Perception and effectiveness of search advertising on smartphones

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ABSTRACT
This paper explores the perception and effectiveness of mobile search ads from the perspective of users. The study investigates the attention and interaction of users as well as their subjective estimation of paid listings within Google search results on smartphones. During the tests, each of the 20 users has to accomplish four different search tasks. Data collection methods combine eye-tracking with click-through analysis and interviews. Results indicate that there is no “ad blindness” on mobile search, but similar to desktop search, users also tend to avoid search advertising on smartphones. For mobile search, ads appear to cause higher usability costs than on desktop.

Keywords
Search engine advertising, mobile search behavior, eye-tracking analysis.

INTRODUCTION
Search engine advertising (SEA) is the core of the business model of universal search engines. Google Adwords is the financial backbone of Google search services. Search ad related business models are an important conditional factor of the current state of the web economy as a whole. Adwords generates revenue for Google and connects its advertisers with prospective customers.

For search engine users, these ads have the potential both to be useful and to act as a barrier when searching for information. In contrast to display advertising, which is pushed to the user and aims to interrupt his or her current activities, one can expect a much higher acceptance of search ads because they are related to the current information need as represented by the query submitted. Nevertheless, several studies (Buscher et al., 2010; Jansen & Resnick, 2006) point out that users prefer organic results, which are generated on the basis of relevance criteria automatically computed by the search engine’s ranking algorithms. The diffusion of the mobile web changes the parameters of search related advertising, both for users and for the advertising industry. For example in October 2015, more search queries have been submitted from mobile than from stationary devices to Google Search (Sullivan, 2015). As a result, the mobile web (including apps) develops into the primary distribution channel for search related advertising. However, search on mobile devices, and therefore search related advertising, is different from search on stationary devices. Although mobile devices are predominantly used in stationary contexts at home and at work, mobile search also happens on the move on many different locations, sometimes in the context of social interaction, and is often location based (Church & Oliver, 2011). In addition to these context specific factors, the devices themselves have different constraints: Their screens are much smaller than screens on stationary or portable devices, leaving significantly less room to present search results. As a result, according to Schwartz (2014), users are much more focused on the first result than it is the case for desktop search. Despite these significant differences, there is a surprisingly small amount of user oriented research on the perception and effectiveness of search advertising on smartphones. Pursuant to a white paper of Marin Software (2013) that compares mobile and desktop search, mobile search ads receive higher click rates, lower costs and lower conversion rates than their desktop counterparts. At first sight, this analysis indicates that mobile search engine advertising is accepted but shows comparatively little effectiveness for advertisers. In an exploratory study employing eye-tracking, Djamasbi et al. (2013) demonstrate that mobile search advertising is not subject to “banner blindness”. Apart from this investigation, studies explicitly investigation users’ behavior and estimations on mobile search engine advertising are, at least to our knowledge, widely missing. This is the starting point of this work. We aim to take a first step to explore basic aspects of search ad perception, usage and acceptance from the perspective of users, pointing to conclusions for the market for mobile advertising. Preliminary results of this study have been published previously (Domachowski et. al. 2015, German).
This version adds an extended analysis and a systematic overview of the state of the art.

RELATED LITERATURE
There is plenty of research on search engine advertising. On January 13th 2016, a search for the phrase “search engine advertising” in publications’ titles in Google Scholar reveals 95 results. Most of these publications are focused on click stream analysis or auction based click management. There are comparatively few studies explicitly aimed at the users’ perception and acceptance of mobile search ads. In this chapter, we aim to sketch an overview of the state of the art of relevant research. First, we start with some basic considerations on the perception of display advertising on the desktop based internet. Then, we focus on investigations explicitly covering search related advertising. Following that, we discuss current research on (search) ads on mobile devices. Finally, we summarize the central results and provide an estimation of methodological aspects of these investigations.

Perceptions of Online-Advertising
Although advertising is the business model behind “free content” services and websites which users are accustomed to, internet advertising usually elicits negative connotations and is rather unpopular. As early as 1998, Benway and Lane (1998) coined the term “banner blindness”, indicating that user actively try to avoid ads that disturb them in their current task. A more recent study of Pagefair and Adobe (2014) states that the number of users with adblocking software installed resembles nearly 5% of the internet population, reinforcing the widespread proliferation of ad aversion.

Higgins et al. (2014) argue that eye movement is a strong indicator for visual attention and depth of information processing. They suggest using eye tracking to capture the details and dynamics of visual attention. They consider it as a method that seems more objective and less prone to biases in comparison to individuals’ verbal statements on ad perception. With regard to display ads on the internet, they state that ad avoidance is a central behavioral pattern of users. Users learn to remember typical ad positions and/or identify ads in their visual periphery. Thus, users often avoid viewing ads in the first place. Perception is dependent on visual factors like ad position and animation. Relevancy and content similarity of display ads do not influence the probability of fixations and viewing time. Finally, memory for display ads is rather low.

With regard to users’ minimal cognitive resource allocation to advertising, Courbet et al. (2014) examine effects of cognitive fluency and implicit memory of pop-up ads viewed at low-level attention. In an experiment, while allegedly given the task to evaluate a prepared website about diet and health issues, 398 students have been repeatedly exposed to different pop-up ads. A week after this exposure, results show a more favorable attitude towards the exposed brands than towards control brands.

Search ads usually have a different visual presentation than display ads on websites. Rather than primarily relying on visuals (logos, images and animations), search ads usually consist solely of written text comprising a short title, a concise description and a URL. Owens et al. (2011) investigate “banner blindness” regarding text ads displayed in the context of an artificially constructed Website. Results indicate that users tend to ignore areas that are perceived as text advertising and that the concept of “banner blindness” needs to be expanded to text advertising.

Search Advertising
Although to date search ads are primarily displayed as text ads, one needs to consider that we cannot simply transfer text ad blindness as investigated by Owens et al. (2011) to search advertising. One has to keep in mind that the role of ads in the context of webpages is fundamentally different to ads on a search engine results page (SERP) for a keyword based search task, cp. Booth & Koberg (2012: 6-11). The basic difference between display and search advertising is the information available for advertisers about the goals and intentions of users. During search, the advertising message is pulled by the user who actively states his or her information need. Display ads can only be targeted towards contextual factors of the user’s website visit and, if available, to more general socio-demographic or behavioral factors of the target audience. Nevertheless, the current intention of the user is usually less clear when placing the ad (Booth & Koberg 2012: 6). Whereas display ads are often employed for brand building purposes, possibly disturbing or interrupting users’ current activity, search ads are usually directly addressing the stated information need and should, theoretically, support the user in his current task. Search ads are only displayed in explicit search contexts. Because of these fundamental differences of display and search advertising one should expect significant differences with regard to ad perception on part of the users.

One of the first studies on the perception of search ads based on a user test is the “examination of searcher's perceptions of nonsponsored and sponsored links during ecommerce web searching” conducted by Jansen & Resnick (2006). In this study, 56 students accomplish six e-commerce searching tasks. The search task queries are selected from the logfiles of a commercial search engine. For each query, the first SERP on Google is retrieved and prepared for the tests. All information hinting to Google as the originating search engine is removed and replaced with a fictitious brand. In total, six SERPs, containing 60 organic
Investigating the effects of different search ad presentation styles on desktop based search on Baidu, Liu, Liu, Zhang and Ma (2014) provide some interesting insights. The authors compare ads marked with a lightly colored background (WBC) and ads without such a feature (NBC). The experiment consists of 24 tasks with 7 navigational and 17 informational/transactional queries. The first query is predefined and for each of the 24 tasks there were two versions of SERPs prepared. One version included NBC-Ads and the other included WBC-Ads. Each SERP contained three ads. Based on the results of tests with 30 students, the authors conclude that NBC-Ads got a higher proportion of visual attention (double length of fixations) and nearly three times higher click rates than WBC-Ads. The authors assume that the reason for these differences can be found in the higher visual similarity of WBS-Ads to organic results. Checking user satisfaction rates with SERPS containing NBC-Ads against SERPS containing WBC-Ads showed no significant differences. Based on these results, NBC-Ads appear to be worthwhile for search engines and advertisers, reaching a significantly higher potential for monetarization without annoying their users.

Summarizing current research on the perception and effectiveness of search ads, it is to state that users exhibit a certain amount of mistrust to this type of results on SERPs, although search ads are not necessarily worse than regular results with regard to relevancy. Nevertheless, paid results fall behind organic results with regard to fixations and click-through-rate and appear to unite the advantages of the information pull context in search (as there is a certain amount of clicks) with the problems of ad avoidance of display ads. At least, recent studies indicate that the amount of views and clicks on paid listings is largely dependent on the visual style and the position of the ads on the SERP.

Mobile Advertising

The dependence on position and style is of special interest for search ads on mobile devices. As mentioned in the introduction, mobile search is different with regard to search context and device specific factors. At first glance, device specific factors appear to limit the potential for mobile search advertising as there is less room to display ads. In addition, click allocation in search is much more focused on the first result (Schwartz, 2014). With regard to the touch paradigm, accidental taps need to be taken into account as a problem for users and as a restriction for mobile advertising (Smith 2012). As a counter argument, one may also take into consideration that the smaller screen size limits users’ options to avoid ad positions and that touch based controls allow for a more natural interaction with advertising, e.g. to directly make a call.

As has been demonstrated, the acceptance and usage of search ads is also dependent on their relevance for the user. In the context of mobile search, there exists much more potential to present ads that are relevant because a larger amount of user and/or location specific context information...
is available, cp. Pelau and Zegreanu (2010) and Krum (2010).

As already stated, in mobile there are comparatively few studies explicitly aimed at the perception and acceptance of mobile search ads by users. O'Donnell and Cramer (2015) compare the perception of personalized ads on mobile and desktop. They combine an online survey (n=256) with in-depth-interviews with 13 teens and 11 adults. According to the survey data, desktop ads are assessed as being more relevant than ads on mobile. The interviews reveal that mobile ads are perceived as less personal than ads displayed on the desktop. Considering the potential of the enriched context information of the mobile web, this result is rather surprising. A possible explanation is provided in the study: One interviewee explicitly mentions that user behavior is fundamentally different on mobile. Whereas on desktop, one uses a broad range of websites, on mobile devices the usage behavior is much more specialized and focused on a few specific apps. Therefore, on desktop, advertisers are able to collect a much broader portfolio of information for personalization.

One study closely related to our research interest is the work of Djamasbi et al. (2013). In a preliminary investigation of “SERPs and ads on mobile devices“, the authors investigate click, scroll and viewing behavior before the first click. Their test design consists of two search tasks on Google. The tasks are presented to the test users in random order. During each task, the participants have to enter a predefined query into the Google search mask and examine the search engine result page for relevant information. Click and scroll behavior as well as fixations are recorded. 16 users take part in the tests. The study reveals some interesting insights. On average, the time until the first action is taken by users is five seconds. In two thirds of the cases, scrolling is the first action, while in one third of the cases, users click a result first. Data indicates that ads influence scroll and click behavior. On SERPs containing ads, users scroll with a shorter delay as on SERPs without ads. On the other hand, if a SERP contained ads there was a longer “click-delay” than on SERPs without ads. In addition, ads received attention by the large majority of users. Four out of five participants focus on ads if they are displayed. Thus, the authors conclude there is no “banner blindness” on mobile search. To our knowledge, this study is the first to actually investigate users’ perception of mobile ads in search contexts. Due to the restriction of measuring first click behavior only, its epistemological “reach” is limited. In addition, none of the mentioned results were statistically significant. Therefore, one should assess this investigation as rather tentative. Nevertheless, it serves as a kind of first point of reference for our investigation.

To sum up, the central results of current research on ad perception and effectiveness present an interesting picture. To start, display advertising has a bad reputation. Users try to avoid display ads (Benway & Lane 1998) and this is also true for text ads (Owens et al. 2011). Display ad perception is dependent on ad position and ad format (Higgins et al. 2014), which also holds true for search ads. In addition, the perception of search ads depends on ad quality (Buscher et al. 2010) and on the similarity of ads to regular results (Liu et al. 2014). The effectiveness of display ads is seen as rather low (Higgins et al. 2014). Nevertheless, one can assume that ads induce a prolonged implicit memory effect (Courbet et al. 2014). Search ads are less effective with regard to selection probability than regular results although not necessarily worse with regard to relevancy (Jansen & Resnick 2006). Top ads get a significant portion of clicks, especially if ad quality is perceived as high (Buscher et al. 2010) and if they are visually similar to regular results (Lui et al. 2015). One can assume that search ads combine the relevancy advantage of the pull context with the problem of ad avoidance of display ads. Astonishingly, although it should be easier to target user needs on mobile devices, ads on mobile are perceived as less relevant than their desktop counterparts. Investigating mobile search ads, Djamasbi et al. (2013) detect differences with regard to time to first action in dependence on the presence or absence of ads. Although ads affect the distribution of attention of the displayed results, ads receive the attention of 90% of users. This hints to the assumption that in mobile search there is no ad blindness.

Concerning methods of investigation, eye-tracking is often employed as an indicator of attention and information processing which is more objective and less prone to memory biases in comparison to individuals’ verbal statements on ad perception (Higgins et al. 2014). Behavioral patterns of ad avoidance involve less fixations on ads due to users learning typical positions of ads as well as recognizing them in the periphery field of vision. Click data analysis can be used as an additional observational method which provides an approximation of effectiveness of search results. Both methods are often combined and data collection can be “enriched” with the subjective views of users collected by surveys. Research designs often reflect task based experimental designs. Information seeking and browsing tasks are at the center of data collection. Therefore, we assume that the design of the tasks can be seen as of highest importance when designing an investigation in this field.

**METHODOLOGY**

The research design of this investigation employs methods as described in user centered studies presented in the chapter above (cp. especially Djamasbi et al. 2013, Owens et al. 2011, Buscher et al. 2010; Jansen & Resnick 2006). Our research focuses on three aspects. We state them as the following research questions:

1) How is attention distributed on the first screen of a mobile SERP and which actions do users take?
2) How effective are ads on mobile SERPs regarding the clicks generated as an indicator of relevance?

3) Are users subjectively aware of ads on mobile SERPs and what is their estimation of ads?

To answer these research questions, we created the investigation as a combination of user tests and surveys. We apply objective data collection methods (eye tracking and click data) with the subjective estimation of the participants (post-test surveys). Eye tracking delivers insights with regard to the allocation of attention on the SERP. The selection of results, especially the click through rate on ads, indicates perceived ad relevance, which in turn indicates their effectiveness from the point of view of advertisers to generate visitors on the respective target properties (usually a landing page). The surveys show the users’ subjective awareness and estimation of mobile search ads.

**Tasks**

Search tasks constitute the core of the test design. Every test person was given the task to execute a mobile search scenario on four pre-defined queries and information needs. For three of the search tasks, the SERP contains ads, while for one search task (no. 2) the SERP displayed only organic results. The queries for the search tasks are derived from a set of 25 informational or transactional queries (Broder, 2002) with a commercial intent, e.g. product search. This set of 25 queries has been compiled from a list of 1,006 unique queries collected from popular search query lists (e.g. Google Zeitgeist, Bing category top lists). For each of the 25 queries, search intents are condensed from the descriptions of possible information needs surveyed from several users (up to five). For the test, four queries (and corresponding intents) out of these 25 are selected and prepared. A pre-test indicated that the selected queries are too general. Because of this, the four queries had to be modified to make them more specific and unambiguous. For example, the query “iphone 6” was changed to “iphone 6 price”. Table 1 gives an overview of the queries and reconstructed information needs of the four test scenarios. In addition, the pre-test indicated that the participants spend a significant amount of time on the landing pages. This extends the duration of the test and does not provide additional insights. Thus, each task has been restricted to a maximum duration of three minutes. As an explanation, the updated task descriptions present a fictitious scenario in which the test person is asked to imagine executing the task to bypass waiting time on a bus stop.

**Test website**

To reflect the most common use case, we choose Google as the search engine employed in our investigation. As ad displays are variable when executing the same query repeatedly, a standardized test website has been prepared to secure that the SERPS and containing ads are exactly the same for each user. For that purpose, all queries are executed on google.de with a Nexus 4 smartphone (screen size: 4.7 inch, resolution: 1280x768 pixels) in order to represent a typical smartphone configuration in 2014. Firefox Mobile is used as the browser with the browser cache and the browser history cleared while the user executing the queries is logged out of Google. The first SERP of the query is saved as a screenshot and the corresponding links are re-inserted. Figure 1 gives an illustration of the SERPS on the test website.

<table>
<thead>
<tr>
<th>#</th>
<th>Query</th>
<th>Search intent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>iphone 6 price</td>
<td>You search for general information on the phone and are primarily interested in the price</td>
</tr>
<tr>
<td>2</td>
<td>digital camera test</td>
<td>You want to get an overview of the best cameras and are primarily interested on test reviews</td>
</tr>
<tr>
<td>3</td>
<td>wii games</td>
<td>You want to find an interesting game for your Wii console</td>
</tr>
<tr>
<td>4</td>
<td>dieting tips</td>
<td>You want to lose weight and are searching on information about the best way to change nutrition habits and about sport disciplines especially suitable for slimming</td>
</tr>
</tbody>
</table>

Table 1. Search tasks. Note: Translated to English, The tasks were presented in German.
Test procedure and data collection

The hardware and browser used for the user tests are identical to the smartphone type and browser app used for preparing the test website, a Nexus 4 smartphone and the Android Firefox Browser. A Tobii X2-60 eye-tracking device is used to record the fixations on the smartphone display. For that purpose, the smartphone is attached to the Tobii Mobile Device Stand for X2 which supports a relatively convenient and natural way of interaction with the smartphone.¹ The eye-tracking device is positioned below the smartphone, which is fixed at a constant distance in portrait mode. User can interact with the smartphone using either their thumb or index fingers. A video of the screen is recorded with a camera positioned above the smartphone. Eye-movements are recorded relative to this video. The procedure of each test is as follows. First, each participant is given a short introduction to the test environment, comprising hard and software including the eye-tracker and the tasks. Second, the eye-tracker has to be calibrated. Third, each participant executes the tasks in the given order to secure the same ad and results sequence for each participant, as Buscher et al. (2010) show that ad sequence influences user behavior. This means that the perception of the ads in the different tasks is dependent on

¹ http://tobiipro.com/product-listing/mobile-device-stand
the perception of the ads in the preceding tasks. Consequently, in our explorative research setting we consider possible effects of task order in the analysis, because a considerably larger group of participants would have been necessary to systematically control for task order. For consistency, each task is presented in written form. For every task, the test facilitator stops the task after three minutes. During the tasks, fixations, clicks and time to first action are recorded. Finally, at the end of each user test, a short structured interview collects the subjective awareness of users and their estimation of mobile search ads.

**Participants and test execution**

Users have been recruited via direct invitations and e-mails within the personal and professional environment of the first author. The test sample can be described as a rather young (age: 23-34; 26.25 mean value), predominantly female (12 female; 8 male), highly educated group which is experienced in the usage of mobile devices. Two users state that they “always” use the smartphone for information seeking, 14 users use it “most of the time” and 4 declared to use it “sometimes” for this purpose. A total of 21 users participated in the tests. One of the participants does not use a private smartphone and therefore has to be dropped from the sample. All tests have been executed between October 31 and November 5 in 2014. The average duration of the tests is 30 minutes.

**ANALYSIS**

In the following, the results are structured according to our research questions.

**Attention on ads and interaction on the first screen**

We recorded fixations on the SERP before the first scroll action and compiled the resulting gaze distributions of all users to measure ad attention. Figure 2 visualizes gaze distribution for all four scenarios based on the time-frame between the start of the task and the first action (scrolling/clicking) of a user (avg. 3.6 seconds). The number of participants varies for variables because of recording issues. The proportion of ads on the visible screen estate is 57% for task 1 and 60% for tasks 3 and 4. The attention of users during these first seconds after opening a web-page appears to be fairly evenly among hits. Statistics on the distributions of the duration of all fixations show, that results on the two top ranks receive more attention (Figure 3), regardless of ads being displayed (task 1/3/4) or not (task 2). From this, we can conclude that users do not systematically skip over ads positioned at the top of the result list.

The gaze distribution for task 1 differs from the other tasks. Here, users focus more explicitly on the hit displayed at the top (compared to task 3 and 4, respectively). There are two possible explanations: First, as the sequence of the tasks is identical for all users, there could have been a learning effect. Another possible explanation is that the two product listing ads at the top of the SERP of task 1 accumulated more attention because these product listings show a picture of the product. This seems plausible, as Google states that product listing often receive higher click through rates than text ads (Google 2015b). In addition, Malheiros et al. (2012) mention that targeted rich media ads receive a higher level of attention.

Furthermore, we analyze scrolling behavior to measure the visibility of ads that are positioned below the organic results at the end of the first SERP. For tasks 1, 2 and 4, roughly half of the users scroll down to the end of the page. For task 3, only one test person scrolls to the end of the page. This indicates that ads at the bottom of the SERP have a comparatively low chance of being noticed.

Behavioral patterns can give an estimation of the validity and reliability of the eye-tracking data. A quick decision to scroll can be seen as an indication of low attention on the first results (ads for tasks 1,3,4), while a comparatively long time to decide on the first click can be seen as a sign of added cognitive barriers for result selection. As a whole, the data in table 2 indicates that over all tasks, values are comparable as there are slight deviations with regard to absolute values but no fundamental differences with regard to time to first scroll and time to first click. Thus, we can assume that behavior is relatively uniform regardless if ads are present on the SERP or not.

However, it is to state that interaction on the SERPs varies among users. The time until the first scroll action varies from 1-2 seconds as the shortest time span to 7-14 seconds as the longest time span, the mean value accounts to 4.76s (SD 3.25s). Over all users, the data shows a normal distribution within the mentioned time spans, but there are some outliers who scroll after waiting for 10 seconds, especially with regard to task 1 (three outliers) and task 4 (two outliers). The same is true with regard to time until the first click. The shortest time span corresponds to 2-5 seconds and the longest to 32-44 seconds. The mean value with regard to time to first click is 16.7s (SD 9.7s). Again, over all users, the data shows a normal distribution within the mentioned time spans. Table 2 presents the mean values and standard deviations with regard to time to first scroll and time to first click, grouped by task.

<table>
<thead>
<tr>
<th></th>
<th>Time to first scroll</th>
<th>Time to first click</th>
</tr>
</thead>
<tbody>
<tr>
<td>Task 1: iphone 6 price</td>
<td>5.75 (3.60)</td>
<td>18.25 (8.35)</td>
</tr>
<tr>
<td>Task 2: digital camera test</td>
<td>4.55 (2.93)</td>
<td>14.25 (9.98)</td>
</tr>
<tr>
<td>Task 3: wii games</td>
<td>3.95 (1.36)</td>
<td>13.7 (8.68)</td>
</tr>
<tr>
<td>Task 4: dieting tips</td>
<td>4.8 (5.05)</td>
<td>20.6 (11.71)</td>
</tr>
</tbody>
</table>

**Table 2: Time to first scroll and time to first click. Mean values (SD) in seconds (n=20).**
Effectiveness of ads

We measure the effectiveness of ads on the basis of their relevance to users and their ability to drive traffic to the website of the respective advertiser. Although positive brand related memory effects can be expected based on ad exposure alone (Courbet et al. 2014), the focus here is on the aptitude of search ads to induce a direct response. Overall, tests users click on organic and ad based search results 176 times. Again, we see a comparable behavior with regard to overall result selection, at least with regard to organic results: On average, users selected 2.2 results per task. The standard deviation is relatively uniform and accounts to 1.07 results over all tasks. Table 3 gives an overview on click behavior on the four tasks. Click behavior on search ads is different between tasks. For tasks 1 and 3, the fraction of clicks on ads is nearly 10% (task 1: 8.7%, task 3: 9.8%). For task 4, there is only one click on an ad. One can state that there is a clear preference for organic results, despite the fact that ads take up the far majority of the space initially visible on the SERPs (on tasks 1, 3 and 4). For task 4, we can even state a clear behavior of ad avoidance as there is only one search ad selected during the tests. The reasons for this are unclear here. One can suspect a lower ad quality or a stronger informational aspect of the information need and search query. This could be an object for further studies. When considering the order of result selection, the picture becomes even more interesting. In only two cases, the results selected first are ads. The seven other occasions on which ads are clicked occurred after users had already selected organic results. Taking into account that 70% of the results initially visible to the users on tasks 1, 3 and 4 are search ads and that only one of the results initially visible on each SERP is an organic result, the impression is created that search ads significantly delay users when accomplishing their search tasks. From this perspective, one can postulate that search ads present a tremendous usability problem for mobile search. In addition, ads that are not initially visible have only a small chance of being selected. Click distributions on result positions (Figure 4) indicate a clear preference for top positions, as long as those positions are not occupied by ads. Finally, as only five out of the 20 participants select search ads at all, a rather negative picture presents itself when it comes to the effectiveness of search ads from the perspective of users.

Awareness and estimation of ads

Awareness and estimations of ads by users is collected at the end of each user test, with the help of a short, structured interview. First, users are asked if they have consciously perceived the search ads. 16 participants (80%) answer affirmatively. Next, they are asked if they feel that ads have disturbed them during their search task. Only one participant confirms this statement. This indicates that the large majority of users may accept ads. However, 12 of the 16 users who perceive search ads consciously state that they have deliberately avoided the ads. These answers are widely in accordance with the actual behavior during the tests: Only one person who states that she deliberately avoids ads has actually clicked on an ad during the preceding search tasks. Three out of those four users who state that they do not avoid ads selected at least one ad during the preceding tests. Asked, whether they had noticed that task 2 did not contain any ads, 13 of the 20 test users answer that they had not noticed that task 2 did not contain

<table>
<thead>
<tr>
<th></th>
<th>Organic</th>
<th>Ads</th>
<th>Fraction of ad clicks on all clicks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Task 1: iphone 6 price</td>
<td>42</td>
<td>4</td>
<td>8.7%</td>
</tr>
<tr>
<td>Task 2: digital camera test</td>
<td>43</td>
<td>No ads available</td>
<td>-</td>
</tr>
<tr>
<td>Task 3: wii games</td>
<td>37</td>
<td>4</td>
<td>9.8%</td>
</tr>
<tr>
<td>Task 4: dieting tips</td>
<td>45</td>
<td>1</td>
<td>2.2%</td>
</tr>
</tbody>
</table>

Table 3: Clicks on organic results and search ads (n=20)

Figure 4: Clicks distribution in dependence on ranking (n=20). Ads marked red.
argue that paid search is rather important for unknown brands and vendors to which users usually not have been able to develop trust. Well-known brands and vendors may not need to employ search advertising. According to Fishman (2013), in such a case search ads may not work and even cannibalize clicks on organic results. This, obviously, is an area where there is room for improvement for search engines and advertisers.

As a whole, the findings here are widely in conformance with results of research on search ads on the desktop, cp. Malheiro et al. (2012), Owens et al. (2011), Buscher et al. (2010), Jansen & Resnick (2006). In comparison to the study of Djamasi et al. (2013) on SERPs and ads on mobile devices, we would be more reserved to state that ads influence scroll and click behavior. We follow the conclusion that there is no ad blindness on mobile search, but find indications of a pattern of ad avoidance for a subset of users. We would additionally state that with regard to the effectiveness of ads, the observed perception of top ads by users does not offer much help for advertisers. In contrast, we believe that search ads on smartphones have a larger negative influence on search tasks than in the context of desktop search, where usually users can at least see more than one organic result on the first screen.

From a methodological perspective, we estimate this investigation as a first exploration in the field. Future studies could include additional factors such as varying the relevance of ads, taking a more fine-grained perspective on information needs or comparing pattern of eye-movements of different user types, e.g. ad clickers and de facto ad avoiders.

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