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PCs versus smartphones: Study on differences between responses in online panel data collection[1]

PCs *versus smartphones*: Estudo sobre diferenças entre respostas na coleta de dados em painéis *on-line*

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ABSTRACT

This article seeks to share and cast light on a cutting-edge methodological approach to the various biases that may be observed when, in a single study, responses via desktop/laptop versus smartphones/tablets are compared in a collection of online data. The study presents a compilation of the most recent research from around the world regarding this methodological concern, and seeks to understand the Brazilian perspective through a case study carried out this year. The next steps and future prospects are discussed at the end.

KEYWORDS: Online research; Online data collection; Smartphone; Optimizing online surveys; Desktop versus mobile.

RESUMO

O presente artigo pretende compartilhar e aprofundar a luz de uma abordagem metodológica vanguardista sobre os diferentes vieses que se poderia observar quando se compara, no mesmo estudo, respostas via *desktop/laptop versus smartphones/tablets* em uma coleta de dados *on-line*. O estudo apresenta um compilado dos trabalhos mais modernos ao redor do mundo sobre essa preocupação metodológica, bem como procura entender a ótica do brasileiro em um estudo de caso realizado no presente ano. Ao final, são discutidos os próximos passos e as perspectivas futuras.

PALAVRAS-CHAVES: Pesquisas *on-line*; Coleta de dados *on-line*, *Smartphone*, Otimização de pesquisa *on-line*, *Desktop versus mobile*.

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1 INTRODUCTION

The importance of smartphones (SP) and our dependence on them nowadays is undeniable. This is increasingly driving and motivating companies to want to use them as a data collection mechanism for their research. This gives rise to various questions and comparative studies have started to appear in this category.

According to Revilla, Toninelli, Ochoa and Loewe (2014), one appealing feature of online surveys, compared with more traditional forms, such as surveys conducted face to face or over the telephone, is the wide range of options regarding visual and interactive resources, use of pictures, videos, etc. These advantages and the interesting possibilities offered by the online format has led to the development of web surveys accompanied with the appearance of new kinds of scales, which are particularly used for opt-in panels. Examples such as menus, sliders, drag-and-drop, ranking, conjoint and max-diff have become very common in online research. Other even more innovative forms have been developed, in particular in marketing-focused projects such as: sum control, 3D rotation, heat maps, virtual shopping, video evaluation, etc. All of these different forms have been used to make surveys more appealing and user-friendly, as well as to enhance the interviewees' survey experience. In some extreme cases, these innovations have an advantage that is often referred to as gamification (Couper, Kennedy, Conrad, & Tourangeau, 2011).

It is worth pointing out that, according to Revilla et al. (2014), when these forms were developed, online surveys were exclusively carried out via personal computers (PCs), either desktops or laptops. They were thus created to run on large screens with good visibility and required an internet connection. However, in recent years, more and more interviewees have started to answer online surveys on their mobile devices (mainly smartphones) even without category planning (researchers, end companies and data collection). Peterson (2012), Bruijne and Wijnant (2014a) have called such interviewees "unintentional mobile respondents". This phenomenon is growing very rapidly in many different countries and panels and can no longer be ignored (Callegaro, 2010; Wells, Bailey, & Link, 2013; Revilla, Toninelli, Ochoa, & Loewe, 2014). How are online data collection companies dealing with this topic/phenomenon?

According to Revilla et al. 2014, in the majority of cases, they have decided to develop a version of the questionnaire optimized for mobile devices. This is sometimes also referred to as “responsive online survey design” (Bruijne & Wijnant, 2013). In the optimized version, the survey program adapts the layout to the size of the device being used to fill out the survey. The survey page, in particular, is adapted to small screens so that interviewees do not need to zoom in to scroll horizontally. Unnecessary items are minimized. The size of buttons is increased. The purpose of the optimized layout is to make it easier to read and respond to the survey on small devices. However, for some question formats, it is difficult to optimize the layout and keep it similar to the PC version. For example, how can matrices be adapted to smartphones, especially when there is a large number of items and response categories?

Many field research companies have decided to optimize their mobile version by splitting questions up attribute by attribute, but that can affect results (Revilla et al., 2014). A similar problem arises for many of the new scales that were developed specifically for online PC surveys. For the majority of such scales, the visual layout is fundamental with images that require highly precise clicking, etc. Consequently, the best way of optimizing them for mobile devices is not so clear.

The characteristics of each device, SP versus PC, are set out below.

As Lorch and Mitchell (2014) mention, on average, mobile devices have screens around 5% of the size of a desktop PC screen and 10% of the size of a laptop screen. They are more portable so it is expected that interviewees will be able to use them to fill in surveys in any location (on the bus, on the subway, in the street or in a bar, etc.). That can result in pedestrians being included in the sample more frequently and therefore introduce a greater usability bias than when PCs are used. In addition, there could be an increase in multi-tasking and distraction among interviewees, which could lead to higher measurement errors (Revilla et al., 2014).

Mobile devices have a different kind of screen (a touchscreen and, in the case of smartphones in particular, a much smaller screen) and a different kind of keyboard (usually virtual) than PCs. That can lead to lower visibility and require greater effort to reply (zooming, scrolling, etc.), which may increase error measurement.

Generally speaking, these differences in the devices' characteristics may affect comparability in terms of the quality of online survey results. A series of studies has focused on this topic. Many studies have compared the results when the survey was reported to via PCs or mobile devices (Peytchev & Hill, 2010; Mavletova, 2013; Toepoel & Lugtig, 2014).

The following section provides an overview of articles/studies from around the world regarding this topic.

2 INSPIRATION

According to Revilla et al. (2014), many studies have considered the new challenges in designing online surveys related to the use of mobile devices (Emde & Fuchs, 2013; Mavletova & Couper, 2013), comparing different indicators and question formats between PCs and mobile devices (Peterson, 2012; Mavletova, 2013; Mavletova & Couper, 2013; Buskirk & Andrus, 2014; Toepel & Lugtig, 2014; Wells et al., 2013; Lambert & Miller, 2015). However, the aforementioned literature focuses mainly on more traditional question formats such as radio buttons and open-ended questions. As far as more specific online scales are concerned, little research has been performed to study the comparability of results between PCs and mobile devices, even though these more recent formats play a crucial role in the attractiveness of online surveys.

In recent years, great effort has been put into studying the use of mobile devices as data collection tools (Buskirk & Andrus, 2012, Bruijne & Wijnant, 2013; 2014b, Revilla et al., 2014). That interest was stimulated by recent studies that showed that mobile devices are rapidly spreading throughout the population in the majority of countries and are even becoming the most used device to access the internet. According to StatCounter Globais Estatísticas (2015), mobile internet use grew from 8.5% (September 2012) to 41.0% (September 2015). In the same period, the use of PCs (desktops and laptops) to go online fell from 91.5% to 59.0%. The speed of this phenomenon varies greatly from country to country. In some countries mobile device owners are overtaking PC owners. According to Revilla et al. (2014), recent results show that they are “no longer negligible”. This has given rise to and spread “unintentional mobile participation” (Peterson, 2012; Wells et al., 2013), which means that respondents try to participate in online surveys through mobile devices, even when the researchers who programmed the online questionnaire did not adapt it for mobile devices, making it unsuited to mobile response.

According to Revilla et al. (2014) the papers by Chae and Kim (2004), and Sweeney and Crestani (2006), contain some of the first research into such differences. Several studies have examined how the different characteristics of mobile devices can affect survey responses and, more generally, the response process. Peytchev and Hill (2010), for example, analyze the effects of displacement (caused by the small size of mobile devices' screens) with different orientations of Likert scales, for example.

This research was the inspiration and foundation for this paper, together with the study by Mavletova and Couper (2013), which compares PCs with mobile devices in a questionnaire focusing on sensitive questions (for example, alcohol consumption or behavioral deviance). In particular, the authors studied how delicate topics affect willingness to communicate confidential information when a mobile device (telephone or smartphone) is used instead of a PC. That was done taking into account different backgrounds and context variables: sex, spectators present during the survey, participation location, etc. This study “is an initial analysis of possible biases concerning delicate matters when responding to online surveys via SP versus PC” (Maveletova & Couper, 2013, p. 202), but it also suffers from some limitations. The main one is that “the study is restricted to members of an online access panel in Russia” (Mavletova & Couper, 2013, p. 200). The authors have encouraged research in this specific area, highlighting the importance of replicating previous studies (Couper & Peterson, 2015).

The survey by Mavletova and Couper (2013) was fully replicated in Spain, according to Revilla et al. (2014), but in a different context in order to test the robustness of their conclusions.

3 FROM RUSSIA TO SPAIN

The methodology used by Mavletova and Couper (2013) was reproduced in Spain. The comparison was between smartphones versus PCs. As well as replicating what Mavletova and Couper (2013) did, the questionnaire was also adapted to SP (there was an optimized version of the questionnaire for smartphones). The purpose of optimizing the questionnaire was to make it easier to participate in the survey with mobile devices by automatically adjusting the layout to the screen size. This had not been done in the study by Mavletova and Couper (2013). This topic has also been studied by McClain, Crawford and Dugan (2012), for example.

A second wave of the survey experiment was implemented in order to investigate whether there was a device/optimization effect. In the first wave, the groups of panelists were selected at random and given the following names: PC (members of the PC group), SNO (members of the non-optimized smartphone group) and SO (members of the optimized smartphone group). In the second wave, the same group of interviewees was asked to take part in the same study again, switching to another configuration, in some cases. For example, if the respondent started with the SNO questionnaire, he might be given the PC questionnaire in the second round. In both waves, the number of survey respondents was 1,608 interviewees.

Generally speaking, according to Revilla et al. (2014), the main things learnt from the study performed in Spain were:

- The majority of interviewees who responded to the survey on smartphones were at home. It was concluded from this that although the device used is highly portable, when responding to a survey, the majority of interviewees prefer to respond at home even when they are using their smartphones.
- The presence of third parties is significantly higher for smartphone participants. However, the perceived privacy and sensitivity of the questions is not higher for those who respond to the survey on smartphones.
- For the majority of indices tested, there were no differences in bias for delicate topics.
- The time it took to fill out the survey was significantly longer for smartphone respondents for various types of question format: matrices, open-ended questions and ranking questions. In some cases, there is also a significant difference between optimized and non-optimized smartphone versions, but this is not systematic and does not always go in the same direction.
- For some matrices, non-differentiation is greater for smartphones but that depends on the questions studied.
- For open-ended questions, there are no differences in the proportions not responding by answering “don't know”. However, the number of characters entered is significantly lower for smartphones.
- For ranking questions the first-placed option does not change but the others vary slightly. When interviewees are using smartphones, fewer respondents select the necessary number of options stated in the instructions.
- The way in which the questionnaire is optimized for smaller screens is not always ideal. For example, in the case of ranking questions, the optimized version actually runs worse than the non-optimized version[1].

[1] This research was presented at the Seventh ABEP Brazilian Market, Opinion and Media Research Congress (held in April 2016). It was converted into an article by its authors, submitted to PMKT, and approved for publication.

4 STUDY IN BRAZIL

4.1 OUTLINE OF THE EXPERIMENT

The study in Brazil was inspired by the methodology used by Mavletova and Couper (2013) and also by technology updates in the survey implemented in Spain by Revilla et al. (2014), though it was simplified and adapted to contemporary new technologies.

One example of this was discontinuing the non-optimized questionnaire cell version, as we found that this kind of questionnaire has become obsolete and current technology allows the majority of questionnaires to be optimized. So much so that the main online field research companies now optimize their surveys for device size. Technological innovations in online data collection are developing very rapidly and we need to keep constantly up-to-date.

We thus opted to carry out a single wave and compare just two different groups (desktop versus smartphones) as an initial starting point for forthcoming studies that may be performed in the near future. The final design was thus as follows:

- Interviewees who own a PC and a smartphone were invited to take part in a survey.
- Those who accepted were randomly assigned one of the following conditions: PC or optimized smartphone.
- They were all instructed to fill out the survey as instructed by the device.
- Each group was made up of 300 respondents.
- The groups were distributed by age, sex and social class according to the Brazil Criteria (Associação Brasileira de Empresas de Pesquisa [ABEP], 2015), which was used to ensure a similar distribution in the sample.

Table 1 shows how they were distributed.

Table 1 - Distribution by sex, age and social class in the study in Brazil

%	Desktop	Mobile
Male	49.8	49.0
Female	50.2	51.0
18 to 35	56.1	56.6
36 or +	43.9	43.4
A	21.1	20.4
B1	20.5	20.7
B2	32.3	33.6
C1	15.5	19.4
C2	10.6	5.9
Base	**303**	**304**

4.2 DATA COLLECTION

The fieldwork was carried out through a Netquest online access panel (www.netquest.com). Netquest invited its panelists by using a list of people who had agreed to receive e-mails after responding to a short satisfaction survey proposed on one of the myriad sites that work with Netquest. The panel members were rewarded for each survey completed. The data collection period ran from January 11 to 15, 2016.

4.3 QUESTIONNAIRE USED

The basis for the questionnaire we used was the questionnaire used by Revilla et al. (2014) which was, in turn, inspired by Mavletova and Couper (2013). The questionnaire included around 100

questions, mainly regarding socially undesirable behavior (delicate questions) such as shoplifting, consuming drugs/alcohol, accepting a bribe, etc.

It is crucial to remember that participants were allowed not to answer some questions and yet continue to respond to the survey. This message was stated at the beginning of the questionnaire.

5 MAIN LESSONS LEARNED

5.1 PRESENCE OF SPECTATORS

It is often argued that one of the reasons differences may be expected in data collected through PCs versus mobile devices is mobility itself. With mobile devices it is expected that interviewees will be able to respond to a survey more easily and therefore more frequently, from any location. However, the use of mobile devices increases the likelihood of other people being present beside the respondent while he/she is filling out the survey. That may affect the responses, especially to questions concerning sensitive topics, due to social bias.

Other people have often been present during surveys performed on smartphones. However, they are probably family members, as many panel members responded to the survey at home. That could explain why there is a smaller percentage of interviewees who feel uncomfortable in the presence of other people for SP than for PC (however, the difference is not statistically significant).

They were directly asked if they felt uncomfortable with having other people present (when they had reported other people being present). Table 2 shows the proportions for the different variables.

Table 2 - Proportions (in %) of interviewees who responded: 1) In different locations; 2) in the presence of spectators and 3) felt uncomfortable because others were present

		PC group (N = 303)	Smartphone group (N = 304)
Participation location	Home	74.9	83.5*
	Work	21.4	13.8*
	Other location	3.4	2.7
People around	(= yes)	23.1	39.8*
Felt uncomfortable due to responding near other people	(= yes)	11.4 (N = 70)	6.6 (N = 121)

Note: * this indicates a significant difference at the 5% significance level between the two groups.

5.2 PARTICIPATION LOCATION

Analysis of table 2 shows that the majority of interviewees responded to the survey from home and through smartphones, which was a similar result to the study performed in Spain. Significant differences were found between the questionnaires filled out via PC or SP at home and at work: the majority of panel members responded to the survey in their workplace when using a PC rather than a smartphone (as seems logical). However, more responses were obtained from SP when they were at home. There was no significant difference for “other locations”. The idea that SP are more mobile is not true when it comes to responding to surveys. The interviewees respond to a survey from their home/workplace even when they use smartphones.

5.3 WHAT PEOPLE ARE DOING WHILE RESPONDING TO A SURVEY

The opportunity was taken to ask the interviewee what he/she was doing when responding to the survey (on a desktop PC or SP) with the results set out in Table 3.

Table 3 - What the respondents were doing while filling out the survey

%	Desktop	Mobile
Listening to music	21.8	22.4
Watching TV	18.2-	30.9+
Chatting with other people	17.8	16.8
Checking e-mail, social networks, browsing other websites with the same device as they used to respond to the survey	13.9+	6.3-
Chatting with other people with the same device as they used to respond to the survey (e.g. using Skype or WhatsApp)	10.2	7.2
Other activity – Specify:	33.3	32.9
Base	**303**	**304**

Note: Significant difference: 95% for more (+) or for less (-).

The results in Table 3 contain a collection of interesting information that may be very useful, especially for institutes that work in communication, since there was a significantly greater number of individuals who were watching TV at home when responding to the questionnaire on an SP.

Among those who accessed and responded to the survey on a PC, a significantly larger number said they were checking e-mails or browsing the internet while responding to the survey. That is very probably due to the fact that they are more likely to access surveys in the workplace.

5.4 MATRICES (STRAIGHT-LINING)

Non-differentiation is a kind of lack of effort (Alwin & Krosnick, 1985) i.e. the tendency not to put maximum effort into responding to the questions. In the most extreme form of non-differentiation, the effort required is reduced and the same response category is always chosen, regardless of their real opinion or the item they are being questioned about. This is often called pure straight-lining. Long question matrices in web surveys particularly give rise to this kind of undesirable behavior. Couper (2013) suggests that one of the reasons explaining the increase in non-differentiation is that in matrices, condensed information can give respondents the impression of it being a long and complicated task. That may discourage the interviewees from putting in maximum effort. In this experiment, there were two long matrices: one about attitudes to immigrants and the other about alcohol consumption. Table 4 shows the proportions of straight-line interviewees for each of the grids and experimental status. Note that the grid was divided into separate questions in the smartphone version so less was expected from that group.

Table 4 - Proportions of pure straight-liners (%)

	PC group (N = 303)	Smartphone group (N = 304)
Grid 1	10.2	3.3*
Grid 2	9.9	5.6*

Note: * this indicates a significant difference at the 5% significance level between the two groups.

Significantly lower proportions of pure straight-liners were indeed found in the SP group in both cases.

5.5 PRECISENESS OF RESPONSES TO OPEN-ENDED QUESTIONS

There were not expected to be any differences between PC and SP for questions that require typing due to the different kinds of keyboards and sizes. The preciseness of responses to open-ended questions was compared using the following three questions:

- Open-ended question 1 - Do you think it is important for everyone to follow the law? [Yes/No]. Please set out, in detail, the arguments on which your response is based.

- Open-ended question 2 - You have said that euthanasia is justified [Always/In most cases/Sometimes/Never]. Please set out the reasons why you think that.
- Open-ended question 3 - Generally speaking, what is your opinion regarding immigrants?

It was expected that interviewees responding with a smartphone would give shorter answers, i.e. they would write fewer characters. Table 5 shows the result of tabulating those variables.

Table 5 - Average number of characters obtained in responses using smartphones

	PC group (N = 303)	Smartphone group (N = 304)
Open-ended question 1	63	62
Open-ended question 2	78	77
Open-ended question 3	64	65

Note: There was no significant difference at the 5% significance level between the two groups (two Wilcoxon Rank Sum Test samples (Mann-Whitney)).

This table shows that that is not the case. There are no significant differences in the number of characters written by the two groups. That is different to what was found in the experiment in Spain. The main difference is that the responses obtained via PCs are shorter in Brazil (all the medians are shorter in Brazil than in Spain for the PC group).

5.6 POSITION

Two questions were studied to examine a routine set of ranking/position questions in an online study: the first one asked the interviewee to select the three most acceptable behaviors from a list of sensitive behaviors, and the second one asked them to select the five drinks they most frequently consumed from a list of 16 names.

A common way of dealing with ranking question data is to calculate the total score for each item, which is a sum of percentages obtained or sometimes a number of points corresponding to the position in which the item was selected. This score gives an indication of the global importance of an item and provides a ranking without repetition, as shown in the following formula:

$$\text{Total points for behaviour} = 3 \times p1 + 2 \times p2 + 1 \times p3$$

$$\text{Total points for drinks} = 5 \times p1 + 4 \times p2 + 3 \times p3 + 2 \times p4 + 1 \times p5$$

Where:

pi = proportion of interviewees who selected the item in the first position, i = 1,2,3,4,5.

In the SP group all of the items are presented in just one column, while in the PC group they are presented in two columns, and there is a third column in which the selected items are summarized (that third column is in the question layout in the questionnaire but is not processed). It is expected that these differences in the presentation of the question will create response differences in addition to any differences arising from device characteristics.

Table 6 shows the ranking obtained by using those total scores (top 3 or top 5, depending on what the question was about).

Table 6 - Ranking (Top 3/5 items) based on total score

	PC group	Smartphone Group
Position 1	Casual sex Euthanasia Lying in your own interest	Casual sex Euthanasia Lying in your own interest
Position 2	Water Soft drink Natural juice Coffee Milk	Water Soft drink Milk Natural Juice Coffee

Generally speaking, the rankings are very similar. For the first question, exactly the same position is obtained for the top 3 in both experimental groups. For the second question, there are some differences in the exact order but the same drinks are in the top 5 and the first two ranks are the same. It must be concluded that the expected differences were not found. This is in accordance with the previous results from the experiment in Spain.

6 CONCLUSIONS AND RECOMMENDATIONS

Generally speaking, as Revilla et al. (2014) found, even though some hypotheses were not supported, the results show that there are some significant differences between the responses obtained via PC versus SP. One example is matrices that use different formats to present questions on PC and SP. However, further research is necessary to study all of the significant differences that may be found through a matrix.

Therefore, the results suggest that all users of online surveys must take care to analyze their data and take into account that the device used may affect the results. In the case of smartphone-optimized surveys (in which matrices are split into separate questions), there is an even greater risk of losing comparability. One possible way of improving comparability would be to avoid using matrices on both PCs and smartphones. It is thus recommended to preferably use an item-by-item layout for online surveys when there is a high likelihood of accessing interviewees through PCs and mobile devices.

Further research is needed to test the robustness of the results in different countries for different topics, scales and targets.

6.1 MAIN CONCLUSIONS

Participation location: although interviewees who respond to a survey using smartphones are free to respond from any location, we can conclude that the most common location from which they participate is their own home. Hypotheses:

- Internet: home Wi-Fi is better quality than SP internet.
- Inability to directly access the survey due to internet quality.
- Data allowance saved for activities other than responding to a survey.
- Questionnaires answered with a smartphone are very complex and take a long time to respond to when travelling from one place to another.
- The questionnaires are user-unfriendly.

The presence of third parties and strangers is significantly higher when a smartphone is used. The complete analyses were rerun with the “age” variable recoded in the same classes as used by Mavletova and Couper (2013): “18-34” and “> 34”. There was no change in the results obtained: the variable continues to be significant (all p <= 0.000).

Regarding the respondent's experience: there are no significant differences between the survey's perceived confidentiality, perception of the level of sensitivity of questions, or a feeling of discomfort when responding to a survey with an SP.

Reporting sensitive information: generally speaking, the survey configurations (PC versus SP) have no significant impact on the sensitive indices studied.

The results confirm the robustness of the majority of that found in the study by Mavletova and Couper (2013). Those authors also found higher proportions of third parties and strangers being present for smartphone respondents. As far as the survey experience is concerned, they also found that the device had no significant effect on perceived privacy. There are also no significant differences regarding the type of survey content (sensitive information).

This suggests that several results from the comparison between using PCs and smartphones to fill out an online survey are robust within the context of the survey, since they have been verified in three very different countries (in terms of internet and mobile data coverage and use, as well as culturally). Therefore, it is possible to presume that the results may be extended to other countries.

It is our view that if researchers intend to continue taking advantage of the possibilities offered by the internet (interactivity, wide range of visual options), since the use of mobile devices to carry out online surveys is growing, they need to think more deeply about how to adapt scales, in particular, and that will be the greatest challenge for a survey performed on small screens with virtual keyboards.

That may require a change not just to the format of such scales for mobile devices; it might also be necessary to revisit their current PC format to enhance the comparability of results.

Other results were similar for other specific scales such as drag-and-drop and sliders.

6.2 RECOMMENDATIONS

The most important recommendations for the future obtained from the study are: always take into account the devices that interviewees used to fill out the survey; ask how you would respond to a survey with a smartphone; take care regarding the current format of mobile-optimized surveys; and, finally, in order to enhance the comparability of data between devices, it is recommended to adapt the PC version with a mobile version in mind, so as to obtain the same layout for both platforms.

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