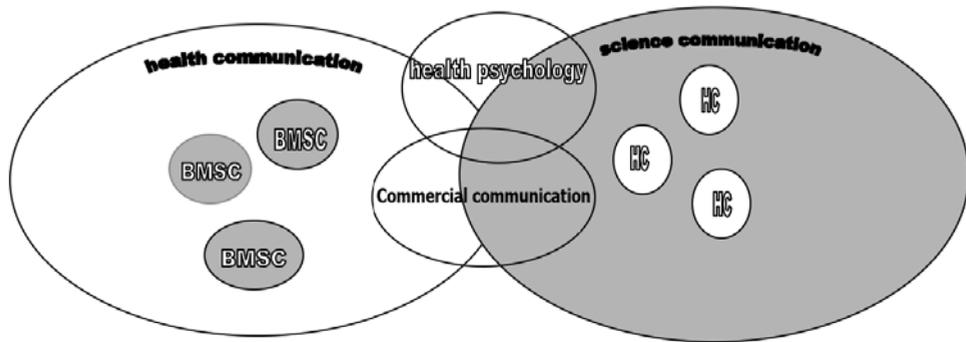

Fig. 5.9: Interrelationship. This figure shows that health communication and biomedical science communication are closest to each other in form and content, as described in chapter 3. Both fields can easily flow from one side to the other. The difference depends on urgency and emotional distance. In chapter 4 we saw that health psychology is fundamental to communication science. The same is true of commercial communication. These cornerstones broaden and deepen the degrees of freedom of the biomedical science communication process. They are indeed important, but are far less directly inter-related with biomedical science communication than health communication is.