

Location of navigation menus in websites

Citation for published version (APA):

Salmerón, L., Abu Mallouh, R., & Kammerer, Y. (2017). Location of navigation menus in websites: an experimental study with Arabic users. *Universal Access in the Information Society*, 16(1), 191-196. <https://doi.org/10.1007/s10209-015-0444-x>

DOI:

[10.1007/s10209-015-0444-x](https://doi.org/10.1007/s10209-015-0444-x)

Document status and date:

Published: 01/03/2017

Document Version:

Peer reviewed version

Document license:

CC BY-NC-ND

Please check the document version of this publication:

- A submitted manuscript is the version of the article upon submission and before peer-review. There can be important differences between the submitted version and the official published version of record. People interested in the research are advised to contact the author for the final version of the publication, or visit the DOI to the publisher's website.
- The final author version and the galley proof are versions of the publication after peer review.
- The final published version features the final layout of the paper including the volume, issue and page numbers.

[Link to publication](#)

General rights

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal.

If the publication is distributed under the terms of Article 25fa of the Dutch Copyright Act, indicated by the "Taverne" license above, please follow below link for the End User Agreement:

<https://www.ou.nl/taverne-agreement>

Take down policy

If you believe that this document breaches copyright please contact us at:

pure-support@ou.nl

providing details and we will investigate your claim.

Downloaded from <https://research.ou.nl/> on date: 09 Feb. 2023

Open Universiteit
www.ou.nl



Location of navigation menus in websites: an experimental study with Arabic users

*Ladislao Salmerón*¹

*Reem Abu Mallouh*²

*Yvonne Kammerer*³

¹ *ERI Lectura & Department of Developmental and Educational Psychology, University of
Valencia, Spain*

² *Basque Center on Cognition, Brain and Language, Spain*

³ *Knowledge Media Research Center, Tübingen, Germany*

Salmerón, L., Abu Mallouh, R., & Kammerer, Y. (2015). Location of navigation menus in
websites: an experimental study with Arabic users. *Universal Access in the Information Society*.
Manuscript accepted for publication 20/10/2015

Correspondence may be sent to:

Ladislao Salmerón

ERI Lectura & Department of Developmental and Educational Psychology,

University of Valencia

Avd. Blasco Ibáñez, 21. 46010 - Valencia (Spain)

e-mail: ladislao.salmeron@valencia.edu

Authors' notes: This research was partially funded by a grant from the Spanish
Secretaría General de Universidades (EDU2014-59422) to the first author.

Abstract

While Arabic users represent by far the fastest growing language population on the Internet, research about how the peculiarities of Arabic language may shape users' web interactions is still scarce. The preferences of Arabic users for menu location in websites have been studied. Two competing arguments have been proposed regarding the best location of menus in websites: conventional design (navigation menu should be placed on that side where users expect it based on previous experience) and reading direction (navigation menu should be placed on that side where readers are used to start off reading, so that the navigation menu is likely to be attended first). In an experiment, twenty-five participants with Arabic as mother language (who also spoke English) were briefly presented with screenshots from websites presented in Arabic or English and with menus located either on the left or the right, and rated their perceived visual appeal, usability, and trustworthiness. Results showed that participants judged the Arabic websites more positive when menus were located in the right- rather than in the left-hand side. In contrast, no differences for menu location were observed for English websites. These results are discussed in light of the conventional design and reading direction hypothesis and with regard to their implications for the design of Arabic websites.

Keywords: website design; menu location; Arabic Internet users.

1. Introduction

According to recent estimations, as of December 2013, there are more than 135 million individuals using the Internet in the 22 Arabic countries [1]. Although the penetration of the Internet in the Arabic speaking population is the lowest within the top five languages (36.9% of the population), Arabic users represent by far the fastest growing language population on the Internet (5297% user growth between the years 2000 and 2013). In contrast to these exponentially growing figures, research about how the peculiarities of Arabic language may shape users' web interactions is still scarce [2].

Contrary to most Western languages, Arab is read from right to left (except for numbers). Given that most existing design guidelines are based on studies from Romanic languages that are read from left to right, some of those guidelines may not be directly applicable to Arabic webpages. In this line, Al-Osaimi and Alsumait [3] noted that design guidelines for websites that are based on studies with English speaking populations didn't reflect the preferences of children from different Arabic countries (see [2], for a similar argument). Marcus [4] explored a sample of webpages from several Arabic universities, and identified particular design features linked to cultural dimensions, such as an emphasis for long-term orientation (e.g. stressing the historical background of the University), or a concern to avoid users' uncertainty (e.g. providing a clear menu hierarchy). The present study contributes to the existing research by focusing on a relevant design guideline related to a specific cultural dimension, i.e. the location of navigation menus in Arabic websites.

2. Preferences for menu location in websites

Different authors have proposed two competing arguments regarding the best location of menus in websites: conventional design and reading direction. Both arguments will be discussed to the extent that they make conflicting predictions

regarding Arabic users' perceptions of menu location. The argument of a conventional design considers that users have initial expectations about the location of particular objects in websites, and their performance may be hindered if designers include objects in unexpected locations [5, 6]. Previous studies conducted with users from English and German speaking countries have shown that users expect navigation menus to be located on the left-hand side of the website, which is the convention in Western language websites [7, 8, 9]. Evidence suggests that this effect weakens after having spent some time on a website, because users can quickly accommodate to a design that differs from their expectations [6]. In this line, as will be outlined below, irrespective of such expectations, users' preferences and their task completion times did not differ between left- and right-hand menus (except for the results by [10]).

The authors are not aware of a conventional design study in Arabic. Their own informal analysis of several dozens of websites from Arabic speaking countries from several categories (internet services companies, government institutions, NGOs, industries, universities, and health institutions) conducted during January and February 2013, indicated that there is no clear standard convention in published websites written in Arabic as regards to the location of navigation menus. In addition, only 42% of all websites published in the Arabic region are in Arabic, while a big percentage of websites are in French and English [11]. This means that in the design of websites in the Arabic region a variety of conventions regarding the location of navigation menus coexists. Considering this evidence, from the conventional design perspective it is hypothesized that Arabic users for Arabic websites would value to a similar degree menus located on the left- or right-hand side. In contrast, for websites written in a Western language they would prefer menus located on the left-hand side, as this corresponds to conventional design.

The argument of reading direction, in contrast, considers that the navigation menu should be placed on that side where readers are used to start off reading, so that the navigation menu is likely to be attended first [12]. As the navigation menu provides an overview of the content of the site, it is helpful to pay attention to it before reading [13]. According to this argument, in languages that are read from left to right, navigation menus should be placed on the left, whereas in right-to-left languages (such as Arabic or Hebrew) they should be placed on the right-hand side. Research on psycholinguistics has shown that the reading habits imposed by the structure of language may affect people's preferences and decision making (for a review see [14]). For example, Ariel, Al-Harthy, Was, and Dunlosky [15] provided native Arabic students with study words in Arabic and native English students with study words in English presented on the left-, middle-, or right-hand side of a computer screen. While Arabic students selected a higher proportion of words located on the right, the opposite pattern was found for native English speakers. Though it was not tested how Arabic students would select study words in English, from this reading-direction perspective it is hypothesized that they will value to a higher degree Arabic websites with menus located on the right-hand side because they are read from right to left, whereas they would prefer English websites, with menus on the left-hand side, because they are read from left to right. Thus, note that while for Western languages both the conventional design and reading direction argumentation result in the same conclusion, namely that navigation menus on the left-hand side are preferred, the two assumptions diverge for Arabic readers.

However, it should also be noted that in contrast to both the conventional design assumption and the reading direction assumption, previous studies with Western participants and websites written in Romanic languages have shown no strong

differences between left or right-hand side menus. Only one study conducted by Kingsburg and Andre [10] found significant differences between left- and right-located menus. The authors studied the menu location of websites with a three-level menu navigation structure (i.e., with primary, secondary, and tertiary menus) in a sample of undergraduates completing a set of search tasks in a fictitious online shop. Participants spent less time searching for products when they navigated in websites with the primary menu being located on the left rather than on the right or at the top. However, participants did not differ in the number of unnecessary clicks made in left- or right-located menus and also showed no preference for either left or right location. Kalbach and Bosenick [16] tested left or right-located menus in a commercial website in German with a sample of non-student adults. Participants completed a series of navigation tasks using one of the two versions of the website. Results revealed no significant differences between the two interfaces with regard to participants' task completion times or the number of tasks that could not be solved within the given time. Furthermore, most participants did not indicate a preference for menu location. Similar null effects in search time and preference have been reported in studies using English websites tested with undergraduate students [12, 17].

Faulkner and Hayton [12] raised the question whether Internet users that read from right-to-left (e.g., Arabic users) would behave differently compared to left-to-right readers. However, as in their study finally only six participants were right-to-left readers they could not draw any conclusions with respect to this issue. To the best of the authors' knowledge, until now no other previous studies have explored the role of menu location in languages that are read from right to left. Therefore, the goal of the present study was to test the two competing hypotheses (conventional design vs. reading direction, see below) in a sample of participants with Arabic as mother language (who

also spoke English). Study participants were briefly presented with screenshots from websites, in Arabic or in English, with menus located either on the left or the right, and immediately afterwards rated their perceived visual appeal, usability, and trustworthiness [18]. This procedure was followed for two reasons. First, Internet users linger at websites for extremely short periods of time before moving to a different website [19] and form initial impressions of the websites during the first seconds [20]. Second, this procedure allows testing a relatively high number of websites, which increases the generalizability of the results.

According to the conventional design assumption, participants' ratings will not differ for menu location for Arabic websites, as a convention for menu location for Arabic websites does not seem to exist (Hypothesis 1a). Instead, for websites written in English participants should rate websites with left-hand menus higher than websites with right-hand menus (Hypothesis 1b). On the contrary, according to the reading direction argument, ratings for Arabic websites will be higher for websites with menus located on the right rather than the left (Hypothesis 2a). Instead, ratings for English websites should be higher for websites with menus on the left rather than the right (Hypothesis 2b).

3. Method

3.1 Participants

Twenty-five native Arabic-speaking graduate students volunteered in the study (64% women, mean age 28.4 [$SD = 3.6$] years). On average, they have been using computers for 10.6 years ($SD = 4.8$), and reportedly used the Internet at home "almost every day", and at the University "once or twice a week". Participants originated from different Arabic-speaking countries, and have lived in Valencia (Spain) for at least one year.

They were all enrolled in graduate studies, including engineering, medicine, or biology.

All participants declared to be fluent in English.

3.2 Material

The material was created from screen captures of real websites. Criteria for selection were that they maintained equivalent Arabic and English versions of the website, and used menus located either on the left- or on the right-hand side of the screen. The final selection included 25 websites, covering a wide range of genres, including global internet services companies (e.g. Gmail, Twitter, Yahoo news), as well as pages from Arabic countries, including government institutions, NGOs, industries, universities, and health institutions. The original Arabic and English versions of the websites included the same pictures and graphical information, and an equivalent portion of text. Original screen captures of the websites were edited to change only the location of the navigation menu. For each of the 25 websites four versions that resulted from combining language (Arabic or English) and menu location (left- or right-located) were created (see example in Figure 1). This resulted in 100 different website versions. Moreover, 20 additional websites were used as fillers from websites in Arabic and English that did not use menus in the website.

3.3 Procedure

All participants were tested individually in a quiet room of the University campus. They responded on a laptop set to a resolution of 1024 x 768 pixels. Each session lasted approximately 30 minutes. The procedure was similar to the one used by Lindgaard [18] (see also [20]). Websites were displayed for 500 milliseconds, preceded by a white mask for 50 milliseconds. Following the presentation of each website participants rated it regarding its perceived visual appeal, its perceived trustworthiness, and its perceived usability, on a scale from 1 (low) to 9 (high). In the beginning of the experiment

participants were familiarized with the procedure by responding to 30 practice websites. Next, the 100 experimental websites were presented in four blocks. Each block included a different version of the 25 websites, together with 5 fillers. In each block, all four conditions appeared in approximately the same number of times. Presentation order was randomized within blocks. An ad-hoc Visual Basic program controlled the procedure and collected students' responses.

4. Results

Independent repeated-measures analyses of variance (ANOVA) were performed with menu location (left or right) and language (Arabic or English) as factors, and participants' ratings regarding the three criteria visual appeal, trustworthiness, and usability as dependent variables. Table 1 shows descriptive data for all dependent variables. First, the ANOVA for visual appeal revealed no significant main effects of language, $F(1, 24)=1.84, p=.19, \text{partial } \eta^2=.07$, or menu location, $F(1, 24)=2.64, p=.11, \text{partial } \eta^2=.10$, but a significant interaction, $F(1, 24)=9.29, p<.01, \text{partial } \eta^2=.28$. LSD post-hoc analyses showed that for Arabic websites, participants judged right-hand menus as more appealing than left-hand menus ($p<.01$), whereas for English websites no differences were observed as a function of menu location ($p=.35$).

Second, the ANOVA for perceived trustworthiness showed no significant main effects of language, $F(1, 24) = 2.93, p = .10, \text{partial } \eta^2=.10$, or menu location, $F(1, 24) = 1.06, p = .31, \text{partial } \eta^2 = .04$, but a significant interaction, $F(1, 24) = 7.01, p = .02, \text{partial } \eta^2 = .23$. Post-hoc analyses revealed that for Arabic websites, participants judged websites with right-hand-menus as more trustworthy compared to websites with left-hand menus ($p = .02$), whereas for English websites no differences were observed as a function of menu location ($p = .13$).

Finally, the ANOVA for perceived usability showed no significant main effect of menu, $F(1, 24) = 1.51, p = .23, \eta^2 = .06$, but of language, $F(1, 24) = 4.81, p = .04, \text{partial } \eta^2 = .17$, with websites in Arabic being perceived as more usable. This effect was qualified by a significant interaction, $F(1, 24) = 6.39, p = .02, \text{partial } \eta^2 = .21$. Post-hoc analyses revealed that in the Arabic condition participants judged websites with menus located at the right-hand side as more usable than those with menus located on the left-hand side ($p = .02$), while in the English condition there were no differences across menu location ($p = .29$).

-Insert Table 1 about here-

5. Conclusions

The results clearly show that Arabic users in the study valued to a higher extent – in terms of visual appeal, perceived trustworthiness, and perceived usability [17] websites written in Arabic with a navigation menu located on the right-hand side than those with a menu on the left-hand side. This is in line with Hypothesis 2a, the reading direction assumption. Effect sizes show that these are medium to large differences [21]. In contrast, Arabic users, who are also fluent in English, do not show any particular preference for menu location when those same websites were written in English. This is neither in line with Hypothesis 1b, nor with Hypothesis 2b. Note that these results cannot be attributed to the actual content of the websites, because it was kept constant across conditions.

To conclude, results do not fully confirm any of the two assumptions tested, i.e. the conventional design assumption and the reading direction assumption. The conventional design view [7, 9] cannot explain why Arabic users value to a higher degree websites with a navigation menu located on the right-hand side, as there is no

clear convention on this regard in existing Arabic websites. The reading direction assumption [12] provides a plausible explanation for this effect, based on the fact that right-hand menus are located at the starting point of their reading. This may facilitate Arabic users to have an initial overview of the content of the site. However, the reading direction assumption cannot explain why Arabic users do not prefer a particular location for menus in English websites. Data indicate that they are sensitive to the language of the website, and react more positively to menus in their mother tongue that match their reading direction. A post-hoc explanation might be that this preference is not so salient in their second language, for which they have no clear preference, as they are used to reading from left-to-right as well as from right-to-left.

While this study provides an initial attempt to understand how Arabic users perceive webpages, other relevant aspects of their web interaction remain unexplored. Future work may use eye-tracking technology to unveil Arabic users' inspection patterns of websites with different menu locations. As Dong and Lee [22] have argued, the way users explore websites may be related to some extent to their cultural background. Specifically, they have found that while Western (American) users tend to explore websites in a sequential-analytical way, East-Asians (Chinese and Koreans) tend to do so in a circular-holistic manner. Against this background, it may be expected that Arabic users would show an inspection pattern closer to those of Asian users. Those potential differences with respect to Western users may have important design consequences for Arabic webpages. In this line, research on advertising blindness indicates differences between left-to-right readers and right-to-left readers. Several eye-tracking studies show that Western readers on websites written in Romanic languages mostly ignore advertisements presented on the right-hand side of the webpage (for a review e.g. [23]). Instead, a first exploratory study that examined native Arabic speakers

interacting with Arabic websites found that they tended to ignore banner ads appearing on the left-hand side [24]. These results concur with the study findings in that Arabic users value to a higher extent the visual elements located on the right-hand side of the websites, to the extent that they may even ignore those located on the left-hand side.

The results from the present study constitute one of the first attempts to build empirically-based design guidelines for Arabic websites (see also [2, 3]). The results clearly suggest locating navigation menus of Arabic websites on the right-hand side. However, it should be acknowledged that this study comes with certain limitations. First, the experiment does not address the issue of the extent to which the positive perception of Arabic websites with right-located menus has a positive impact on users' actual performance [10]. Although the literature review on Romanic languages discussed above suggests that the impact of menu location on performance is rather small and diminishes with time [6], this still remains an open question for future research. Second, the authors have focused on a particular Arabic population, i.e. graduate students studying abroad, fluent in other (Romanic) languages. This means that they have had extensive practice with websites in Romanic languages, and therefore may be more flexible than monolingual users in switching reading directions in different websites. Future research should test if the patterns found can be generalized to other Arabic populations or whether, for instance, monolingual Arabic users would also prefer right-located menus in websites written in Romanic languages, as this is right-to-left is the only reading direction they are familiar with. Studying specific Arabic users, such as children and seniors, who may not have extensive practice interacting with websites, may also shed further light on the effects of menu location. Third, the Arabic users' perceived usability, visual appeal, and trustworthiness of webpages were analyzed using the procedure outlined by Lindgaard et al. [2, 3],

previously used with Western users. Prior research has found that the way users interpret 'usability' may vary across cultures, and therefore one should be cautious when comparing cultures with such procedure. Frandsen-Thorlacius et al. [25] have reported that Asian (Chinese) users value to a higher degree compared to Western (Danish) design aspects such as visual appearance and satisfaction in their usability judgments. Future research should study what 'usability' means for Arabic users, as compared to the way it is perceived by Western and Asian users.

Notwithstanding these limitations, based on the results of the present study, designers of Arabic websites are encouraged to locate their navigation menu on the right-hand side to improve their users' perception of visual appeal, trustworthiness, and usability of the website.

References

1. Internet World Stats 2014 (2014) Internet world users by language languages. <http://www.internetworldstats.com/stats>. Accessed 12 April 2015
2. Muhanna M, Jaser E (2014) HCI-Based guidelines for electronic and mobile learning for Arabic speaking users: Do they effectively exist? In: Universal Access in Human-Computer Interaction. Universal Access to Information and Knowledge. Springer International Publishing, pp 378-387
3. Al-Osaimi A, Alsumait A (2012) Design guidelines for child e-learning applications with an Arabic interface. Kuwait J Sci Eng 39:149-173
4. Marcus, A (2009) The impact of culture on the design of Arabic websites. In: Proceeding of the HCI International Conference, Springer Verlag, pp. 386-394
5. Leuthold S, Schmutz P, Bargas-Avila JA, Tuch AN, Opwis K (2011) Vertical versus dynamic menus on the world wide web: Eye tracking study measuring the influence of menu design and task complexity on user performance and subjective preference. Comput Hum Beh 27:459-447.

6. Santa Maria L, Dyson MC (2008) The effect of violating visual conventions of a Web site on user performance and disorientation. How bad can it be? In: Proceedings of the 26th annual ACM international conference on Design of communication, Lisbon, pp. 47-54
7. Bernard ML (2001) Developing schemas for the location of common web objects. In: Proceedings of the Human Factors and Ergonomics Society Annual Meeting. SAGE Publications, 45, pp. 1161-1165
8. Nielsen J (2010) Horizontal attention leans left. Alertbox. <http://www.nngroup.com/articles/horizontal-attention-leans-left/>. Accessed 12 April 2015
9. Roth SP, Schmutz P, Pauwels SL, Bargas-Avila JA, Opwis K (2010) Mental models for web objects: Where do users expect to find the most frequent objects in online shops, news portals, and company web pages? *Interact Comput* 22:140-152
10. Kingsburg JR, Andre, AD (2004) A comparison of three-level Web menus: Navigation structures. In: Proceedings of the Human Factors and Ergonomics Society Annual Meeting, SAGE Publications, 48, pp. 1513-1517
11. Madar Research & Development (2012) Arabic ICT use and social networks adoption report. <http://www.kacst.edu.sa/en/about/publications/Other%20Publications/Arabic%20ICT%20Use%20Report%202012.pdf>. Accessed 12 April 2015
12. Faulkner X, Hayton C (2011) When left might not be right. *Journal of Usability Studies*, 6:245-256
13. Salmerón L, García V (2011) Reading skills and children's navigation strategies in hypertext. *Comput Hum Beh* 27:1143–1151
14. Ouellet M, Santiago J, Israeli Z, Gabay S (2010) Is the future the right time? *Exp Psychol* 57:308–314
15. Ariel R, Al-Harthy IS, Was CA, Dunlosky J (2011) Habitual reading biases in the allocation of study time. *Psychon B Rev* 18:1015-1021
16. Kalbach J, Bosenick T (2003) Web page layout: A comparison between left and right-justified site navigation menus. *Journal of Digital Information* 4
17. Devine H, Andre AD (2005) Effect of scroll bar and navigation menu co-location on web performance. In: Proceedings of the Human Factors and Ergonomics Society Annual Meeting. SAGE Publications, 49, pp. 1454-1458

18. Lindgaard G, Dudek C, Sen D, Sumegi L, Noonan P. (2011) An exploration of relations between visual appeal, trustworthiness and perceived usability of homepages. *ACM T Comput-Hum Int* 18: 1
19. Weinreich H, Obendorf H, Herder E, Mayer M (2008) Not quite the average: An empirical study of Web use. *ACM Trans Web* 2:5-31
20. Lindgaard G, Fernandes G, Dudek C, Brown J (2006) Attention web designers: You have 50 milliseconds to make a good first impression! *Behav inform technol* 25:115-126
21. Cohen J (1998) *Statistical power analysis for the behavioral sciences*. Lawrence Erlbaum Associates, New Jersey
22. Dong Y, Lee K P (2008) A cross-cultural comparative study of users' perceptions of a webpage: With a focus on the cognitive styles of Chinese, Koreans and Americans. *International Journal of Design* 2:19-30
23. Owens JW, Chaparro BS, Palmer EM (2011) Text advertising blindness: The new banner blindness? *Journal of Usability Studies* 6:172-197
24. George RP, Anwar R, Jeyasekhar S (2011) Visual reading patterns on Arabic interfaces: Insights from eye tracking. *Journal of Computing* 3:109-114
25. Frandsen-Thorlacius O, Hornbæk K, Hertzum M, Clemmensen T (2009) Non-universal usability?: a survey of how usability is understood by Chinese and Danish users. In: *Proceedings of the ACM SIGCHI Conference on Human Factors in Computing Systems*, pp. 41-50

Table 1: Means and standard deviations (in parentheses) for the three dependent variables as a function of language (Arabic or English websites) and menu location (left-hand or right-hand)

	Arabic websites		English websites	
	Left-hand menu	Right-hand menu	Left-hand menu	Right-hand menu
Visual appeal	5.58 (1.48)	5.85 (1.51)	5.64 (1.34)	5.57 (1.34)
Perceived trustworthiness	5.31 (1.20)	5.55 (1.28)	5.34 (1.12)	5.22 (1.07)
Perceived usability	5.34 (1.29)	5.60 (1.37)	5.37 (1.20)	5.27 (1.19)

Note. Ratings range from 1 (low) to 9 (high).

RUNNING HEAD: Menus in Arabic websites

Figure 1. Screenshot of a website used in the study corresponding to the Food and Agriculture Organization of the United Nations, for the conditions: Arabic left-hand side menu (top left), Arabic right-hand side menu (top right), English left-hand side menu (bottom left) and English right-hand side menu (bottom right).

