Country Selection on Web Forms: A Comparison of Dropdown Menus, Radio Buttons and Text Field with Autocomplete

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***Abstract*—Many forms on the web include obligatory country fields. Usually country form-fields are implemented using a long drop-down menu. This preliminary study set out to investigate whether the typical country drop-down menu is as efficient as common practices indicate. A controlled within-groups experiment with $N = 17$ participants was conducted comparing radio buttons, drop down lists and a text field with autocomplete. The results show that the mean time to select country by inputting the prefix of the country in a text field with autocomplete was the fastest although not significantly faster than the drop-down menu. However, both were significantly faster to use than radio buttons. The results support the choice of mechanisms used on some websites where country selection is implemented with a multi-mode input control that can be used either as a drop-down menu or by inputting the country prefix according to the users' preferences.**

Keywords—web form, country selection, autocomplete, drop-down

I. Introduction

Many forms on the web that are aimed at international audiences contain country fields, such as online shops, cloud services and international conference registrations, just to mention a few. Most often these forms implement the country form-field using a dropdown menu where the user gets a choice of close to 200 countries (see Fig. 1 (a)).

There are rational arguments for using dropdown menus for country selection. First, the user does not need to use a keyboard. Low reliance on keyboards is particularly useful in mobile settings when using small form-factor smartphones with soft keyboards. Second, users can recognize their country and therefore do not have to recall what the country is. Nor do the users have to remember how a country is spelled. The principle of recognition over recall is a widely embraced user interface principle [1]. Consequently, several user interface guidelines recommend minimizing the use of text entry in interfaces. One common approach to avoid text entry is to use QR-codes [2].

However, input of country is a special case that deserves special attention. We argue that the linguistic word representing one's country is well-known to users. One may assume that most users do not struggle to recall their country name nor know how to spell the name of their country as they may do with other types of items. When entering a word in combination with autocomplete, the task is further accelerated (see Fig. 1 (b)) as fewer keystrokes are needed to enter the country prefix [3]. Next, the autocomplete adds an element of recognition to the input process.

However, navigating a list of 200 countries can be perceived as time-consuming and frustrating. Such lists are typically ordered alphabetically where the user needs to have a working knowledge of the alphabet. In one sense one may consider the search through the list as a type of "mental typing" as one scans for the country letter-by-letter.

The frustrations associated with country selection from drop down menus have led to interesting coping strategies such as the one used to enter the country of "Norway" more efficiently using keyboard shortcuts. The user first enters an "O" as a shortcut to go to the first country that starts with "O", namely "Oman", and then press arrow up, to go to Norway which is the last country with the letter "N" [4]. Hence, the country is input using two keystrokes without having to scroll down the dropdown list.

Based on these observations our research questions were formed to challenge the existing practices of using dropdown menus for country selection. We hypothesised that users with access to a full physical or soft keyboard and with average typing skills would select the country faster by writing the prefix of the name rather than selecting the country from a dropdown menu.

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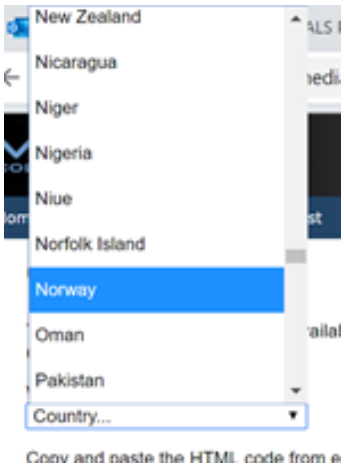
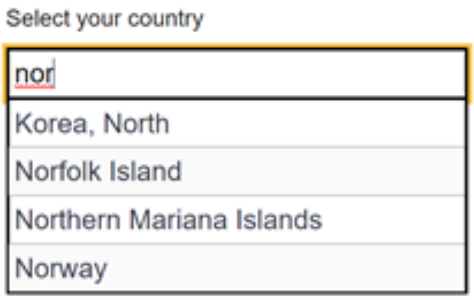
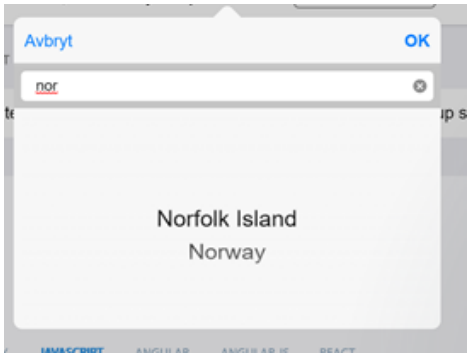


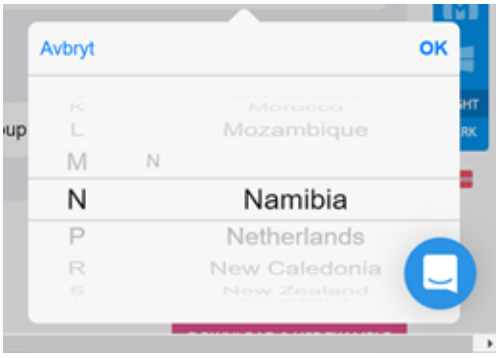
(a) Dropdown selection



(b) Text entry with autocomplete



(c) Variation on autocomplete.



(d) Group with dropdown (two step)

Fig. 1. Examples of country selection fields

II. Related Work

Many studies have addressed the design of questionnaires and web-forms with the aim to understand users [5], increase completion rates [6] and minimize errors [7, 8]. Studies have addressed how to optimize the forms [9], how form and restrictions can help users avoid errors and more generally the effectiveness of various input methods.

Studies have also addressed dropdown menus in particular. These works include a study of walking menus versus dropdown menus [10], the use of force fields in cascading dropdown menus to facilitate use, effects of advertisements in dropdown menus [11] and a study of how the design of menus influences on information-seeking [12]. Bargas-Avila et al. [13] observed the effectiveness of three date input mechanisms including text fields, drop down menus and visual calendar widgets. They found that drop down menus were associated with the lowest error-rate. The text fields with format requirements yielded the shortest task completion times.

Deniz and Durdu [14] measured smartphone form input methods. Their results showed that with few options the task completion times were shorter with buttons. The spinner yielded the shortest task completion times with longer lists of options. In a related study the same authors observed that the input of text yielded longer task-completion times and higher error rates compared to input by radio selections. Similar studies applied to time-picking interfaces have also been conducted [15].

Several methodologies have been used to study menus such as task completion times, Fitts's law, eye tracking and cognitive modelling.

Text entry with autocomplete, also known as text prediction, has also received much attention in the research community [3, 5, 16]. Autocomplete was initially designed to assist input for users with reduced motor function [3] but later found its way into the mainstream with small form-factor devices and general search engines such as Google. Again, autocomplete has come full circle as general purpose technology has also been demonstrated to be particularly useful for individuals with dyslexia when using search engines [4, 5]. Research into autocomplete has also addressed the associated cognitive load with older users [17], texting among youth [18], smart watch text entry, alternative prediction models and cost-effect study of the interactions associated with word suggestions [19]. A related input technique known as abbreviation expansion has also been explored for languages such as Norwegian with long compound words where prefixes were less effective than in English [20, 21, 22].

III. Method

A. Experimental design

A controlled experiment with a within-groups design was chosen with input type as independent variable and task completion time as dependent variable. The independent variable input type had the following levels: dropdown menus, text field with autocomplete and radio button as a reference.

B. Participants

We recruited 17 participants for the experiments. The participants were all enrolled as students at Oslo Metropolitan University.

C. Equipment

Three custom-made forms were created using html, CSS and JavaScript to measure the time to input countries using radio buttons, dropdown menus and text fields with autocomplete.

D. Procedure

Each of the 17 sessions was conducted individually for each participant with two of the authors present. The participants were first informed of the experiment and gave their oral consent to participate. Next the participants were given the task for each of the three forms. The forms were all tested in the same order. The three task completion times were recorded with a stopwatch. Each session lasted between five and ten minutes. No information that could reveal the participants' identity was recorded, and therefore no formal permissions regulated by the European Union General Data Protection Regulations (GDPR) were needed.

E. Task

The tasks involved inputting countries using the three web forms.

F. Analysis

A Shapiro-Wilks test revealed that the radio button and text field observations were not normally distributed. Non-parametric statistical testing procedures were therefore employed, namely the nonparametric Friedman test with subsequent Conover's post-hoc tests. The observations were analysed using the open source statistical analysis package JASP version 0.10.0.0.

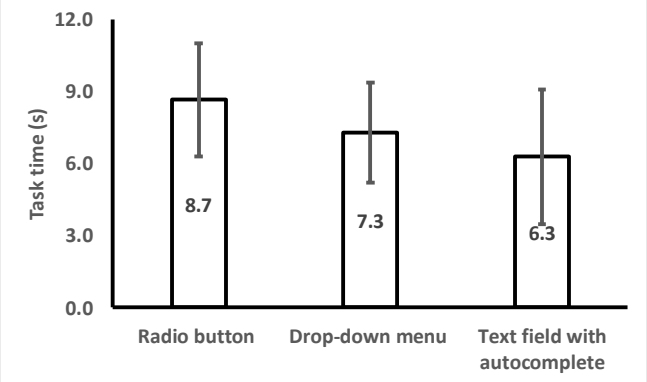


Fig. 2. Observed task completion times, SD shows standard deviation.

IV. Results

Fig. 2 shows the results of the experiments. The radio-button interface was the slowest in terms of task completion times in seconds (M = 8.7, SD = 2.3), followed by the dropdown menu (M = 7.3, SD = 2.1), with the text field being the fastest (M = 6.3, SD = 2.8). A Friedman test flagged a significant effect of input device ($\chi^2(2) = 10.239$, $p = .006$). Conover's post-hoc testing indicated that the radio-button interface was significantly different to both the dropdown menu ($p = .021$) and text field ($p = .015$), while there was no significant difference between the text field and the dropdown menu ($p = .55$).

V. Discussion

The results point in the direction of our expectations, namely that country selection using text is faster than using dropdown menus. However, the lack of statistical significance means that we cannot conclude whether text entry with autocomplete is preferable based on the current data or not. We can be certain that text fields are not slower than dropdown menus. Clearly, the text interface was associated with the largest spread of the three. It is highly likely that a scaled-up experiment in terms of participants and number of tasks would reveal significant different differences in favour of the text field. The fact that the radio-button interface was the slowest was as expected.

There are some advantages to text fields compared to drop-down menus in context of country selection. Some countries can cause some confusion such as Taiwan which in countries such as Norway is politically considered "China". On certain Norwegian website such as the Immigration Police there is no Taiwan entry, but only China. Taiwanese citizens will therefore not recognize themselves on such dropdown menus. Obviously, one workaround is to introduce double entries, such as including both "Taiwan" and "China". However, having flexible text fields allows the users to enter their country according their own identity without having to make design decisions that may send political signals or offend users, for example, "South Korea" instead of just "Korea", etc. Moreover, the map of the world changes rapidly and a static dropdown menu may quickly become obsolete if it is not updated in a timely manner. For example, it could be an insult to present former country names no longer in use such as Chechoslovakia, Ceylon, Zaire, Moldavia, Burma, Upper Volta and Rhodesia.

One may also ponder whether web forms should include a country field at all. Assuming users are accessing the form from their home country, a simple IP-lookup should easily be able to automatically detect the country and automatically fill in the country field. In rare cases when users are accessing forms from abroad, they could have the option of modifying the default suggested value. Also, better use of browser form autofill mechanisms could be a great help. To achieve this, web form developers should use more consistent form field identifiers in their html-markup.

A. Limitations

The results presented herein are only based on observations of 17 participants from a limited cohort, namely young computer literate users that were students at a university. One should therefore not generalize too much based on these preliminary results as the patterns may vary for other cohorts such as users with less computer usage experience and users from different age groups. It is also possible that desktop and laptop computer users will have different preferences to smartphone and tablet users.

This experiment solicited objective time measurements. It would also be relevant to solicit the participants' subjective perceptions of the three input techniques. Future studies should also employ such an instrument for the three methods, for example, a simple Likert scale or some established instrument, e.g., the System Usability Scale (SUS) or NASA-TLX.

The experiment could also have been improved in terms of compensating for the type of name in terms of how the prefixes are formed and the position on the dropdown list. One

approach would be to ask the participants to enter a series of country names in various positions in the list of countries.

Finally, the presentation order was fixed. It is thus a danger that there are learning effects at play which could have affected the results. Future experiments should randomize the presentation sequence in order to compensate for learning effects. One possible outcome could be that the practical difference between the dropdown menu (second trial) would be more similar to the text field (third trial).

VI. Conclusions

The input of country names was investigated. The results showed that the text field with autocomplete was practically better than dropdown menus, but not statistically better. However, a larger experiment may also flag statistical differences. Although the problem studied is very specific and narrow in scope, it is also a highly relevant problem to understand as most advanced forms on the web targeting the global audience will ask the user about their country of origin or residence. The results thus support the approaches adopted on some websites where a mixed model is implemented allowing users to either select a country from a dropdown menu or start entering the prefix of the country to more quickly arrive at the country name.

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