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Mood, Persuasion and Information Presentation

The influence of mood on the effectiveness of persuasive digital documents

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Abstract: We describe an experiment studying the effectiveness of persuasive digital documents, taking mood, exposure time and site design into account. Participants in either a neutral or a positive mood were confronted with a persuasive site. These sites could either be “content only” or “content plus” (the latter using some of the information presentation possibilities offered by digital documents). In addition, in a limited exposure condition, participants were given a restricted time to visit the site, while in the unlimited condition, participants were allowed to spend as much time on the site as desired. The results of the experiment showed that both mood and site design had a strong effect on attitude change, while exposure time did not. Participants in a positive mood were more inclined to change their attitude in the direction of the advocated position than participants in a neutral mood. And, participants visiting a content-plus site were more inclined to change their attitude than participants visiting a content-only site. Interestingly, there was an interaction between these two factors, to the effect that the presence of additional information presentation cues was particularly effective for participants in a positive mood.

Keywords: mood, information presentation, time pressure, persuasive communication, digital documents, navigation.

1. Introduction

Persuasive documents (see e.g., Hoeken 1998) can be defined as documents that attempt to change the attitude of the reader in a non-coercive way. In recent years, the interest in using *digital media* (digital documents, web sites, etc.) for persuasive purposes has increased substantially (see e.g., Fogg 2002, 2003). A prime example is the rise of e-commerce applications, but persuasive digital documents are also often used for educational purposes or simply to provide attitude-relevant information. This increased usage of digital documents as a persuasive tool is not surprising, since digital documents have certain characteristics that make them potentially relevant for persuasive purposes. Many of these characteristics have to do with *information presentation* (see e.g., Nielsen 2000, Huizingh 2000). For instance, digital media is more interactive than traditional media, because it offers readers the possibility to navigate through a document whichever way they want. This creates opportunities for adaptation to individual user profiles and tailored information presentation. Besides plain text, color and graphical illustrations, also the use of animations or video is increasingly common in digital documents. Naturally, documents can be characterized along more dimensions (see e.g., Hartley 1998), but it seems far to state that digital documents have more and different possibilities for presenting persuasive information than do traditional text documents, where these possibilities are primarily related to *information packaging* (Vallduví 1992) rather than informational content.

Given such differences between digital and traditional documents, the question arises whether or not they influence the *effectiveness* of persuasive documents (e.g., Murphy et al. 2003). There is some evidence that tailored information presentation increases the potential for attitude change

(see e.g., Nowak et al. 1999). Arguably, the attractive packaging of the information may also influence the persuasive effectiveness. This can be explained by models of persuasion, which often involve multiple ways in which attitudes can change. In Petty & Cacioppo's (1986) Elaboration Likelihood Model (ELM), for instance, there are two ways in which a person can process (or 'elaborate' on) the information in a persuasive message, either by following a central route or a peripheral one. The central route to attitude change requires serious cognitive processing; the receiver systematically processes the information ('issue-relevant thinking') and critically evaluates the arguments offered in the message. The peripheral (or heuristic) route, on the other hand, involves only limited elaboration. When following this route, the receiver pays more attention to 'peripheral' cues, such as the presence of a credible source ('experts are always right'), the number of *prima facie* plausible arguments ('more arguments are better') and lay-out ('a nice design is more convincing'). In view of the aforementioned differences between traditional and digital media, it might be that digital media are especially effective when a person follows the peripheral route.

According to Petty & Cacioppo (1986) there are at least two factors that co-determine how a person will process a persuasive message: *motivation* and *ability*. If the motivation and/or the ability are low, a person will be more likely to perform little elaboration. One interesting factor that may influence motivation and ability for elaboration is *mood* (see e.g., Isen 1993, Petty et al. 1997, Ashby et al. 1999, Wood 2000, Evans 2001), where it has been noted that mood may influence both (i) the motivation to process the contents of a persuasive text (see e.g., Mano 1997, Ellis and Moore 1998) and (ii) the ability to do so (see e.g., Mackie and Worth 1989, 1991, Bless et al. 1990). Mackie and Worth for instance, claim that the cognitive capacity available for information processing is reduced when people are in a positive mood. A person may want to process information systematically, but cannot. Apparently, mood triggers a neurological stimulation that may lead to adjustments of the thresholds and weights governing the way the brain works, thereby modifying the cognitive process (Ashby et al. 1999, Isen 1993), where a positive mood generally leads to broader, more 'shallow' processing. As a result, this person might be more inclined to pay attention to the superficial properties of the persuasive document. Interestingly, Mackie and Worth also found an effect of time: when participants were 'forced' to follow a central route (since they had to evaluate the logical quality of arguments), participants in a positive mood required more time than did participants in a neutral mood. This can again be explained from limited information processing abilities: participants in a positive mood simply need more time for focused or 'deep' processing. In this respect, it is interesting to observe that reading times for digital documents may differ from those for standard documents. On the one hand there is some evidence suggesting that reading from a screen takes more time than reading from paper (see e.g., Garland & Noyes 2004). But on the other hand, people tend to be less inclined to read for longer stretches of time on a screen, while they are willing to do so for texts on paper (see e.g., Morkes and Nielsen 1997).

In this paper, we report on an experiment investigating the impact of information presentation techniques in digital media on the effectiveness of persuasive documents. We confronted participants with two kinds of persuasive digital documents: documents that were primarily content-oriented, and documents that made use of the various information presentation possibilities offered by the digital medium. The second kind of site might be more effective when participants are less likely to do systematic processing. Given that the motivation and the capabilities of a person co-determine whether a persuasive message will be processed

systematically or not, and given that mood is one of the established factors influencing motivation and capabilities, we used mood as a variable in the experiment to find out whether it had an influence on the effectiveness of persuasive digital documents. In addition, since time appears to influence the effect of mood (in that participants in a positive mood need more time to achieve a comparable level of processing than people in a neutral mood) and since reading time can be an important difference between traditional and digital media, we decided to control for time as a third factor in our study.

The remainder of this paper is organized as follows. In section 2 we outline the experimental method. We used a variant of the experimental paradigm presented in Mackie and Worth (1989, 1991), where moods were induced in participants by showing them 5-minute television fragments (an approach which at least dates back to Gouaux, 1971). Subsequently, participants were confronted with a persuasive digital document after which their attitude-change towards the advocated position was measured. The results of the experiment are described in section 3. We end with some concluding remarks in section 4.

2. Method

2.1 Overview

Participants who were either in a positive or in a neutral mood were confronted with a persuasive digital document devoted to one of two controversial, contemporary issues. Participants were always confronted with a counter-attitudinal document (i.e., one which tried to change their attitude in the opposite direction), that either only presented textual information (Content Only) or that had a variety of secondary characteristics (Content Plus). In the limited exposure condition, participants were given a limited amount of time to visit the site, while in the unlimited exposure condition they were allowed to spend as much time on the site as they required. Various dependent variables were measured, including the amount of attitude change toward the position advocated on the site.

2.2 Participants

Participants were 40 young adults, between 20 and 27 years of age. 18 of the participants were male and 22 female. All were students or had recently graduated. They all had substantial experience with the internet, using it at least two-three times per week for more than a year. The participants were randomly assigned to an experimental condition.

2.3 Materials

2.3.1 TV segments

Moods were induced in participants by confronting them with 5-minute clips taken from two different sources. Participants in whom a positive mood was to be induced were shown a 5-minute segment from *Friends*, a comedy series particularly popular within the participants' age groups. Participants in whom a neutral condition was to be induced were shown a similar length fragment from *Animal Encounters*, an informative nature program from the Animal Planet Network.

2.3.2 Digital documents

Two topics were selected as attitude-objects: *genetic modification* (the modification of the DNA structure in living organisms) and the *Betuwe route* (a railway line through the 'green heart' of the Netherlands). Both are contemporary issues with a clear relevance to society, and both have been the subject of extensive media coverage in the Netherlands. Both involve complex and complicated issues, each with clear advantages *and* disadvantages. This made them suitable for our purposes.

According to its proponents, genetic modification can help in reducing hunger and vitamin shortages in third world countries and can be beneficial in overcoming various diseases. But opponents maintain that the alleged advantages for hunger reduction are doubtful, that genetic modification may cause new and different health problems because it is still poorly understood, and finally, that it is not ethical.

Advocates of the Betuwe route state that its main advantage is that it will be easier to distribute goods arriving in Rotterdam harbour over Europe by train than by lorry, and that this has various positive economic and environmental side effects. But critics claim that the alleged economic advantages are uncertain and that the environmental advantages are non-existent. In addition, they claim that the construction of the Betuwe route is much too expensive.

In the experiment, participants' attitudes were pre-tested (see section 2.5 below), and participants were always confronted with a counter-attitudinal message. Thus, participants with a positive attitude toward genetic modification or toward the Betuwe route were directed to a site that tried to convince them of the negative effects. Similarly, participants with a negative attitude visited a site that emphasized the positive points. One text was written for each of the four resulting positions (pro / contra genetic modification, pro / contra Betuwe-line). All of the texts contained an introductory section and three arguments (those described above), which were taken from various on-line information sources listed at the end of the bibliography. All of the texts consisted of 29 lines and thus were comparable in length. In an informal pretest, a number of people (different from the participants in the experiment) were asked to judge the different texts and argumentations, irrespective of their own opinion. They considered the four texts equally convincing.

Each text was used in two different documents: one variant was purely informational (*Content Only*). It had a 'sober' layout (one color), and limited navigation possibilities; participants had

only two options: ‘next page’ and ‘previous page’. As a result, they could only follow a linear route through the site. The other site variant presented the same information, but had a number of secondary characteristics as well (*Content Plus*). The layout was assumed to be more ‘attractive’, with different colors and various graphical elements (photos and drawings). The site allowed for menu-driven navigation, with links referring to the introductory page and each of the three arguments (concisely labeled with one or two key-words). Therefore the participants could always navigate from their current page to every other page in the site. Finally, the site was given an independent and reputable source, which was visually emphasized on the first page (these were NRC Handelsblad for the Betuwe route and HP/De Tijd for Genetic modification). In terms of the Elaboration Likelihood Model, we conjecture that the Content Plus site variant facilitates peripheral processing (next to or instead of central processing) while the Content Only site does not, although we did not directly test this in the experiment. Table 1 summarizes the differences between the two site variants. Figure 1 illustrates them with some representative fragments.

TABLE 1: OVERVIEW OF THE DIFFERENCES BETWEEN SITE VARIANTS **CONTENT ONLY** AND **CONTENT PLUS** IN TERMS OF NAVIGATION STRUCTURE, PRESENCE OF GRAPHICS, SOURCE AND COLOR SCHEME.

	Site variant one: Content Only	Site variant two: Content Plus
Navigation	Linear	Menu-driven
Graphics	No	Yes
Source	No	Yes
Color	No	Yes

FIGURE 1: FOUR REPRESENTATIVE SCREEN SHOTS FROM THE INTRODUCTORY PAGES OF THE PRO-SITES DEVOTED TO THE BETUWE-LINE AND THE CONTRA-SITES DEVOTED TO GENETIC MODIFICATION. NOTE THE SOURCES ON THE CONTENT PLUS SITES (NRC HANDELSBLAD AND HP/DE TIJD), AND THE MENU’S REFERRING TO THE VARIOUS ARGUMENTS.

[SCREEN SHOTS AT THE END OF THE MANUSCRIPT]

2.4 Design

The experiment had a 2 (mood) \times 2 (site design) \times 2 (exposure time) factorial design, with mood and site design as between-subjects variables and exposure time as within-subjects variable (see Table 2).

TABLE 2. EXPERIMENTAL DESIGN, WITH BETWEEN-SUBJECTS VARIABLES (MOOD AND SITE DESIGN) AND WITHIN-SUBJECTS VARIABLE (EXPOSURE TIME).

		Mood			
		Neutral		Positive	
		Site Content Only	Site Content Plus	Site Content Only	Site Content Plus
Time	Unlimited Exposure	A. Betuwe Route	B. Betuwe Route	E. Betuwe Route	F. Betuwe Route
	Limited Exposure	C. Genetic Modification	D. Genetic Modification	G. Genetic Modification	H. Genetic Modification

Participants always visited two sites (both Betuwe route and Genetic Modification), where mood and site design were kept constant for individual participants. To avoid undesirable learning effects, half of the participants were first confronted with the Betuwe route (unlimited time exposure), while the other half were first confronted with Genetic Modification (limited time exposure). Table 3 summarizes the eight resulting experimental versions. The procedure was the same for each pass.

TABLE 3: EXPERIMENTAL VERSIONS, WITH FIRST AND SECOND TOPIC AND NUMBER OF PARTICIPANTS PER VERSION. THE LETTERS A – H REFER TO THE 8 CONDITIONS IN THE EXPERIMENTAL DESIGN.

Version	First pass	Second pass	#Participants
1.	A [Betuwe route]	C [Genetic Modification]	5
2.	C [Genetic Modification]	A [Betuwe route]	5
3.	B [Betuwe route]	D [Genetic Modification]	5
4.	D [Genetic Modification]	B [Betuwe route]	5
5.	E [Betuwe route]	G [Genetic Modification]	5
6.	G [Genetic Modification]	E [Betuwe route]	5
7.	F [Betuwe route]	H [Genetic Modification]	5
8.	H [Genetic Modification]	F [Betuwe route]	5

2.5 Procedure

The experiment was performed individually. Participants were invited to an experimental laboratory, where first the procedure was explained to them. Every participant went through this procedure twice, once in the unlimited exposure condition, and once in the limited exposure condition. (See Tables 3 and 4.)

TABLE 4: OVERVIEW OF THE EXPERIMENTAL PROCEDURE. ALL PARTICIPANTS UNDERWENT THIS PROCEDURE TWICE, ONCE WITH AN UNLIMITED EXPOSURE TIME (BETUWE ROUTE) AND ONCE WITH A LIMITED EXPOSURE TIME (GENETIC MODIFICATION).

Step 1	Attitude pre-measurement
Step 2	Mood modification
Step 3	Site visit
Step 4	Attitude post-measurement
Step 5	Post-experiment questionnaire

In the first step of the procedure, the attitude of the participants toward genetic modification or the Betuwe route (depending on the experimental condition) was measured using a questionnaire (“In my opinion, {genetic modification | the Betuwe route } is...:”). The questionnaire consisted of six bi-polar 7-point semantic differential scales, which had the following adjectives at their respective poles (English translations of Dutch originals):

- Good / Bad
- Positive / Negative
- Desirable / Undesirable
- Necessary / Unnecessary
- Progressive / Conservative
- Well-conceived / Ill-considered

In the actual questionnaire, the presentation order of adjectives was randomized. For processing, the negative adjectives were scored 1 (= very negative) and the positive ones 7 (= very positive). When participants had an average score below 4 they were considered to have a negative attitude towards the topic and they were subsequently confronted with a positive site (n=18 for the site about the Betuwe route; n=17 for the site about genetic manipulation). Participants scoring 4 or higher (on average), on the other hand, were considered to have a positive attitude and hence were confronted with a negative site (n=22 for the site about the Betuwe route; n=23 for the site about genetic manipulation). In this way, the participants were always confronted with a counter-attitudinal site. In our analyses, we controlled for possible effects of these pre-attitudes on attitude change (see section 3.2).

After their initial attitude was measured, participants were shown a 5-minute TV segment to induce the desired mood. Following this, we tested whether watching the segment had the intended effect. For this purpose, the participants were again presented with a short questionnaire asking them about their current mood (“At this moment, I feel...”). This questionnaire consisted of six 7-point bi-polar semantic differential scales, using the following adjective pairs (based on Mackie and Worth 1991 and Bohner et al. 1992; English translations of Dutch originals):

- Happy / Sad
- Pleasant / Unpleasant
- Satisfied / Unsatisfied

- Content / Discontent
- Cheerful / Sullen
- In high spirits / Low-spirited

Again, the order of the adjectives was randomized on the questionnaire. For processing, negative feelings were scored 1 (= very unhappy) and positive ones 7 (= very happy).

Next the participants were asked to visit the relevant, counter-attitudinal website. Participants in the unlimited exposure condition were told they could stay on the site as long as they desired, while participants in the limited exposure condition were told they had exactly 110 seconds to visit the site. Pre-testing indicated that this was the time needed on average to read all of the information once. In the limited exposure condition, the site went off-line after this period of 110 seconds. In both conditions, the actual reading time was measured for each participant.

Following the site visit, the participants' attitude towards the topics was re-measured, using the same questionnaire as before. Finally, the participants had to fill in a short questionnaire with open questions to test what they remembered from the source and the arguments on the site, and what they thought about the quality of the text on the site. Participants in the limited exposure condition were also asked whether or not they found the allowed reading time sufficient.

3. Results

3.1 Preliminaries

The internal consistency of the three scales was measured using Cronbach's α : for pre-testing attitude the α was 0.90, for mood it was 0.88, and for the post-testing attitude it was 0.88 as well: in all three cases the consistency was good.

Table 5 displays the results of the mood questionnaire. As intended, participants who watched the *Friends* fragment were in a significantly more positive mood than participants who watched the *Animal Encounters* episode ($t(78) = 4.40, p < .01$). Participants who watched a *second* fragment of *Friends* (in the second part of the experiment) even felt slightly *more* positive ($t(19) = 2.29, p < .025$). Watching a second fragment of *Animal Encounters* did not influence the mood ($t(19) = .68, n.s.$). Overall, participants scored rather high on the mood scale, yet even though there was a mild ceiling effect, participants who watched the five-minute fragment from *Friends* were roughly 33% more positive than participants who watched *Animal Encounters* (i.e., they scored .49 and .63 higher of the 1.7 and 1.68 to the end of the scale for the first and second fragment).

TABLE 5: MEAN AVERAGE RESULTS OF THE MOOD QUESTIONNAIRE FOR PARTICIPANTS WHO WATCHED A FIVE MINUTE SEGMENT OF **ANIMAL ENCOUNTERS** (NEUTRAL) OR **FRIENDS** (POSITIVE) DURING THE FIRST AND THE SECOND ROUND OF THE EXPERIMENT. SCORES RANGE FROM 1 (= VERY UNHAPPY) TO 7 (= VERY HAPPY). STANDARD DEVIATIONS BETWEEN BRACKETS.

	Neutral mood	Positive mood
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First mood rating	5.30 (0.37)	5.79 (0.66)
Second mood rating	5.32 (0.39)	5.95 (0.66)

Participants in the limited exposure condition were allowed to visit the site for 110 seconds. Afterwards they were asked whether they found this time sufficient. Table 6 shows that participants in a positive mood more often considered the time sufficient while most participants in a neutral mood would have preferred more time. This difference is statistically significant ($\chi^2(1) = 5.01, p < .05$).

TABLE 6: NUMBER OF PARTICIPANTS IN THE LIMITED EXPOSURE CONDITION THAT FOUND THE TIME SUFFICIENT AS FUNCTION OF MOOD.

	Neutral mood	Positive mood
Sufficient	5	12
Insufficient time	15	8

This finding is mirrored in the time measurements in the unlimited exposure condition (see Table 7). Here it turns out that participants in a neutral mood required significantly longer reading times than did participants in a positive mood ($t(38) = 10.95, p < .01$). Participants in a neutral mood spent on average 157 seconds on the site, while participants in a positive mood only needed 116 seconds (i.e., essentially the time needed to read everything once).

TABLE 7: AVERAGE TIME IN SECONDS SPEND ON A SITE IN THE UNLIMITED EXPOSURE CONDITION, AS A FUNCTION OF MOOD. STANDARD DEVIATIONS BETWEEN BRACKETS.

	Neutral mood	Positive mood
Time	157.8 (16.0)	116.75 (6.17)

3.2 Attitude change

Table 8 contains the main result: the average attitude change in the direction of the position advocated on the counter-attitudinal site. MANOVA tests with exposure time as the within-subjects factor showed that the amount of attitude change was not the same for the different groups. Main effects of mood ($F(1,36) = 732.5, p < .001, \eta_p^2 = .95$) and of site design ($F(1,36) = 1844.2, p < .001, \eta_p^2 = .72$) were found, but no main effect of exposure time was found. Exposure time did not interact with any of the other variables. Interestingly, we did find a significant two-way interaction of mood and site design ($F(1,36) = 93.9, p < .001, \eta_p^2 = .72$).

TABLE 8: MEAN AVERAGE ATTITUDE CHANGE IN THE DIRECTION OF THE ADVOCATED POSITION AS A FUNCTION OF MOOD, SITE DESIGN AND EXPOSURE TIME. THE ATTITUDE CHANGE IS COMPUTED BY SUBTRACTING THE ATTITUDE PRE-MEASUREMENT FROM THE ATTITUDE POST-MEASUREMENT, AND TAKING THE ABSOLUTE VALUE. MINIMAL CHANGE IS 0, MAXIMAL CHANGE IS 6. STANDARD DEVIATIONS BETWEEN BRACKETS.

		Mood			
		Neutral		Positive	
		Site Content Only	Site Content Plus	Site Content Only	Site Content Plus
Time	Unlimited Exposure	0.37 (0.23)	0.33 (0.19)	1.23 (0.14)	2.18 (0.20)
	Limited Exposure	0.42 (0.23)	0.45 (0.24)	1.26 (0.16)	2.23 (0.24)

Inspection of Table 8 clearly illustrates these effects. In all eight conditions, participants showed an inclination to adapt their attitude to that argued for on the site they had visited. However, the various changes clearly differ in magnitude. Participants in a *neutral mood* only showed a small adaptation of attitude towards the advocated position (between 0.33 and 0.45 absolute points). This change did not depend on the site design, nor did it depend on the exposure time. Participants in a positive mood, on the other hand, always underwent a substantial attitude change. Moreover, the aforementioned interaction (mood x site design) indicates that this attitude change was dependent on the site design: positive participants who visited a Content Plus site showed a significantly larger attitude change (almost 1 absolute point larger) than positive participants who visited a Content Only site ($F(1,19) = 346.5, p < .001, \eta_p^2 = .95$).

In an additional analysis, we checked whether or not the attitude change depended on the participants' pre-attitudes (i.e. the attitude that was measured before subjects were confronted with the experimental texts). The attitude changes of participants with a positive or a negative pre-attitude did not differ ($F < 1$ for both the Betuwe route site and the genetic manipulation site).

3.3 Recall and text quality

In the final questionnaire participants were asked various questions about the site they had visited in order to find out what they remembered and what they thought about the quality of the text. Participants were asked to write down the arguments they encountered on the site. Initially, one person coded the correctness of the recalled arguments. The coding was generally straightforward, and a few difficult cases were discussed to reach a consensus classification. Table 9 records the average number of correctly recalled arguments in the various conditions. No

effects of mood or exposure time were found for argument recall. There was a main effect of site ($F(1,36) = 40.4, p < .001, \eta_p^2 = .53$): participants who visited a Content Plus site on average recalled more arguments than participants who visited a Content Only site. This can probably be explained by observing that in the Content Plus sites the navigational menu contained links to the 3 arguments, summarized in one or two key words that were visible on all pages of the site.

TABLE 9: NUMBER OF CORRECTLY RECALLED ARGUMENTS IN THE VARIOUS CONDITIONS. MINIMUM IS 0, MAXIMUM 3. STANDARD DEVIATIONS BETWEEN BRACKETS.

		Mood			
		Neutral		Positive	
		Site Content Only	Site Content Plus	Site Content Only	Site Content Plus
Time	Unlimited Exposure	1.80 (0.79)	2.50 (0.53)	1.50 (0.53)	2.60 (0.52)
	Limited Exposure	1.80 (0.79)	2.50 (0.53)	1.50 (0.53)	2.50 (0.53)

All Content Plus sites contained a primary source. Table 10 reveals that most participants (8 or 9 out of 10 in each mood and time condition) were able to recall this source. Mood and time did not have a significant influence on this recall.

TABLE 10: NUMBER OF PARTICIPANTS THAT CORRECTLY RECALLED THE SOURCE OF CONTENT PLUS SITES AS A FUNCTION OF MOOD AND EXPOSURE TIME (N=10 IN EACH CELL).

	Neutral mood	Positive mood
Unlimited exposure	8	9
Limited exposure	8	8

Finally, participants were asked to rate the clarity of the text on the webpage. In all conditions, the vast majority of participants found the text quality good, where this judgment was not influenced by mood or reading time (see Table 11). This confirmed the results of the informal pre-test of text quality.

TABLE 11: NUMBER OF PARTICIPANTS THAT JUDGED THE TEXT QUALITY AS SUFFICIENT AS A FUNCTION OF MOOD AND EXPOSURE TIME.

	Neutral mood	Positive mood
Unlimited exposure	18	17
Limited exposure	16	17

4. Concluding remarks

We have described an experiment on the effectiveness of persuasive digital documents, taking mood, exposure time and site design into account. We found main effects for mood and site design on attitude change, and a two-way interaction between these two factors. Exposure time did not influence the attitude change.

Mood turned out to have a strong influence on the effectiveness of the two persuasive digital documents. Participants in a positive mood showed a greater attitude change than did participants in a neutral mood, which is in accordance with earlier findings on mood and persuasion. Interestingly, the attitude change in positive people was strongest after visiting a Content Plus site. These sites made good use of the information presentation possibilities of digital documents, such as an attractive lay-out (colors, graphical elements), a credible source, and a menu-driven navigation structure that allowed participants to browse the site in any order that they desired. It may be assumed that the positive participants were more inclined to let themselves be convinced of a certain position on the basis of such non-content related cues. Note that the current experimental set-up does not allow us to judge the relative importance of the various cues, and this is one important line for future research.

Mackie and Worth (1991) found that participants in a positive mood required longer reading times, presumably as a compensation for the alleged cognitive limitations (people in a positive mood need more time for the same cognitive task). In contrast, we found that participants in a positive mood required *less* time to browse through the site. Arguably, the current task (as opposed to the task used by Mackie and Worth) did not require 'deep' cognitive processing. Perhaps, the participants in a positive mood were less inclined to process the information systematically (which would take more time and mental effort) in an attempt to preserve their positive mood (cf. Wood 2000).

Exposure time did not affect any of the dependent variables. It did not matter whether participants' reading time was limited to 110 seconds, or not. Subjects in a negative mood did spend more time in the unlimited condition, but this difference did not have any effect on recall or attitude change. This indicates that attitude change is not related to the amount of time participants in any mood spent processing the information. We should, however, be somewhat careful in our interpretation of this result: in our design, exposure time was confounded with text topic. In other words: the site about the Betuwe route was always processed in the unlimited condition and the site about genetic manipulation was always processed in the limited condition. On the basis of our design, we cannot rule out the possibility that text topic interfered with exposure time. However, we carefully designed the texts to be comparable in terms of structure and length. In the pretest of our materials, the two topics were judged equally convincing. We did not find any indications for one site being more difficult than the other. Therefore we assume that exposure time was the most important difference between the two conditions, and not text topic.

In addition to investigating the relative importance of the various non-content related cues (in isolation and in combination), there were two other limitations of the current experiment that we would like to address in future work. Firstly, we did not check the persistence of the attitude change in the experiment. Since participants in a positive mood are more inclined to perform shallow processing, it might be that the new attitude is relatively unstable and that the participants might revert back to their original position after some time. Related to this, we only looked at one particular mood (a positive one), and it would be interesting to re-do the experiment inducing different moods. It might be, for instance, that a negative mood causes a more stable attitude change, and one that is particularly effective when the argumentation involves 'negative' feelings (e.g., anger or indignation), since negative feelings tend to lead to more thorough processing (e.g., Ellis and Moore 1998).

What are the consequences of the current experiment for the design of digital persuasive documents? The results show that site design can have a strong influence on the effectiveness of persuasive digital documents. But the complication is that this effect was only found when the participants were in a positive mood; for participants in whom a neutral mood was induced the site design did not have a significant influence on the attitude change. It is interesting to speculate about ways to exploit site design, and one option might be to try and induce a positive mood in visitors, for instance by displaying something humorous (a cartoon, say), which seems related to the folk wisdom that it is good to start a lecture with a joke (even a lame one). Perhaps starting with a joke may induce a more positive mood in the members of your audience, which, as a result, might be more inclined to believe you (albeit due to peripheral processing of the content). In a similar vein, Morkes et al. (1999) showed that humor can have a positive influence on task oriented human-computer interaction, provided the humor is used with care. It would be interesting to see in future work whether this use of humor, combined with site design, can indeed have an impact on the effectiveness of persuasive documents.

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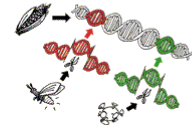
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