ERASMUS UNIVERSITEIT ROTTERDAM

Popularizing science by the media?

How controversy framing and cultural predispositions affect people's trust in science

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January 2014

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Abstract

In the debate of science communication public illiteracy is often held responsible for the low levels of trust in science these days. Therefore to revitalize the public's trust in science, education by the media is seen as a crucial factor. In this paper this simplistic idea of science education is problematized as being too focused on an assumed knowledge deficiency of the public and the possibility to solve this by a unilateral process of science communication. This obscures the often ambiguous characteristics of media messages and how such media messages are culturally negotiated by the public. To overcome these shortcomings this study investigates how different scientific debates (controversial/harmonious) affect trust in science and how this effect is moderated by the cultural predispositions 'science views', 'anti-elitism' and 'anomia'. In addition it is tested whether and how these interactions could explain the relationship between education (level and field) and trust in science. Testing the assumptions by means of a self-conducted vignette survey experiment it turned out that framing effects exist, though they depend on field of study and science views. Furthermore, none of the cultural variables could explain the relationship between education and trust in science. Though in the end it becomes clear that despite the moderate results science communication is nevertheless more complex than the Science Deficit Model assumes. The vignette experiment appears to be a good way to illustrate this.

Keywords: trust in science, science communication, controversial messages, framing effects, cultural predispositions.

1. Introduction

Several scientists have expressed their concern about the assumed waning public trust in science (Dijkgraaf, 2011; Bodmer, 1985; Wynne, 2006). Robbert Dijkgraaf, former president of the *'Royal Dutch Academy of Sciences' (KNAW)* expressed his worries during the Machiavelli reading of 2011 by asserting that science nowadays suffers from a severe lack of public trust while it is a crucial and indispensable aspect of our Western democratic society. The increased complexity of the world has made science increasingly complex. For lay people it therefore becomes increasingly difficult to be knowledgeable about it. This way, *'Science becomes infinitely distant and at the same time infinitely near'* (Dijkgraaf, 2011; translated from Dutch). In order to revitalize the public's confidence in science Dijkgraaf points to the importance of science education through the media. Scientists should enter the public stage to convey their scientific message to the broader public. This would allow lay people to learn more about science and that way learn to appreciate it more. However these ideas of science education are not new but mainly are based on the already existing 'Science Deficit Model' (Bodmer, 1985; Durant, Evans & Thomas, 1989). According to this model, the public is largely ignorant of science, especially those who lack higher education. This while a better notion of science would definitely lead to more support for it. Therefore, the scientific literacy of the public has to be enlarged through media channels (Bodmer, 1985; Jenkins, 1997; Logan, 2001; Einsiedel, 2000). In this model a linear communication process from sender to receiver is assumed.

However it can be questioned whether media coverage of science would necessarily lead to increasing levels of trust in it. Scientific debates aren't always stories of mutual agreement, but can also be, and probably are, much more often stories of controversy, uncertainty and conflict due to science's nature (Houtman, 2011; Houtman et al., 2012). Moreover, conflict is not only a main characteristic of science, also the media often follow the logic of adversarial in which two or more opposing statements are stated against each other (Boykoff & Boykoff, 2004). Good examples of this controversial characteristic of mediated science are the climate change debate and the debate of the Mexican flu vaccinations. Additionally it can be argued that the audience is not a passive recipient but actively constructs meaning of the world. Studies in the field of communication have shown that audiences evaluate media messages according to their own cultural framework of references (Besley & Shanahan, 2005; Ho et al., 2008; Nisbet, 2005; Scheufele, 1999; Scheufele & Lewenstein, 2005).

As Kitcher (2001) argues, in democratic systems the persistence of the scientific system is highly dependent on its legitimation by society. Therefore public trust in science is indispensable. To study how public trust in science is generated or destroyed can be helpful to understand science's social dynamics of legitimacy. Furthermore, the Science Deficit Model seems to be too simplistic to give a good understanding of the social dynamics of science media communication, there it ignores the messages content and the cultural predispositions of the audience in the process. To overcome this all too simplistic notion of science communication it is therefore worthwhile to incorporate both a variety of media frames and cultural predisposition into this study. The research question to be answered in this study then is whether and how people's trust in science is affected through exposure to different scientific media messages (harmonious/controversial) and whether and how this effect is mediated by people's cultural predispositions?

In order to answer the research question a vignette survey experiment (Mutz, 2011) is carried out. First people are asked to fill in a short questionnaire containing questions on their cultural values and some other characteristics. Subsequently they are asked to read a written scientific media piece (harmonious or controversial), followed by filling in a short questionnaire on their opinions toward science. The results are obtained by doing an OLS-regression analysis. But first now is turned to the relevant literature for a better theoretical understanding of the research framework.

2. Theoretical framework

2.1 Why we need to study scientific messages and cultural predispositions together to understand the complexities of science communication

In the introduction the science deficit model is argued to be too simplistic to give an adequate picture of science communication. Scientific messages aren't always stories of harmonious agreement but also of conflict, and cultural values play an important role for the evaluation of communicated messages. Framing theory can be helpful to overcome the mentioned shortcomings by giving a more realistic picture of how science communication might work. Framing theory argues that everyday reality is constructed in communication processes (Chong & Druckman, 2007) in which every issue can be conceived from many perspectives. To communicate then always means to select and emphasize some aspect of a perceived social reality and to ignore others. By using this selection process the mass media actively construct specific frames of reference for their audience. According to this it is expected that the framing of an issue or event will lead to a particular opinion formation or change of opinion. This is called the framing effect of communication (Chong & Druckman, 2007).

However, while many agree that science communication can contain harmonious as well as controversial frames, there is no clarity about how controversial and harmonious frames affect the evaluation of science in terms of trust. On the one hand, research on framing argues that exposure toward controversial scientific media messages leads to more uncertainty about and less trust in science as compared to non-controversial messages (Corbet & Durfee, 2004; Friedman et al., 1999; Pollack, 2003). Controversial debate may confuse people what in turn easily leads to the relativization of all truth claims (Berger, 1973; Houtman et. al., 2012). On the other hand, other research has indicated that it is not controversial debate but instead harmonious debate which leads to less trust in science (Wynne, 1996; 2006). According to this theory, people are particularly able to cope with ambivalences and uncertainties. Everyday life is full of uncertainties and people intuitively know that this is also the normal situation for science. This suggests that rather harmonious debates will be seen suspiciously as unrealistic and therefore as untrustworthy (Wynne, 1996, 2006). Although to a certain extent both claims take into account the social context, i.e. both assume that framing effects will depend on interpretation by the audience, they both conceptualize the audience as one undifferentiated mass. Both theories ignore that interpretations will vary among people. This while not everyone will be equally confused or will be equally able to cope with ambivalence and controversy in scientific media messages. This instead will be dependent on people their cultural predispositions.

Research has shown that cultural predispositions are essential for the way people interpret and make meaning of media messages. The audience is not just a sponge which absorbs and reflects passively all opinions and perspectives poured out by the media. People actively construct meaning about issues and events by interpreting media messages in the light of their own individual frame of thoughts (Chong & Druckman, 2007). Numerous studies have shown that moral values, religious beliefs and cultural values play an important role for the evaluation of messages (Ho et al., 2008; Nisbet, 2005; Nisbet & Goidel, 2007; Scheufele, 1999; Scheufele et al., 2008). These are essential intermediating factors influencing the evaluation of media content. Wynne (1995) for instance, argues that trust is an important determinant of how one will perceive and evaluate a scientific message. If one doesn't trust science or (a) scientist(s), a scientific message is much more likely to be rejected (See also Achterberg et al, 2010; Achterberg, 2012). Although studies on individual frames have been a step forward in disclosing how mediation processes work, most of them only focused on the predispositions of the audience without considering the highly differing content of media messages (See Houtman et al., 2013). This while research on the effects of communication frames only focused on the media content (Chong & Druckman, 2007) ignoring the cultural predispositions of the audience. By taking both sides into account, both the variability of media messages and the varying cultural predispositions at the receivers end, this research project aims to provide more clarity on what is going on in science communication. This way, this study aims to contribute positively to the scientific debate about the role of media communication in rising or drawing back the audience's confidence level toward science.

Thus, in this study it is expected that the way messages are framed (controversial/harmonious) matters for the interpretation of those messages, though the way in which interpretations are contingent and to what degree, is expected to depend on people's cultural predispositions. To test this claim, this study aims to investigate whether and what kind of relationship exists between the type of debate and trust in science and whether and how this relationship is contingent on three cultural predispositions, namely 'science views', 'anti-elitism' and 'anomia'. These latter three are selected because of their expected explanatory value in two respects. First, they are expected to explain a part of the relationship between type of debate and trust in science. Second, they are expected to explain a part of the often founded relationship between education and trust in science (Derks, 2000; Elchardus & Smits, 2007; de Keere, 2010; Houtman et al., 2012; Miller, 1983, 2004; Pion & Lipsey, 1981). First now is turned to a discussion of the cultural predispositions 'science views', 'anti-elitism' and 'anomia'. Next, a discussion of their relationship to education follows.

2.2 Cultural Predispositions: Scientific viewpoints, Anti-elitism and Anomia

The evaluation of the varying media debates is expectedly contingent according to three cultural predispositions, namely science views, anti-elitism and anomia. The first predisposition to be considered is someone's science views. In this study this is conceived as the way one perceives science's epistemological claims. Does one believe there is just one universal truth which can only be known by exactly applying the correct mathematical models (fixed science view)? Or does one believe that there is a plurality of truths, that truth is a social construction and thus that knowledge is always trivial, uncertain and disputed (relativist science view)? According to Houtman et al. (2012) especially people who don't know that controversy and conflict is an ordinary part of scientific practice, would lose trust in science when they are confronted with controversial debate. People with a fixed science view see controversy and conflict as excesses of science which ordinarily are not a part of science. Controversial debate then for them is the evidence that scientists don't know anything about the topic they discuss. Additionally, research has shown that scientific information is most effective for people who already think in line with that information (Fieldman & Zaller, 1992). This implicates that people with a fixed science view, who are used to see controversy as a deviant and excessive part of science, would lose more trust in science when confronted with controversial debate as when confronted with harmonious debate. Controversial debate is opposed to their internal frame of reference and therefore they will regard controversy with more suspicion than science relativists may do. Harmonious debate instead, is perfectly in line with their fixed view of science as just one possible universal truth. Therefore they may regard harmonious debate with less suspicion as compared to controversial debate. People with a relativist stance, instead, are used to see controversial scientific debate as normal and even desirable part of the scientific world which even is indispensable for science to evolve. Controversial debate is thus in line with their previous internal frame of reference. Hence they will lose less trust in science when confronted with such controversial debate than people with a fixed science view whose frame of reference is opposed to that controversial debate. Thus, a fixed science view may finally be translated into a higher decrease of trust in science when confronted with controversial scientific content as compared to a more relativist science view. This decrease of trust is relative to the level of trust when one is exposed to harmonious debate.

The second predisposition is anti-elitism. Several studies have demonstrated an increasing gap between citizens and the elite (Houtman et al., 2010; Beck, 1992; Zizek, 2000). Citizens increasingly distrust the intentions of political, governmental and bureaucratic elites. The political elite have frequently been accused of only serving their own interests and that of their capitalist allies instead of those of the ordinary people. In turn science is often associated with serving the interests of the state and the big capitalist enterprises (Aupers, 2012). In other words science is increasingly seen as the legitimation machine of the status quo (Roszak, 1969). The lack of trust in the elite and the association between science and the elite has fostered conspiracy thinking in which the higher elites (scientists included) are suspected to cahoot together against the ordinary people (Aupers, 2012; Uitermark et al., 2012). People with an anti-elitist stance thus share a deeply felt distrust toward as well the political, the capitalist as the scientific elite. This is important if we consider that trust has revealed to be an important factor for the acceptance or rejection of scientific information (Wynne, 1995). When we start from the idea that anti-elitist people distrust science because of assumed conspiracies, this may indicate that harmonious scientific messages will more easily be associated with conspiracies as compared to controversial debate and therefore will lead to a higher decrease of trust relative to controversial debate. The exposure towards different viewpoints in controversial debate instead indicates a more democratic process of knowledge production and therefore may be seen as more fair and less vulnerable for conspiracies. Therefore it could be expected that exposure towards controversial debate leads to a lesser decrease of trust in science as compared to exposure to harmonious debate or may even lead to a higher level of trust. People who lack an anti-elitist stance, are less inclined to see scientists as cahooting together against society and therefore they will less probably experience harmonious scientific debate as a conspiracy while controversial debate as more fair and democratic. Therefore it is expected that these people will lose less trust in science when exposed to harmonious debate as their anti-elitist counterpart. The decrease of trust in science when exposed to harmonious debate is thus expected to be greatest for people with an anti-elitist stance.

The third and last cultural predisposition is anomia or, in other words, cultural insecurity (Houtman et al., 2012). According to Durkheim (1960), the early founder of the term, anomia arises in a situation in which social norms can no longer exercise a decisive influence on the regulation of behavior. This lack of common social norms leads to a deeply experienced social disorder and uncertainty about one's feelings, opinions and behavior (Achterberg & Houtman, 2009; Blank, 2003; Durkheim, 1960; de Koster et al., 2010; McDill, 1961). This uncertainty is often found to go together with a regained call for authority and a call to restore order by removing perceived threatening objects from society (Houtman, 2002). In other words, feelings of uncertainty go together with a desire for new certainties. Exposure toward controversial scientific debate, however, doesn't fit with anomic people's desire for a unified story and therefore expectedly would be confusing for them. Confusion then could easily lead to the conclusion that scientists doesn't know anything at all (Berger et al., 1973; Houtman et al., 2012), which results in a decline of trust in science. In turn exposure towards harmonious debate will fit their desire for certainty and therefore will be less confusing what may lead to less decreasing levels of trust in science as compared to exposure towards controversial debate or would even lead to relatively higher levels of trust in science. People who are less anomic will be less concerned with gaining new certainties. This makes them more able to deal with uncertainties like those in controversial scientific debates. For them uncertainties just are a part of ordinary society. Therefore the negative effect of exposure toward controversial scientific debates on trust in science is expected to be less for people with lesser anomic feelings.

2.3 Explaining the relationship between education and trust in science by science communication

What the three predispositions have in common is that they are not equally distributed among the population but vary both by level of education and field of study. Several studies have shown that lower educated have a more fixed viewpoint of science (de Keere, 2010), are more anti-elitist (Aupers, 2012) and are more anomic (Achterberg & Houtman, 2009; De Keere, 2010; Elchardus & Smit, 2002, McDill, 1961) than higher educated. Subsequently, it is suggested that the three predispositions vary according to someone's field of study (economics/social-cultural). Because there is no empirical research on this, theoretical arguments are used here. Educational fields are subcultures in which students become socialized during their studies. These influence the way how students make meaning of the world around (Guimond, Begin & Palmer, 1989; van de Werfhorst & Kraaykamp, 2001). This implicates that if one is socialized in an environment with large emphasis on the broadening of cultural perspectives, one is more likely to hold a broad perspective on the world than if one is socialized in an environment with less emphasis thereon. Several scholars have demonstrated that social/cultural studies put more emphasis on the broadening of cultural perspectives as compared to the more exact (mathematical) studies like chemistry and economics which rely above all on a fixed model based way of thinking (e.g. Van de Werfhorst & Kraaykamp, 2001). In social/cultural studies social reality is mainly conceived as a pluralistic space which consists of not one but several truths. This while economic studies are more likely to conceive of reality as a fixed space in which just one universal truth is possible. When we take into account that students become socialized with these kinds of ideas this implicates that social-culturally educated are more likely to hold a broad perspective on the world and its cultures while economically educated would hold a more fixed perspective. In turn a broad or relativist perspective on the world can be associated with a relativist science view as well as with a non-anti-elitist attitude and less or no anomic feelings. A narrow or fixed perspective can be associated with a fixed science view, an anti-elitist attitude and substantial anomic feelings (e.g. Houtman & Achterberg, 2012; De Keere, 2010). Following this argumentation it can be expected that economically educated would have a more fixed science view, a more anti-elitist attitude and more anomic feelings as compared to the social/culturally educated.

It may be clear now how the three predispositions science views, anti-elitism and anomia are expected to be related to both educational level and field of study. We also already know how the predispositions are expected to affect people's trust in science when exposed to the different types of debate. This makes it an interesting question to test whether and to what extent the much found positive relationship between education and trust in science (Derks, 2000; Elchardus & Smits, 2007; de Keere, 2010; Houtman et al., 2012; Miller, 1983; Pion & Lipsey, 1981) can be explained by the interplay between the discussed predispositions and the varying scientific media content. The Science Deficit Model one-sidedly attributes the relationship between education and trust in science to the amount of 'objective' scientific knowledge people possesses (Miller, 2004). The inclusion of science communication and intermediating cultural factors therefore may prove that the relationship between education and trust in science needs a more nuanced explanation than the Science Deficit Model suggests. Therefore testing this is the second aim of this research.

2.4 Summary and hypotheses

In sum, framing theory suggests that the way scientific debates are framed determines how messages are interpreted by the audience. However, it remains unclear how scientific debates (controversial/harmonious) specifically lead to more or less trust in science. Studies on the framing of science have demonstrated ambiguous findings. Whereas on the one side framing scholars argue that controversial debate will be confusing for people and therefore will lead to lower levels of trust as compared to harmonious debate, on the other side Wynne (1996; 2006) argues that it is just harmonious debate that will lead to less trust in science, people are used to controversy in daily life and harmonious debate is therefore at least suspicious. The problem of these studies, as we have seen, is that they all conceptualize the perceiving audience as one undifferentiated mass. Yet while cultural predisposition, which are highly different among people, are proved to be crucially important for the interpretation of communicated messages (Ho et al., 2008; Nisbet, 2005; Scheufele et al., 1999).

Therefore in this study the audience has been integrated by adding three cultural predispositions as mediating factors for the evaluation of scientific debate. These are science views, anti-elitism and anomia. Controversial debate is expected not to fit with the universalistic ideas on science of people with a fixed view while will be confusing for people who are anomic, and therefore it is expected that the more fixed science views one has and the more anomic one is the higher the decrease of trust will be when confronted with controversial debate. This while harmonious debate is expected to lead to conspiracy thinking for people who are anti-elitist and therefore would lead to more decreasing levels of trust for anti-elitists as when compared to people who are not anti-elitist[1]. This can be translated into the first three hypotheses: *'The more fixed people's science views are, the more trust they lose when confronted with controversial debate (H1) '; 'The more anti-elitist people are, the more trust they lose when confronted with harmonious debate (H2)'; The more anomic people are, the more trust they lose when confronted with controversial debate (H3)'.*

Subsequently, it has been argued that science views, anti-elitism and anomia all are related to educational level and field of study (Achterberg & Houtman, 2009; Aupers, 2012; De Keere, 2010; Elchardus & Smits, 2002; McDill, 1961). The lower and economically educated are expected to have a more fixed science view, to have a more severe anti-elitist stance and to be more anomic than the higher and socially educated. In turn the predispositions are expected to mediate the relationship between media exposure and trust in science. This makes it interesting to test whether the much founded relationship between education and trust in science can be explained by the mentioned interplay between media messages and the cultural predispositions, science views, anti-elitism and anomia. Where the interplay between scientific viewpoints and anomia and the media content are expected to explain a part of the positive relationship between education and trust in science, the interplay between anti-elitism and media content is expected to mitigate this positive relationship by working in the reverse direction. However to test this, it first has to be tested whether and how educational level and field of study mediate the relationship between the type of debate and trust in science. People with a lower and economical educational background are expected to lose more trust in science when confronted with a controversial debate as compared to people with a higher education or social/cultural background. This leads us to the next two hypotheses: *'The lower educated as compared to the higher educated lose more trust in science when confronted with controversial scientific debate (H4)'; 'This is also the case for the economically educated as compared to the social/culturally educated (H5).'* Then it can be tested whether the relationship between education and trust in science can be explained by the intermediation of the scientific debates by science views, anti-elitism and anomia. The last six hypotheses can be conducted: *'The lower educated as compared to the higher educated lose more trust in science when confronted with controversial debate because of their fixed science views (H6)'. 'This is also the case for the economically educated as compared to the social/culturally educated (H7)'; 'The lower educated as compared to the higher educated lose less trust in science when confronted with controversial scientific debate because of their anti-elitist attitude (H8)'; 'This is also the case for the economically educated as compared to the social/culturally educated (H9)'. 'The lower educated as compared to the higher educated lose more trust in science when confronted with controversial scientific debate because of their anomic feelings (H10)'; 'This is also the case for the economically educated as compared to the social/culturally educated (H11)'.*

3. Data, Methods and Operationalization

3.1 Data and methods

As it is expected that framing effects will differ along educational level and field of study, students from different levels and directions (social-cultural/economics) were asked to participate in a vignette experiment. In the end a total of 323 students participated in the experiment, respectively 62 students from a social/culturally directed MBO, 91 from an economically directed MBO, 54 from a social academic faculty and 116 from an economic academic faculty. However, while student samplings are used widely in scientific research, they can pose serious problems for the generalizability of the research outcomes (Gordon, et al., 1986) especially when educational socialization is expected to play an explanatory role for the research outcomes. Educational socialization may be more effective at the time of studying than it may be several years later. A long interval between someone's study and the experiment then possibly mitigates the effect of educational socialization. Using students as respondents then may cause the explaining value of the cultural predispositions to be overestimated. Moreover, students also differ systematically from non-students on factors such as age and life experience (Carlson 1971; Sears, 1986), which may further increase the sample bias. Therefore, to increase the generalizability and representativeness of the sample, an additional online version of the questionnaire is conducted using the construction program thesis tools and is randomly spread through the social media sites Facebook and Twitter. This makes the respondents of the online questionnaire less likely to be students at the time of the experiment. If the treatment effects in both samples appear to a large extent the same, then for the generalizability it doesn't really matter whether students are used or not (Druckman & Kam, 2009). Therefore by comparing the outcomes of the different questionnaires, the representativeness of the sample may be enhanced (See also Gordon et al., 1986). In the end 134 online questionnaires were completed of which 95 were higher educated and 39 lower educated. By taking the student and online respondents together the sample contains of 457 participants.

The vignette experiment is particularly suitable for this research since it gives us the opportunity to combine an experimental treatment (scientific debate) with a survey on cultural attitudes in one research design (See Mutz, 2011). During the experiment respondents first are asked to fill in a short questionnaire concerning their cultural predispositions and some other characteristics like education, age, gender and religiosity. Subsequently, they are asked to read a controversial or harmonious media piece which are randomly assigned to them. Because science is a broad concept and consists of more than exact sciences alone, both a social and exact science debate are used (See appendix 5). However for reasons of brevity they are put together and treated as one general scientific debate. To control for a possible exceptional influence of one of the vignettes on the results, their separate influence will be controlled for in the analysis. After the respondents have read the vignette, they are asked to answer some questions on how they perceive the trustworthiness of science. After having finished the experiment the obtained data is imported into SPSS where after the assumptions are tested using an OLS Regression procedure.

3.2 Measurement

For the student population educational level is measured by the current educational level (MBO (0) or University (1)). In addition to increase response rates for the online questionnaire, in the online version educational level is measured by 5 categories: primary school or VMBO; HAVO or VWO; MBO; HBO or University. In the end the variable is dichotomized into two categories: higher and lower educational level. Primary school/VMBO, HAVO/VWO and MBO are merged into lower educational level (0) and HBO and University into higher educational level (1). In the end the whole sample contains of 42 % lower educated and 58 % higher educated respondents.

For the student population field of study is measured by only two categories, e.g. Economic studies and social/cultural studies. Again to increase the response rates of the online questionnaire some additional categories are included in the questionnaire. Its categories consist of 'Social/cultural studies, technical/Natural science studies, economic-financial/administrative studies, law studies, medical studies, studies otherwise. In the end, to measure field of study the variable is transformed into two dummy variables, namely 'economics' and 'study otherwise'. Economics just consists of the economically educated, while study otherwise consists of the studies technical/natural science, law studies, medical studies and studies otherwise. For both dummies social/cultural studies functions as the reference category. The whole sample contains of 49 % economically educated, 40.6% social /culturally educated, and 10.4% otherwise educated.

To measure the respondent's science views a scale is constructed of two standardized five-point *likert*-type items e.g. *'Science is the continuous search for the absolute truth'* and '*An absolute truth doesn't exist in science'* (answer categories are: 1= totally agree; 2= agree; 3= neither agree, nor disagree; 4= disagree; 5= totally disagree). After recoding a higher score indicates a more 'relativist' scientific viewpoint. The reliability of the scale remains relatively weak with a Cronbach's Alpha of .53. This is not very satisfactory there a reliable scale has at least a reliability of Cronbach's Alpha .6. However, reliability scores often increase when more items are added. This is not all due to objective increased reliability, but is instead also a trait of the measure. If we take into account that the constructed scale 'science views' only consists of two items this makes a Cronbach's Alpha of .53 more acceptable than it would have been the case with a scale consisting of more items. Moreover, the correlation between the two items is .36 which is quite high and the two items together explain 68.1% of the variance in the items (Eigenvalue 1.36).

The variable 'Anomia' is based on Srole's renowned scale for anomia (Srole, 1956) and consists of four standardized five point likert-type items e.g. '*These days a person doesn't really know whom he can count on'*, '*To get a better life is often a matter of luck', 'Nowadays it is irresponsible to bring children into the world', 'In this society it is no longer important what one feels or thinks'* (answer categories are:1= totally agree; 2= agree; 3= neither agree, nor disagree; 4= disagree; 5= totally disagree). The scale is coded in such a way that a higher score indicates a higher level of anomia. All cases with a valid score on at least three of the four questions are included. Furthermore together the four items constitute one factor with an eigenvalue of 1.86 and an explained variance of 46.48 %. With a Cronbach's Alpha of .61 this is an acceptable reliable scale.

Anti-Elitism is measured by three standardized five point liker-type items e.g. '*Nowadays the political elite only serve their own interest', 'Society would me much fairer without the current elites at the top', 'Politicians try to make society a better place for everyone'* (1= totally agree; 2= Agree; 3= neither agree, nor disagree; 4= disagree; 5= totally disagree). A higher score indicates a higher level of anti-elitism. All cases with at least two valid answers of the three questions are included. In a factor analysis the three items form one factor with an eigenvalue of 1.87 and an explained variance of 62.39 %. With a Cronbach's Alpha of .70 this is a sufficient reliable scale.

The dependent variable 'Trust in Science' is measured by five standardized likert-type items adopted from the Belgian mail survey '*Biotechnology in the Public Sphere'* carried out by the research group TOR from the Vrije Universiteit Brussel (2004). The used questions are '*Science and technology make us healthier', Science and technology make our lives easier and more comfortable', 'Scientists make valuable contributions to society', 'Science and technology have already caused more harm than good', 'Science and technology provide more opportunities for the next generation'* (1= Totally agree; 2= Agree; 3= Neither agree, nor disagree; 4= disagree; 5= Totally disagree). The items are coded in such a way that a higher score indicates more trust in science. All cases are included if they have at least four valid answers of the five questions. Together the items form one factor with an eigenvalue of 2.63 and an explained variance of 52.51 %. This together with a Cronbach's Alpha of .77 indicates that the scale is properly reliable.

Previous research has shown that religiosity, age and sex are all related to trust in science (See for sex: Claes et al., 2004; for age: Houtman & Mascini, 2000; Claes et al., 2004; for religiosity: Brossard et al., 2009; Scheufele & Brossard, 2008). Therefore they are included as control variables in these analysis. Sex will simply be measured by the categories male (0) and female (1) and age by the categories: '15 to 25 years (1); 26 to 35 years (2); 36 to 45 years (3); 46 to 55 years (4); 56 to 65 years (5); Older than 65 (6). Religiosity will be measured by two questions. The first question is 'Do you believe there is only one God? (1=yes; 2=No there are more Gods; 3=No there is no God; 4= I don't know whether there is one God or not). The second question is '*Can you indicate on a scale from one to ten how religious you think you are regardless of whether you belong to a certain religious movement or not?'* In the online version the scores on question two deviate slightly from the student questionnaire, there it consists of a scale ranging from 0 to 9 instead of a scale ranging from 0 to 10 as in the student questionnaire. This can be attributed to the fact that the student questionnaire is conducted first. When it has been decided to add an online version to the sample it turned out that only 10 scores were accessible. Because the non-religious had to be included too (score 0) it was decided to code score 9 and 10 both as 9 and they will both represent the highest score for religion. In the end, to get an appropriate variable for religiosity the product variable is calculated by multiplying the standardized scores of the two questions.

4. Results

To test the hypotheses, an OLS-Regression is performed[2]. In addition to disentangle potential differences or similarities between the online and student sample results an additional OLS-regression is conducted. The results of both groups are represented separately.

4.1 Measuring framing effects: The intermediating role of science views, anti-elitism and anomia

In the first step it is tested whether we can find a separate direct effect of exposure toward different scientific messages (controversial/harmonious) on the level of trust in science, as was indicated by both the ‘confusion’ and the ‘ambivalence as part of everyday life’ theorists. The results, as listed in table 1 model 1, show that this is not the case. Exposure toward controversial or harmonious scientific debate doesn’t directly lead to lower or higher levels of trust in science. Regarding the effects of scientific debate on trust in science this indicates that no conclusions can be drawn from exposure to scientific messages alone.

In the next step the three cultural predispositions science views, anti-elitism and anomia are added to the analysis to test whether and how the effects of the different debates are dependent on these. The expectation is that science views and anomia lead to a decrease of trust in science when exposed to controversial debate while anti-elitism is expected to lead to a decrease of trust in science when exposed to harmonious debate. To test these claims three interaction variables are constructed by calculating the product of the standardized scores or science views, anti-elitism and anomia with the standardized score of the type of debate. After a test has proven that the cultural predispositions contain no mutual collinear relationships, the newly conducted interaction variables ‘science views*type of debate’, ‘anti-elitism*type of debate and ‘anomia*type of debate’ are entered into the regression model. As can be seen in model 6 of table 1, only science views significantly mediates the effect of scientific communication on trust in science. Not people with a fixed view but instead people with a relativist view toward science, are inclined to translate controversial scientific debate into lower levels of trust as compared to harmonious debate.

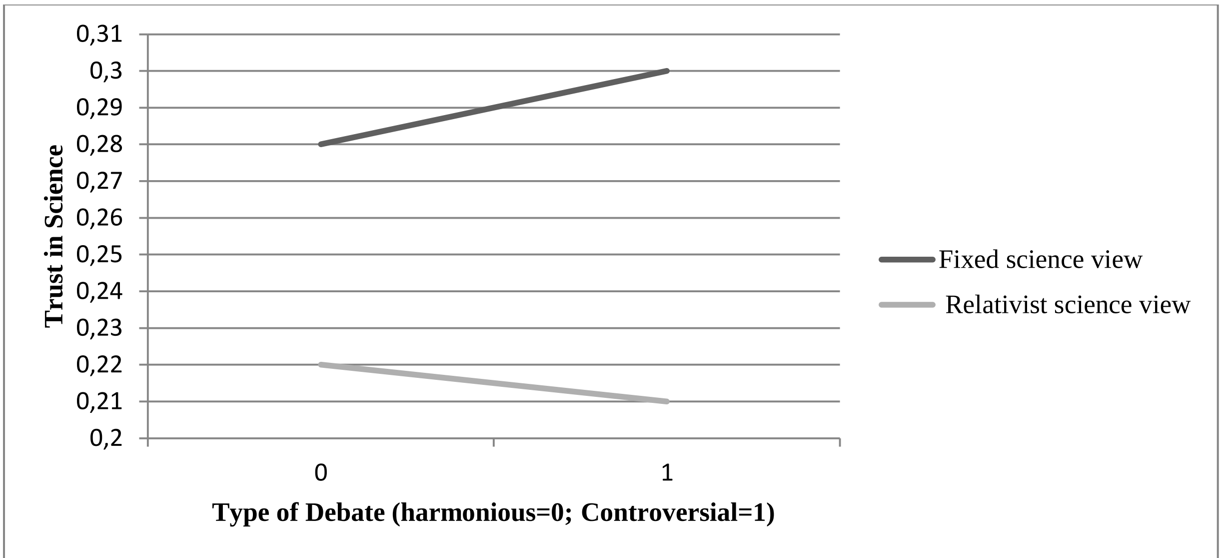

Figure 1. The relationship between type of debate and trust in science according to science views

This while people with a fixed science view gain trust under the same conditions (See figure 1.). This is opposed to the expectation that a fixed science view as compared to a relativist science view leads to a higher loss of trust when exposed to controversial debate. Therefore hypothesis 1 must be rejected.

Furthermore, anti-elitism and anomia don't mediate the effect between scientific media frames and trust in science in a linear way. As is shown in table 1 (model 6) none of these two interaction effects are statistically significant. However it must be mentioned that the interaction term of anti-elitism indicates a relatively strong interaction-effect (B=.07) which is practically significant ($p<.055$). This makes it quite conceivable that future research, containing a larger sample or a more adequate measure of anti-elitism, may verify this result. However for now hypotheses 2 and 3 both must be rejected.

4.2 Explaining the relationship between education and trust in science by framing effects

The second aim of this study is testing whether and how the interplay between the cultural predispositions science views, anti-elitism and anomia and scientific media messages mediate the relationship between education (level and field) and trust in science. To test this, first it is measured whether and in how far educational level and field of study mediate the relationship between type of debate and trust in science. According to the third and fourth hypotheses it is expected that the lower and economically educated lose more trust in science when confronted with controversial debate as compared to the higher and social/culturally educated. In order to test, this three interaction variables are constructed by multiplying the standardized scores of 'educational level', 'economics' and 'other study' with the standardized score of the type of debate. Then the obtained interaction variables are entered into the regression model. As model 2 of table 1 shows, the interaction effect of educational level is not significant. This means that educational level doesn't explain any linear connection between the experimental stimuli media content and the dependent variable trust in science. This indicates that the positive relationship between educational level and trust in science cannot be explained by the interplay between educational level and the scientific media content. The fourth hypothesis must therefore be rejected. For field of study (economics), however, the interaction effect is significant (See figure 2). Economically educated lose trust in science if confronted with controversial scientific debate while socially educated gain trust under the same experimental circumstances. The negative direction of the interaction effect proves to be in line with the expectation that economically educated lose more trust in science as compared to the socially educated when confronted with controversial debate. Someone's field of study thus matters if we want understand the complexities of science communication. The fifth hypothesis has proven to be correct and therefore has to be approved.

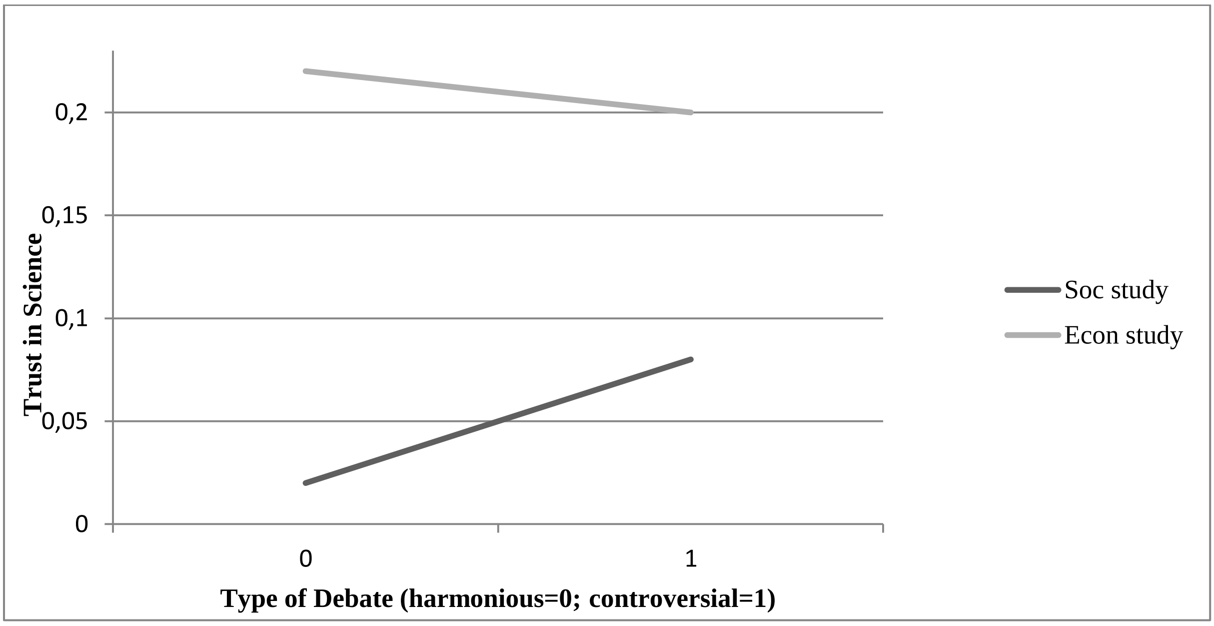

Figure 2. The relationship between type of debate and trust in science according to field of study

Now it can be tested whether the relationship between education and trust in science can be explained by the interplay between the cultural predispositions science views, anti-elitism and anomia and the type of scientific debate. Expected is that the lower and economically educated lose more trust in science when confronted with controversial debate because of their more fixed science view and anomic attitude, while they will lose less trust in science when confronted with controversial debate because of their anti-elitist stance. However, the evidence suggests that none of the cultural factors is able to explain the mentioned relationship. As it is shown in table 1 model 2, no linear relationship exists between educational level and the level of trust in science after exposure to the different debates. This means that there is no relationship to explain by the cultural predispositions. Therefore the sixth, eighth and tenth hypothesis must be rejected. Next, it has been demonstrated that field of study mediates the relationship between type of debate and trust in science. However this mediation can neither be explained by science views nor by anti-elitism or anomia, as we can see in table 1 model 3, 4 and 5. No mitigation of the interaction effect can be observed for field of study if science views and anomia are entered into the model. Likewise there is no increase of the field of study interaction when anti-elitism is entered into the model. This makes clear that hypotheses seven, nine and eleven also must be rejected.

Table 1. **Explaining the effects of science communication on trust in science/Explaining the positive relationship between education and trust in science (OLS-regression Method=ENTER, N=400)**

	Model 1		Model 2		Model 3		Model 4		Model 5		Model 6	
	B	S.E	B	S.E	B	S.E	B	S.E	B	S.E	B	S. E
Constant	.03	.03	.02	.03	.02	.03	.01	.03	.01	.03	.28***	.09
Type of debate (0= harmonious; 1= controversial)	.04	.03	.06*	.03	.06*	.03	.06*	.03	.06*	.03	.02	.04
Educational level			.19***	.03	.21***	.03	.017***	.04	.16***	.04	.14***	.04
Educational level *type of debate			-.02	.03	-.02	.03	.01	.04	-.00	.04	-.01	.04
Economics[1]			.20***	.03	.17***	.03	.17***	.03	.17***	.03	.11**	.04
Economics *type of debate[1]			-.08**	.03	-.09**	.03	-.09**	.03	-.09**	.03	-.105***	.03
Other study[1]			.03	.03	.04	.03	.05	.03	.06*	.03	.05	.04
Other study* type of debate[1]			-.04	.03	-.04	.03	-.04	.03	-.04	.03	-.07*	.03
Science views (Relativist)					-.09***	.02	-.08***	.02	-.08***	.02	-.06***	.02
Science views *type of debate					-.02	.02	-.03	.02	-.03	.02	-.03*	.02
Anti-elitism							-.12**	.04	-.13**	.05	-.132**	.05
Anti-elitism * type of debate							.06	.04	.08*	.05	.074 (p.<.055)	.05
Anomia									-.00	.05	.02	.05
Anomie * type of debate									-.06	.05	-.04	.05
Controls												
Sex (male = 0; female=1)											-.24***	.07
Age											-.05	.05
Religiosity											-.10**	.04
Beta Vignette *Type of debate											.09	.06
R^2 (adjusted)	.00		.14		.18		.20		.20		.23	

[1] Social/Cultural Study is reference category

*p<.05; **p<.01; ***p<.001 (one-tailed tests for significance)

4.2. Measuring external validity

Now the central hypotheses have been tested for the sample as a whole, an additional OLS-regression is conducted to test whether the student questionnaire and the online questionnaire provide us with the same or different results. To do this, the data is split according to the type of questionnaire (online/student). When we look at table 2 we can discern some interesting disclosures. First, an interaction effect of field of study cannot be detected in the online questionnaire. However, this may be due to the low amount of economically educated respondents (10) in this subsample. What is more interesting, however, is that the interaction effects of science views and anti-elitism in the student questionnaire are not significant while they are strongly significant in the online questionnaire. Moreover, the direction of these effects in the online questionnaire even shows to be opposed to that of the student questionnaire.

Table 2. Explaining the effects of science communication on trust in science/Explaining the relationship between education and trust in science, separated by sampling method (OLS-regression, N= 400)

	Student questionnaire		**Online questionnaire**	
	B	**S.E**	**B**	**S.E**
Constant	.28**	.11	.30	.19
Type of Debate (0=harmonious; 1=controversial)	.04	.05	.12	.15
Educational level	.14***	.04	.16*	.09
Educational Level*Type of debate	-.04	.04	.07	.10
Economics[1]	.09*	.04	.26*	.13
Economics*Type of Debate[1]	-.12***	.04	.07	.13
Other study[1]			.10*	.06
Other study*Type of Debate[1]			-.05	.05
Science Views	-.04*	.02	-.10**	.04
Science Views* Type of Debate	.01	.02	-.09**	.04
Anti-elitism	-.12*	.06	-.19*	.09
Anti-elitism*Type of Debate	-.04	.06	.26**	.09
Anomia	-.03	.06	.14	.12
Anomia*Type of Debate	-.05	.06	-.04	.12
Controls				
Sex (male = 0; female=1)	-.34***	.08	.09	.14
Age	-.02	.07	-.07	.07
Religiosity	-.08*	.04	-.16**	.07
Beta vignette*Type of Debate	.10	.07	.10	.13
R^2 (Adjusted)	.26		.23	
N	287		113	

[1] Social/Cultural Studies is the reference category

*p<.05; **p<.01; ***p<.001 (one-tailed test for significance)

Where science views in the student questionnaire demonstrates a modest but non-significant positive interaction-effect, this effect is considerably bigger and negative in the online questionnaire. For Anti-elitism the reverse is the case. While this interaction effect is (non-significantly) negative for the student questionnaire, this is significantly positive in the online questionnaire. These striking dissimilarities indicate that for the first regression analysis the found interaction effects for science views and anti-elitism are entirely attributable to the online sample.

5. Conclusion and discussion

In this study it has been examined whether and how trust in science is affected by complex processes of science communication. Many scholars still adhere to the idea that a lack of trust in science is caused by an ignorant lay public and that science communication therefore linearly leads to higher levels of trust in science. However, by means of a self-conducted vignette survey experiment this study has demonstrated that this idea is far too simplistic and that effects of science communication both depend on the framed content of the scientific message and the way this message is interpreted by its audience.

Starting from framing theory it was expected that the way a message is framed determines how it will be interpreted. Scientific communications are by no means only stories of harmonious agreement but also of controversy and conflict. By taking framing theory into account, it is therefore likely that controversial and harmonious scientific debate will be interpreted differently. However up till now there was no clarity about whether and how controversial debate would affect people's trust in science differently than harmonious debate would do. While on the one side scholars have claimed that controversial debate is confusing and therefore leads to decreasing levels of trust in science (Corbet & Durfee, 2004; Dunwoody, 1999; Pollack, 2003), on the other side it has been argued that it is harmonious debate that leads to decreasing levels of trust, as controversies are an ordinary part of everyday life and harmonious debate therefore is at least suspicious (Wynne, 1996, 2006). The results found in this study indicate that trust in science cannot directly be explained by the type of scientific debate. A controversial scientific debate doesn't linearly lead to a higher or lower level of trust in science as compared to a harmonious debate. Thus by only taking into account the content of the scientific message, just like the 'confusion' and 'controversy as part of everyday theorist', in this study it seems there is no framing effect at all.

The problem with the above mentioned studies, it was argued, is that they conceptualize the audience as one undifferentiated mass interpreting scientific messages all the same. This, while it has extensively been proven that cultural values, which are highly different among people, are important for the interpretation of scientific communications. Therefore in order to give a more adequate picture of how science communication works, in this study cultural predispositions were integrated into the research design. Overall, it was expected that the way in which messages are framed matters for the evaluation of those messages, though the way in which interpretations are contingent and to what degree, was expected to depend on someone's cultural predispositions. To test this, three cultural predispositions were added to the analysis, namely science views, anti-elitism and anomia.

Yet, the analysis showed that only science views exert a direct linear influence on the evaluation of scientific debate while anti-elitism and anomia do not. For science views it was expected that people with a fixed science view would show a higher decrease of trust in science when exposed to controversial debate then people with a relativist science view. However although the analysis showed that science views indeed exert a direct linear influence on the evaluation of the scientific debates, this showed to be in the reverse direction as was expected. People with a relativist science view lose trust in science when confronted with controversial debate while people with a fixed science view gain trust in it. This is opposed to the theoretical assumption that people with a relativist science view will be more used to the ordinariness of controversial messages and therefore will lose less trust in science as compared to people with a more fixed science view. This may be due to the fact that although science relativists are more used to controversy and ambivalence, in a reflexive sense they may be more inclined to connect these controversies with the constraints of science for societal progress. Beck already argued that the well-educated reflexive individual can be characterized by an increased consciousness of the constraints of science (Beck, 1992). A controversial scientific message then possibly confirms their ideas about the restraints of science, which draws back their trust in it as bringer of progress and truth.

For anti-elitism it was expected that an anti-elitist stance would lead to a higher decrease of trust when exposed to harmonious debate than a non-anti-elitist stance. Although the results of this study indicate that this is not the case, it must be noted that despite its non-significance, anti-elitism seems to be relevant for the evaluation of scientific content. Restricted to the sample therefore it can be said that people with an anti-elitist stance lose trust in science when confronted with harmonious debate while people without an anti-elitist stance trust science more when harmonious debate is exposed to them. This is in line with the theoretical assumption that anti-elitist people are more inclined to think in terms of deception and conspiracy when they are exposed to harmonious debates. In contrast, a controversial debate will probably be perceived as more democratic, open and fair. However, the relationship is just not significant, and therefore future research containing a bigger sample or stronger measure of anti-elitism, should reveal whether this suggestion can be verified or not.

The last cultural predisposition added to the analysis is anomia. It was expected that anomic people would show a higher decrease of trust in science when exposed to controversial debate. People with anomic feeling were expected to be confused when exposed to controversial debate because of their inability to deal with many different perspectives. However on the base of the found results, this proved not to be true.

Subsequently, it was tested whether and how the relationship between education and trust in science could be explained by the interplay between scientific debate and the three cultural predispositions ‘science views’, ‘anti-elitism’ and ‘anomia’. Although the results show that educational level and field of study both directly are related to trust in science, only field of study appears to matter for the evaluation of the scientific media content. This means that the relationship between educational level and trust in science cannot be explained by the interplay between the predispositions and the scientific debates. As expected, the economically educated lose trust when confronted with controversial debate, whereas the socially educated in contrast gain trust. However none of the cultural predispositions could explain a part of this interaction. This indicates that the greater loss of trust of the economically educated cannot be attributed to their science views, anti-elitist stance or level of anomia.

There were good reasons to assume that the positive relationship between educational level and trust in science could be explained by the interplay between scientific debate and the three cultural predispositions. Though, the explanations proved not to be true. Notwithstanding these results could mean there are no relationships at all, they could also mean that the relationships are even more complex than expected. As mentioned in the discussion above, relativist science views lead to a decrease of the level of trust in science when exposed to controversial debate. According to De Keere (2010) these relativist science views can especially be found with higher educated persons, who have a more reflexive consciousness than the lower educated. Next it was also expected that anomia would decrease the level of trust in science when exposed to controversial debate[3]. According to De Keere anomia is mainly a characteristic of the lower educated. If on the one side the higher educated lose trust in science when confronted with controversial debate because they see their relativist views confirmed, while, on the other hand, the lower educated lose trust in science because they are confused by the ambiguousness of the message, then this could obscure the interaction effect of educational level in the analysis. However further research is needed for a better understanding of these complex relationships.

Finally, a comparison was made between the online and student sample to enhance the external validity of the research outcomes. The analysis pointed out that the explaining value of science views and anti-elitism in the first regression must be attributed entirely to the online questionnaire. This great contrast with the student questionnaire evokes the question of how this is possible. First, this may mean that the student sample significantly differs from the online sample and therefore the student sample is not representative for the whole population. However, although a modest bias was anticipated, because age, educational socialization and experience of students were expected to differ from non-students, such a huge contrast seems unlikely to be just a consequence of the slightly differing samples. Moreover the average age of the online respondents is quite the same as compared to the student’s average age and many of them are as educated as the student population. This makes it likely that a great part of the online respondents also are still students or are graduated in the near past. The online and student population are thus less different on the mentioned characteristics than was expected previous to the research. This not only means that comparing the two samples cannot help increase the external validity of the outcomes, this also means that the differences between the two samples possibly need an alternative explanation.

A possible alternative explanation may be the unequal distribution of the research population. The online questionnaire contains an overrepresentation of higher (social/culturally) educated research subjects. This, while this group is underrepresented in the student questionnaire. Achterberg et al. (2010) found that the more scientific knowledgeable people are, the better they are able to integrate their cultural predispositions into the evaluation of scientific messages. Because the higher educated are expected to be more knowledgeable on science than the lower educated (Bodmer, 1985; Jenkins, 1997) and thus are better able to integrate their cultural predispositions into the evaluation of science, it may be that the strong interaction effects in the online questionnaire can be attributed to the higher educated. However it could also be that some of the cultural predispositions of the higher and lower educated are based on different basic assumptions. As it may be that the anti-elitism of the higher educated would mainly be based on their critical reflective attitude while the anti-elitism of the lower educated may rather stem from a feeling of discomfort, a feeling that the elite has let down its citizens and only serves its own interests instead. Because the online sample contains an overrepresentation of higher educated respondents, the stronger interaction effect in the online sample may be possibly induced by the reflective anti-elitism of the higher educated and thus not or less by the discomfort based anti-elitism which is above all a characteristic of the lower educated. However, to really find out whether and in how far the different outcomes are attributable to a sampling bias or alternative explanations like described above, additional research is needed containing a more representative sample and a more differentiated theoretical framework.

Even though only one of the eight hypotheses has been confirmed, the results still have shown that science communication is a much more complex issue than the Science Deficit Model suggests. It is not simply the transfer of knowledge what makes that science is trusted by the public. As we have seen the way messages are framed and how people negotiate those framings are indispensable for a better understanding of how science communication works. Moreover, this study has also contributed to the debate on framing by showing a new innovative way of researching communication issues. Traditional framing studies would have observed no framing effect at all, however this vignette experiment has shown that framing effects do exist, but are contingent on cultural predispositions. The vignette experiment is a promising research method to disentangle these kinds of intermediating relationships. However we should remain careful to generalize the founded results to the entire population. As described above, the sample cannot clearly be seen as representative for the whole population there it mainly consists of students and people who graduated in the near past. Therefore additional more representative research is needed to improve the external validity of the results. Of course, this study was just a first exploration of studying science communication experimentally and therefore many questions remain unanswered. However, notwithstanding the sample restraints and modest results, this research has demonstrated the importance of studying science communication by means of the experimental design and opened up a range of possibilities for future research. Moreover, the experimental study of cultural mediations is becoming increasingly relevant in our fragmented world, where people with different cultural backgrounds live together and construct their meanings of the world around according to their own frame of reference.

Notes.

1. The decrease/increase of trust in science in all cases is relative to the opposite kind of debate (harmonious/controversial). Thus when trust decreases when one is exposed towards controversial debate this is weighted against harmonious debate while when trust decreases when one is exposed towards harmonious debate this is weighted against controversial debate.
2. Two cases of which the score is located more than 3 standard deviations from the mean are excluded from the analysis. In addition two other cases are excluded as the result of their deviant position in the plots.
3. Though in this data a significant interaction effect of anomia cannot be observed, this could be a consequence of a weak measure of anomia. Also could it be a consequence of a weak measure of science views which possibly represses the effect of anomia. Therefore better scales are preferred for future research.

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Appendices

Appendix 1. Factor analysis dependent variable ‘Trust in Science’ (Varimax Rotation)

Items	**Factor loadings**
Science and technology make us healthier.	.784
Science and technology make our lives easier and more comfortable.	.745
Science and technology have already caused more harm than good.	.608
Scientists make valuable contributions to society.	.730
Science and technology provide more opportunities for the next generation.	.743
Eigenvalue	2.63
R^2	.53
Reliability (Cronbach’s Alpha)	.77
N	415

Appendix 2. Factor analysis Independent variable ‘Science Views’

Items	**Factor loadings**
Science is the continuous search for the absolute truth.	.825
An absolute truth doesn’t exist in science.	.825
Eigenvalue	1.36
R^2	.68
Reliability (Cronbach’s Alpha)	.53
N	442

Appendix 3. Factor analysis independent variable ‘Anomia’ (Varimax Rotation)

Items	**Factor loadings**
These days a person doesn’t really know whom he can count on.	.652
To get a better life is often a matter of luck.	.552
Nowadays it’s irresponsible to bring children into the world.	.719
In this society it is no longer important what one feels or thinks.	.783
Eigenvalue	1.86
R^2	.46
Reliability (Cronbach’s Alpha)	.61
N	430

Appendix 4. Factor analysis independent variable ‘Anti-elitism’ (Varimax Rotation)

Items	**Factor loadings**
Nowadays the political elite only serve their own interests.	.847
Society would be much fairer without the current elites at the top.	.792
Politicians try to make society a better place for everyone.	.726
Eigenvalue	1.87
R^2	.62
Reliability (Cronbach’s Alpha)	.70
N	412

Appendix 5. Vignettes scientific debates: Exact science harmonious, Exact science controversial, Social science harmonious, Social science Controversial (Translated from Dutch)

WEDNESDAY, MARCH 20, 2013

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Omega-6 appears to be unhealthy

Recently scientific research has indicated that Omega-6 fatty acids aren't good for health.

Researcher Valery McConnel: "Heart patients who replace saturated (animal) fats with vegetable fats with unsaturated omega-6 fatty acids are more likely to die of cardiovascular diseases. It would be wise to avoid food that contains Omega-6 fatty acids in the future."

The outcome of this study has also been placed next to the results of other studies. These studies indicated that omega-6 fatty acids are indeed harmful to your health and increase the risk of cardiovascular diseases. Therefore, also according to these studies the avoidance of food that contains omega-6 fatty acids appears to be wise.

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WEDNESDAY, MARCH 20, 2013

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Omega-6 appears to be unhealthy?

Door: Bart de Jager – 20/03/13, 09:36

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The outcome of this study has also been placed next to the results of other studies. However these studies indicated that Omega-6 fatty acids are not bad for your health at all and even reduce the risk of cardiovascular diseases. Therefore, according to these studies, the avoidance of food that contains omega-6 fatty acids isn't wise at all.

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WEDNESDAY, MARCH 20, 2013

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Facebook makes youngsters feel lonely

By: Bart de Jager – 20/03/13, 09:36

Recently scientific research has indicated that Facebook makes people feel lonely.

Researcher Valery McConnel: "Young people who are often active on Facebook are more likely to suffer from loneliness because they have forgotten how to make friends in real life. It would be wise for them to avoid Facebook more often in the future. "

The outcome of this study has also been placed next to the results of other studies. These studies indicated that Facebook indeed make youngsters feel lonely. Therefore, also according to these studies the avoidance of Facebook appears to be wise.

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WEDNESDAY, MARCH 20, 2013

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Does Facebook make youngsters feel lonely?

By: Bart de Jager – 20/03/13, 09:36

Recently scientific research has indicated that Facebook makes people feel lonely.

Researcher Valery McConnel: "Young people who are often active on Facebook are more likely to suffer from loneliness because they have forgotten how to make friends in real life. It would be wise for them to avoid Facebook more often in the future."

The outcome of this study has also been placed next to the results of other studies. However these studies indicated that Facebook doesn't make people feel lonely at all. Therefore, according to these studies, the avoidance of Facebook isn't necessary at all.

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