

Effects of Header Images on Different Devices in Web Surveys

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Header images are typically included in web surveys to make surveys more appealing for respondents. However, headers might also induce a systematic bias in response behavior. In order to examine both the potential effects (more specifically, effects on motivation and context effects) of header images with respondents using different devices, an experiment embedded in a web survey on students' time use and stress was conducted using a probability sample of 1,326 students at the University of Bonn. Respondents were presented either with a picture of an auditorium with students sitting in a class, a picture of leisure activities on campus, or no picture, respectively. To control for position effects, pictures were placed either in the upper right or upper left of the questionnaire. The results indicate that header images attract attention in the beginning of a survey, but do not significantly increase motivation over the course of the survey. When faced with a header picture, respondents in the picture conditions evaluate their time in class differently compared to respondents in the control group. While the device providing the visibility makes no difference, effects are only significant when the picture is placed on the left side of the screen. In sum, the interaction of header placement and the content-related proximity of header content and question may alter response behavior.

Keywords: Context effects, device effects, header images, web surveys

1 Introduction

In self-administered surveys, like web surveys, respondents do not have the support of an interviewer during the survey process and only perceive information and questions visually sometimes accompanied by sound. In order to guide respondents through the questionnaire and to lower the burden of answering the survey, particular attention must be paid to the design. Visual design can therefore minimize measurement error and nonresponse, but also induce it when applied poorly (Dillman, 2014, p. 172).

As we are confronted with a variety of devices permitting online access, survey participation on the web is also possible with mobile devices like smartphones and tablets. As the number of diverse devices entails a wide variety of screen sizes which differ in their representation of the survey, proper survey design has become even more crucial.

Implementing visual design in web surveys is very easy nowadays, and header images in banners in particular are a design element which is integrated in many survey platforms by default. Header images are mainly used as decoration or motivation, and are not intended to influence respon-

dents' answer patterns. Pictures accompanying a question are also more likely to be used as an illustration and clarification of the content of the question. If the evaluation of a picture, for example a product advertisement, is the focus of a question, the picture can even act as the main stimulus (Couper, Conrad, & Tourangeau, 2007). Even though visual elements are not primarily intended to influence respondents' answer patterns, previous research has been able to show that responses to survey questions may be affected by visual context (Couper et al., 2007; Couper, Tourangeau, & Kenyon, 2004; Witte, Pargas, Mobley, & Hawdon, 2004).

The purpose of our research is to investigate whether the widely-used approach of uniform pictures in the header of a survey has an effect on respondent's motivation in web surveys. The potential benefit will be compared with the downsides of visual elements and the accompanying risk of influencing respondents' answering behavior. The mediating effect of header placement and visibility on different devices will also be assessed.

2 Background

Factors affecting respondents' willingness to participate in surveys and to engage actively have been of major interest for survey researchers to this day (Groves, Cialdini, & Couper, 1992; Groves & Couper, 1998). As interest in the topic is a crucial determinant for starting and continuing a survey (Groves, Presser, & Dipko, 2004; Groves, Singer, &

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Corning, 2000), perceived burden is a major factor affecting the respondents' motivation in the survey process. *Burden* consists of various components like task difficulty, length of the questionnaire, respondents' discomfort evolved by sensitive questions, and the number of surveys participated in. In terms of web surveys, response burden can also be reduced by a short time provided between survey invitation and reminder, automated password entry, and a progress indicator (Crawford, Couper, & Lamias, 2001). Regardless of the definition and operationalization of *burden*, according to Bradburn (1979) burden can be counteracted by a survey situation which is "creating an interesting and enjoyable experience for the respondents" (p. 36). While in face-to-face surveys interviewers can influence the survey situation positively by motivating respondents (Krosnick, 1991), web surveys have to rely on other aspects, like design. Proponents of gamification and surveytainment, who use visual stimuli in their extreme forms for web surveys, argue that motivation and active participation is increased when the survey is designed to be more enjoyable by implementing visual augmentation (Adamou, 2013; Puleston, 2011).

Empirical studies showed that specific pictures attract people (Knobloch, Hastall, Zillmann, & Callison, 2003; Sargent, 2007), increase click-rates in surveys (Liu, Kuriakose, Cohen, & Cho, 2015), and lead to greater enjoyment during the question-answer-process (Bărbulescu & Cernat, 2012; Downes-Le Giun, Baker, Mechling, & Ruyle, 2012; Mavletova, 2015). Regardless of the assumed motivating effect of visual embellishment, break off rates seem to be unaffected by pictures (Bărbulescu & Cernat, 2012; Mavletova, 2015).

Besides these positive aspects, visual elements are an additional source of error as they evoke thoughts and emotions in the respondent which can potentially change response behavior (Couper, 2008, p. 88). Depending on the visual stimuli and their placement in the survey, studies demonstrate that pictures in web surveys may also contribute to context effects. Context effects are usually triggered by adjacent information that unconsciously affects respondents' answering behavior (Tourangeau, Rips, & Rasinski, 2000, chapter 7). In consequence, respondents' answers to survey questions might not reflect reality and systematically bias results. A study performed by Couper et al. (2004) reveals an assimilation effect where the answer to the question reflects the content of the visual stimulus. The researchers show that in four out of six examples, pictures of high-frequency events increase the number of events reported, and a picture of low-frequency events decreases the number of events reported. Moreover, in some cases different pictures also lead to effects on subsequent questions. People, who are presented with a picture of fast food, report having enjoyed their last meal less than people responding to picture of a fancy restaurant, and also state that they spent less money on their last meal. If pictures of both high and low-frequency events are visi-

ble for the respondent, responses are similar to those respondents who only saw the high-frequency picture. In a study by Couper et al. (2007), where they also experimented with picture size (smaller versus bigger picture) and placement of the picture (in the header or close to the question), respondents are more likely to report a lower fitness level when presented with a picture of a fit woman rather than a sick woman. The authors conclude that respondents use the picture as reference to their own health status. In this case, the use of visual elements leads to a contrast effect. However, these effects are only visible when the picture appears on the prior screen or above the question and pictures in the header have an effect only in one out of three experiments. Placement of the picture and picture size did not make a difference. Further, Toepoel and Couper (2011) find evidence that verbal instructions can counteract visual cues and conclude that precise question writing can reduce context effects.

In contrast, in a study by Barth (2014), neither assimilation effect nor contrast effect can be confirmed. In the study, which examines students' housing situation, pictures with three different scenarios of housing conditions are included in the header, with a no-header control group. The author argues that header images are seen more as part of the layout than being task-related, especially when they remain the same throughout the whole survey. This argument relates to what Pagendam and Schaumburg (2001) call "banner blindness". People typically overlook banner advertisements and can often neither recall nor recognize advertisements presented in the banner of a website they saw earlier. This effect is even stronger when people are looking for something specific rather than surfing aimlessly online.

Several studies (Baraggioli & Brasel, 2008; Ghosh & Bhatnagar, 2013; Gidlöf, Holmberg, & Sandberg, 2012) that took advantage of the eye-tracking method confirmed that most people do not remember the content of the banner and therefore can be categorized as *banner blind*. However, most studies also showed that attitudes are changed unconsciously regardless of the ability to recall and recognize banner advertisements. In the study by Ghosh and Bhatnagar (2013), participants who look at the adverts more often have a more positive attitude towards the brand, while participants who look at the adverts less often but more intensely have more negative attitudes. Lee and Gretzel (2012) also show that pictures on destination websites can influence the mental perception of a specific destination and lead to an increase in attitude strength among website users.

In terms of the effect of placement, other studies on the basis of the eye-tracking method reveal that most website users read in a F-shaped manner. Only in the beginning participants read the entire text from left to right, but as they continue, their eye movement covers smaller sections of the beginning of the lines. This technique also visualizes that readers fixate more on the left than on the right side of a page



Figure 1. Header images (campus¹ on the left, auditorium² on the right)

¹Image is copyrighted and all rights to this image are owned by Dr. Thomas Mauersberg, University of Bonn. ²Image is copyrighted and all rights to this image are owned by Volker Lannert, University of Bonn.

(Nielsen, 2006; Pernice, 2017). If we apply these findings to the effects of headers on answer behavior, it can be expected that respondents are more likely to be influenced by pictures on the left side than on the right side.

In summary, these studies suggest that pictures in a survey are likely to positively influence respondent's motivation during the survey process but are also likely to negatively bias answer behavior in form of context effects. Studies show that context effects are more likely when the picture is placed closer to the question or on the right side of the page, but that these effects are unrelated to the vividness of the image.

As the use of header images is much more common compared to pictures accompanying a question in surveys, it is important to look further into the potential positive and negative effects of header images. The present study will therefore investigate whether headers in web surveys can foster motivation or engender context effects depending on picture type and placement. As different devices with various screen resolutions are more common nowadays, it is also worth testing whether the effect of vividness related to specific devices is enhancing these effects.

3 Experimental Design and Hypothesis

We use an experiment based on a 2 x 2 factorial design to test different effects of header images. Factor 1 – *image content* – consists of level 1, a campus image, and level 2, an auditorium image (figure 1). The campus image illustrates the *Hofgarten*, a public park on the university campus in Bonn, with students sitting on the grass before and after class. The university campus is a public place not restricted to students, and therefore a spot also connected to leisure time unrelated to university life. The second image illustrates an auditorium with students taking part in a lecture.

Factor 2, placement of the picture, consists of level 1, *right* placement, and level 2, *left* placement. A version without an image serves as the control group. This results in five questionnaire versions:

1. no picture
2. auditorium picture on the right

3. auditorium picture on the left
4. campus picture on the right
5. campus picture on the left

The original sample was randomly divided in five groups with each receiving one of the five questionnaire versions. The Unipark software (see <http://www.unipark.com>) was used to program the questionnaire. We chose to self-optimize the survey for mobile browsers instead of using the responsive design offered by Unipark as the responsive design did not produce satisfactory results. Respondents were free to choose the device for answering the questionnaire. Figure 2 illustrates an example of a question from version 2 on a PC, laptop or notebook and figure 3 illustrates an example of version 5 on a smartphone (for translation of the questions see appendix A1). While the header took up about a tenth of each questionnaire page on all devices, headers are more visible on devices with bigger screen sizes like PCs and laptops.

Since visual elements are thought to lower respondents' burden in the process of answering a questionnaire, several objective indicators are used to measure respondents' motivation. In this experiment, it is assumed that high motivation of respondents is reflected by a low dropout rate on the first page, a finished questionnaire, no item non-response, and an open comment on the last page of the survey.

H 1 Header images increase respondents' motivation.

In case of an assimilation effect, responses reflect the content of the visual stimulus. When respondents are presented with a visual stimulus, they might include the time spent on the activity of the picture in their time estimation of activities related to the picture content. For example, when presented with the auditorium picture, students are expected to include time spent in class into their overall time on studying and in turn report higher time estimations for studying. The same effect is expected for time in class. Since campus is a place of leisure, but closely connected to university life, it is expected that *studying* will yield higher estimates when the respondents are confronted with the *campus* picture. Relevant questions for this hypothesis concern students' esti-



In den nächsten Fragen geht es um deinen gewöhnlichen Alltag.

Dabei möchten wir dich bitten zu schätzen, wie viel Zeit du mit bestimmten Aktivitäten verbringst, indem du die Stunden in die entsprechenden Felder einträgst. Du kannst dabei auch Teile von Stunden angeben, für eine halbe Stunde beispielsweise 0,5. Welche Tätigkeiten du einer Kategorie zuordnest, ist dabei dir überlassen.

Bitte schätze, wie viel Zeit du in einer durchschnittlichen Woche...

Stunden

...in Veranstaltungen verbringst.

...für dein Studium lernst.

...arbeitest, um Geld zu verdienen.

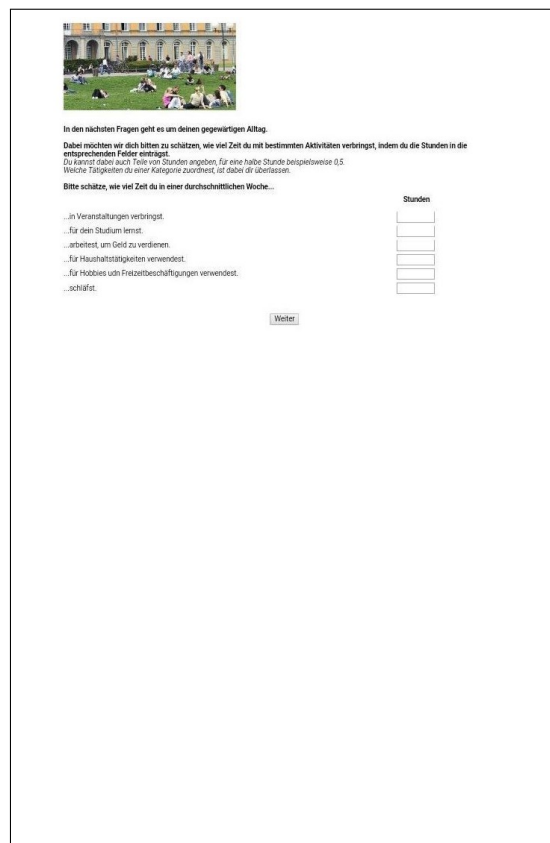
...für Haushaltsstätigkeiten verwendest.

...für Hobbies und Freizeitbeschäftigungen verwendest.

...schläfst.

[Weiter](#)

Figure 2. Example of screenshot of laptop version with auditorium picture on the right



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Figure 3. Example of screenshot of smartphone version with campus picture on the left (portrait display)

Table 1
Sample composition, in percent

Device	Experimental condition (%)					Chi-Square	Sig.	N
	No picture	Audi right	Audi left	Campus right	Campus left			
PC/laptop	18.9	19.6	20.0	19.6	21.9			940
Smartphone	21.5	17.5	20.1	21.8	19.1	5.21	0.73	303
Tablet	21.6	24.3	20.3	18.9	14.9			74

mated time spent in lectures and on studying in an average week (with open-ended answers).

H 2 Conditions with the campus and auditorium header images produce assimilation effects on time estimation for studying and time in class.

Contrast effects occur when responses are made in reference to the visual stimulus. It is assumed that respondents evaluate the time spent on certain activities in relation to the time spent on the campus or in class when they are confronted with a picture. Students might rather say that they spend too much time in class when presented with the auditorium picture. The target question for this hypothesis is therefore “please indicate how you would rate your time for time in class in reference to your well-being” with *not enough*, *enough* or *too much* as answer options.

H 3 Conditions with the auditorium header images produce contrast effects on time evaluation for time in class.

As it could be shown that the placement of pictures next to a question induces context effects, it is assumed that header images can have effects on response behavior if they are placed closer to the question. Since the survey is read from left to right, pictures on the left side are closer to the question than pictures on the right side.

H 4 Pictures on the left side are more likely to induce context effects than pictures on the right side.

Finally, it was shown that headers on all devices take up the same screen real estate, but as header images on devices with bigger screens are more visible, we assume that responses made on devices with bigger screen sizes are more prone to context effects.

H 5 PCs, laptops, and notebooks enhance context effects compared to tablet and smartphones while tablets enhance context effects compared to smartphones due to the improved visibility of the header on the screen.

4 Sample and data collection

The experiment was part of a study about university students' time consumption and stress (Trübner, 2020). The questionnaire was set up of several question blocks in the following order: estimation of overall stress level, coping mechanisms with stress, perceived burden of different life conditions, time estimations of different domains for an average day and the previous day, perception of time strain in these domains. The survey ended with an item block on background information and an item block about the circumstances in which the survey was completed. After that, respondents were able to leave open comments about the survey. The respective header appeared on top of each questionnaire page on the first page and stayed the same throughout the whole survey. The last page of the survey gave participants the possibility to participate in a lottery with a 50 Euro Amazon coupon as an incentive. Common time taken to complete the survey was about 10 minutes. The survey was conducted in June 2015 and sent out among a probability sample of 10,000 students at the University of Bonn (out of a total of about 34,000 students). The mailing list was representative for bachelor's and master's students, but not for doctoral students since they do not automatically receive a university email address upon enrollment. If they had studied at University of Bonn beforehand, they kept their existing e-mail address. Invitations were sent by email and included a personalized URL to access the survey. Nonresponders received a reminder four days after the initial invitation. Overall, 1,326 contacted students answered at least 50% of the questionnaire. Using the The American Association for Public Opinion Research (2011) response rate definition RR2, the survey reached a response rate of 13.3%. The response rates for all questionnaire versions were evenly distributed, with the lowest response rate of 12.8% in the *auditorium right* version and with the highest response rate of 13.9% in the *campus left* version.

Most respondents (71.4%) answered the questionnaire on a PC, laptop or notebook, while 23.0% answered on a smartphone and only 5.6% on a tablet. For 9 respondents, we had no information about the device used to answer the survey, therefore these cases are excluded from further analyses. As respondents self-selected the device for answering the ques-

Table 2
Distribution of objective indicators of motivation

Variable	Categories	Experimental condition (%)		Chi-Square	Sig.	N
		No picture	Picture			
Drop out on first page	yes	11.0	7.4	4.40	0.04	1559
	no	89.0	92.6			
Completed Survey	yes	81.8	84.5	1.35	0.25	1559
	no	18.2	15.6			
Item nonresponse	yes	19.5	16.8	1.02	0.31	1326
	no	80.5	83.2			
Open-ended comment	yes	14.3	16.6	0.79	0.37	1305
	no	85.7	83.4			

tionnaire, the experimental condition is unrelated to device type (see table 1).

The research aim of the current study is to focus on the effect of images on respondent's motivation and answering behavior, rather than to develop a generalization for a population, which makes this experiment with students appropriate.

5 Results

5.1 Motivation

It is hypothesized that header images lead to higher motivation. To test this, we compare the share of completed surveys and the share of dropouts on the first page between respondents being exposed to a picture and those respondents being in the control group. These indicators are calculated on the basis of the number of respondents clicking on the survey link. The share of respondents with no item-nonresponse, and the share of respondents giving an open-ended comment is also tested between picture conditions (see table 2). The analysis of the share of respondents with item-nonresponse and with an open-ended comment by picture condition are restricted to valid cases answering at least 50% of relevant questions.

Out of all students clicking on the survey link 11.0% in the no picture condition left the survey on the first page, while only 7.4% left in the picture condition. These differences are slightly significant with only a small effect size ($CV = 0.05$), however. As expected, more respondents in the picture condition completed the survey, fewer skipped one or more questions, and more left an open-ended comment at the end of the survey. In detail, while in the control group only 81.8% completed the survey, 84.5% of respondents in the condition with pictures completed the survey. While over 80% of respondents in the group with no picture in the header answered every single question of the survey and 14.3% left a comment at the end of the survey, respondents in the con-

ditions with header images have a slightly higher share of respondents with no item-nonresponse (83.2%) and an open comment (16.6%). However, these differences are not statistically significant.

Summing up, the first hypothesis about a motivational effect of images can partly be confirmed. In this specific experiment, pictures motivate respondents to drop out later, complete the survey, and answer more questions during the survey process, however these differences between experimental groups are only small and only in one case statistically significant.

5.2 Context Effects

Assimilation effect. Table 3 illustrates the results for the multiple regression analyses conducted to examine a potential assimilation effect by comparing students' estimation of time use in the different conditions in two steps: models 1a and 2a present main effects for picture condition and device type, and models 1b and 2b comprise interaction effects. We included an interaction term between picture condition and device type to see if the effects of picture condition differed for those answering on a laptop compared with those answering on a tablet or smartphone. Cases which reported no time in the activity of the dependent variable and PhD students were dropped from the analyses.

Models 1a and 2a reveal that auditorium and campus pictures on the left side significantly increase the estimated time for class participation, but not for studying, compared to no picture at all. Smartphone users report significantly more hours on class participation and fewer hours on studying compared to PC and laptop users. Tablet users are not statistically different from PC and laptop users. Since respondents self-select the device for answering the questionnaire, systematic differences between users of PCs/laptops, tablets, and smartphones can be expected and explain the inconsistent effects of device type by groups.

Model 1b reveals that for PC users in the experimental

Table 3
OLS regression analyses on estimated time per week for different activities

	Estimated time per week for...							
	Class (1a)		Class (1b)		Studying (2a)		Studying (2b)	
	Est.	Std. Err.	Est.	Std. Err.	Est.	Std. Err.	Est.	Std. Err.
<i>Logo (reference: no picture)</i>								
audi right	1.56	0.87	1.23	1.05	0.11	1.19	-0.44	1.40
audi left	2.11*	0.86	2.04	1.05	0.19	1.17	-1.23	1.41
campus right	1.46	0.87	1.36	1.07	0.21	1.18	-1.13	1.42
campus left	2.11*	0.86	2.11*	1.03	1.85	1.16	2.16	1.36
<i>Device (reference: PC/laptop)</i>								
smartphone	2.13**	0.65	1.03	1.41	-2.47**	0.88	-4.12*	1.93
tablet	1.83	1.17	4.86	2.56	-2.09	1.65	-4.71	3.61
<i>Interaction effects</i>								
audi right × smartphone	-	-	2.17	2.08	-	-	2.39	2.85
audi right × tablet	-	-	-2.98	3.51	-	-	0.09	4.95
audi left × smartphone	-	-	0.76	2.01	-	-	3.28	2.74
audi left × tablet	-	-	-2.14	3.61	-	-	10.11*	5.02
campus right × smartphone	-	-	0.98	1.99	-	-	4.94	2.71
campus right × tablet	-	-	-2.46	3.74	-	-	0.51	5.30
campus left × smartphone	-	-	1.86	2.03	-	-	-2.43	2.75
campus left × tablet	-	-	-9.07*	3.89	-	-	2.16	5.54
Intercept	13.64***	0.65	13.74***	0.75	17.93***	0.87	18.50***	1.00
N	1199		1199		1241		1241	
Adj. R ²	0.01		0.01		0.01		0.01	

* p<0.05 ** p<0.01 *** p<0.001

condition with a picture of the campus placed on the left side report to spend 2 more hours in class per week compared to tablet and smartphone users in this experimental group. The significant interaction effect further demonstrates that the difference between the condition of campus left versus no picture is significantly smaller for tablet users compared to PC users (2.11 – 9.07 = -6.96) and also smaller on the other experimental conditions although these differences are not statistically significant. Interaction effects for smartphones are all positive, but not statistically significant.

Model 2b reveals that not the picture condition but the device used for the study has a significant effect on reported hours for studying. Smartphone users spend on average 2½ hours less on studying compared to PC/laptop users. Model 2b shows that this device difference is even stronger for smartphone users in the no picture condition who spend 4 hours less on studying compared to PC/laptop users in the control group.

Summing up, hypotheses 2 and 3 can partly be confirmed. Pictures have an enhancing effect on time estimation if they are closely connected to the content of the question (which in this case is a lecture) and placed on the left side of the

page. Placement of the header seems only relevant when picture content is closely related to the question. In hypothesis 5 it was assumed that assimilation effects are stronger on PC/laptop than on tablets and stronger on tablet than smartphones due to visibility which cannot be confirmed.

Contrast Effect. In terms of a contrast effect, it is assumed that students evaluate the time spent on different activities in relation to the time spent at university when they are faced with a picture. Logistic regression analyses, shown in table 4, are applied, with the dependent variable being recoded in 0 (not enough, enough) and 1 (too much). By analogy to analyses of the assimilation effect, model 1a represents calculations of main effects and model 1b includes interaction effects.

As expected, the auditorium picture has a significant positive effect on evaluating time in class as too much by holding device type constant, but only when placed on the left side of the screen. The significantly positive effect of smartphone and tablet on evaluating time in class as too much is related to systematic differences between these subpopulations. Also in terms of contrast effects, interaction effects in model 1b are not significant indicating that there are no device effects.

Table 4
Logistic regression analyses on evaluation of time spent at class

	Class (1a)		Class (1b)	
	Est.	Std. Err.	Est.	Std. Err.
<i>Logo (reference: no picture)</i>				
audi right	0.12	0.26	0.16	0.34
audi left	0.55*	0.25	0.51	0.32
campus right	0.17	0.26	-0.01	0.35
campus left	0.20	0.26	0.32	0.32
<i>Device (reference: PC/laptop)</i>				
smartphone	0.65***	0.17	0.45	0.43
tablet	0.79**	0.29	1.35*	0.59
<i>Interaction effects</i>				
audi right × smartphone	-	-	0.07	0.60
audi right × tablet	-	-	-0.63	0.85
audi left × smartphone	-	-	0.27	0.55
audi left × tablet	-	-	-0.42	0.83
campus right × smartphone	-	-	0.68	0.57
campus right × tablet	-	-	-0.50	0.92
campus left × smartphone	-	-	-0.06	0.58
campus left × tablet	-	-	-1.83	1.22
Intercept	-2.14***	0.20	-2.13***	0.25
N	1275		1275	
Pseudo R^2 (Mc Fadden)	0.02		0.03	

* $p < 0.05$ ** $p < 0.01$ *** $p < 0.001$

Therefore, hypothesis 5 can be completely rejected.

Hypotheses 1 and 4 can partly be confirmed. Just like in the example of the assimilation effect, given that the picture is placed close to the question, answer behavior is influenced when the content of the picture is closely related to the question.

6 Discussion and Conclusion

Uniform header images are frequently used as a tool in web surveys to make a survey more appealing. The goal of this experiment was to establish the extent to which header images affect respondents' motivation during survey completion. We also tested whether or not header images influence response behavior. The experiment compared five questionnaire conditions which differed by picture type and placement of the picture.

A key argument for including header images in surveys is to make the survey more enjoyable for respondents and to lower response burden. In this experiment, evidence was found suggesting that header images slightly increase participants' motivation in the beginning of the survey. However, images do not result in more respondents completing the survey, fully answering the questions or leaving open

comments. Nowadays, visual elements – especially in web surveys – are widely used, and thus might not be seen as an asset which increases motivation, but are instead necessary for attracting people's interest.

Further, it was shown that header images partly induce assimilation effects and contrast effects. The auditorium and campus pictures result in higher estimates for time spent in class and the auditorium picture also results in a higher probability of evaluating time in class as *too much*. In both cases, effects are only visible when the picture in the header is placed on the left side of the screen. In that regard, if the header image is directly placed above the question, the header might be indistinguishable from a picture accompanying a specific question for respondents. In contrast, the picture's visibility does not seem to play a role, since device types with bigger screens did not enhance effects. However, it is unknown whether respondents zoomed in on the survey or used landscape instead of portrait display which leads to better visibility also on smaller devices. Further research in this area should address these issues.

The limitation of the study is that the sample consists only of students. We are confronted with a very homogeneous population in terms of age, education, and ability to

answer surveys. It would be worth exploring whether pictures have different effects on subpopulations. The application of header images would be further complicated when subpopulations reacted differently to header images.

Even though this experiment is based on a survey of students with a student-specific topic, it provides evidence about conditions under which header images potentially affect response behavior. On that note, it was shown that header content related to a close-by question can induce context effects, even though these effects are negligibly small. Nevertheless, header images should be used with caution. To further guarantee that banners do not induce bias, it is important that header images are neutral, simple, and unrelated to the content of the questions. These precautions should be taken regardless of the device that is used for answering the survey. The results of this experiment also give indications that headers are better placed on the right side of the survey to further rule out any kind of connection to survey questions.

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Appendix

A1: Translation of questionnaire page

The next questions are about your present everyday life.

We would like to ask you to estimate how much time you spend on certain activities by entering the hours in the appropriate fields.

You can also enter parts of hours, for example 0.5 for half an hour. It is up to you which activities you assign to each category.

Please estimate how much time you spend in an average week...

- in courses.
- studying for university.
- working to earn money.
- doing household chores.
- on hobbies and leisure activities.
- sleeping.