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Scientific article

The influence of microinteractions in registration forms on user experience

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***Abstract**: The process of user registration to an online service often represents an important step in converting a website visitor to a regular user or customer. However, poorly designed registration forms can lead to frustrations and result in the abortion of the registration process. This paper explores the use of microinteractions in registration forms for the purpose of improving usability and overall user experience. Microinteractions provide small details that can impact the performance and overall experience of using user interfaces. In the experimental part, three interactive prototypes of registration forms were tested: without microinteractions, with microinteractions focused on functional aspect of the interface and with microinteractions focused on both functional and affective aspects of the user interface. Task analysis method was used to test the usability of the forms. and User Experience Questionnaire was used to measure the user experience. Compared to the registration form without microinteractions, both forms featuring microinteractions had better performance for task completion time and number of errors as well as higher scores for user experience for every category. The study demonstrates how the use of microinteractions in the design of registration forms can significantly improve the usability and user experience of online services, providing valuable insights into how small details in interface design can impact user behavior and satisfaction.*

***Keywords**: microinteraction, registration forms, user experience, usability*

1. Introduction

In an era of increasing saturation with digital products and services, the challenge of prompting users to create accounts and provide personal information is becoming increasingly difficult. Nevertheless, many online services and products require user registration or enrolment to access content or utilize features. Companies that can successfully identify users have the opportunity to personalize the user experience and establish additional touchpoints with customers. However, mandatory registration can lead to significant drops in user engagement and negatively impact website traffic [1].

Compounding this issue, users are typically goal-oriented when using online products and services [2]. Additional steps, such as the registration process, introduce friction and frustration, which can result in task abandonment [1]. Furthermore, many companies require extensive user information, leading to security concerns from the users and requiring increased cognitive effort during the registration process. Poorly designed registration forms can exacerbate these issues,

further discouraging users from completing the process. Research suggests that a more sensible approach to form design can improve completion rates in the range of 10% to 40% [3].

To address these challenges, many companies are streamlining the registration process by utilizing shorter registration forms that require only a username and/or email address and password, gathering additional information from users at a later stage if necessary. While these short registration forms simplify the registration process, their design can still either facilitate or obstruct user enrolment in the product or service.

In the search to create a more robust security around user accounts, companies are often making password-composition policies more complex. These policies specify requirements for acceptable passwords, such as its minimum length and required character classes. However, password-composition policies can differ between products and services, and in some cases can be very complex and sometimes are communicated to the user only after the submission of data. Finding out about these policies through trial an error can result in user frustration abandonment of the process. However, lenient password-composition policies often lead to creation of simple passwords which are less resistant to various types of attacks [4]. This makes the presentation and timely feedback of password-composition policies one of the key elements in short registration

1.1. Microinteractions

The concept of microinteractions in the context of user interface design was introduced by Dan Saffer, who defined them as "a contained product moment that revolves around a single use case or task" [5]. Although small interaction elements with a singular purpose already existed in user interface designs, Saffer formalized the concept and outlined a model for microinteractions [6]. Saffer argues that a focus on details, in the form of small interactions, and their appropriate integration into the larger interface can significantly impact the overall user experience.

Microinteractions can have multiple benefits for user interfaces. They can provide users with feedback on the system's status, help prevent errors, and even communicate brand attributes or increase the affective dimension of the product [5, 7, 8, 9]. All of these factors can be beneficial to registration form designs, as most users do not willingly go through the process of registration. Reducing the cognitive load, preventing errors, and making the forms more attractive can reassure users and enable them to carry out the process more efficiently. Therefore, incorporating microinteractions into registration forms can be an effective way to enhance the user experience and improve the completion rate of the registration process.

In recent years, there has been a visible shift towards designing microinteractions for registration forms. However, many products and services have yet to adopt this approach or offer only partial imprementations.

2. Previous work

Despite the increasing popularity of microinteractions in online forms, scientific research on their use in registration forms remains limited. The few available studies focus mainly on the effects of specific microinteractions. Falkowska et al. conducted an eye-tracking study on microinteractions in online forms, finding that prototypes featuring more elaborate microinteractions led to better usability results [10].

However, numerous studies on general online form design guidelines apply to registration forms and their accompanying microinteractions. For example, Penzo's research on label placement relative to the input field concluded that labels placed above the input field result in best performance [11]. Bargas-Avila et al. suggest that field format restrictions should be communicated in advance, without providing an example [12]. Sherwin recommends including visible password-composition policies, the ability to show the password input and a visible password strength meter in password fields [13]. Tzeng's research shows that using error messages in the form of computer apologies accompanied by emoticons resulted in a more desirable and aesthetically pleasing experience for users [14]. Nielsen suggests using symbols or other additional encoding with text color change to indicate error messages [15]. Regarding the form submission process, Linderman and Fried recommend to disable the submit button after form submission to avoid accidental resubmissions [16].

This study aims to investigate the impact of microinteractions on the user experience in short registration form design compared to solutions that do not use microinteractions. Additionally, we aim to determine whether an effective design approach to microinteractions in registration forms impacts performance and overall user experience.

3. Research

3.1. Participants

Fifteen participants were recruited for this study through random selection, with ages ranging from 20 to 45 years old. All participants had prior experience with using online registration forms.

3.2. Stimuli

For the purpose of the research, three interactive prototypes of short registration forms for an e-commerce website were developed, varying in the use of microinteractions. All prototypes shared the same visual styling, with the only differences being the presence and styling of microinteractions, as well as changes in microcopy (Figure 1). This approach enabled a direct comparison of the effects of microinteractions on the user experience.

In the design of the first prototype (P1), microinteractions use was kept at a minimum and used in their most basic form, such as masking the password input and for the confirmation modal, so this prototype will be referred to as the one without microinteractions. The password-compositing policies were presented as unstructured text below the field and the validation of data was carried out only after the user clicked on the submission button (Figure 2). After the successful registration process, users were presented with a modal window informing them that the registration was complete. The tone of the micro-copy and instructions was formal.

The second prototype (P2) featured multiple microinteractions The email input field had active monitoring and provided real-time feedback on the validity of the email address format. The password field contained several microinteractions, where password formulation policies were presented as a list below the input field. Each list item contained an active bullet element that changed color and bullet symbol when a certain policy was honoured. The system indicated which policies for password formulation were achieved in real-time. A real-time password strength indicator was also included, combining textual feedback above the field ranging from “weak” to “strong” with the change of the input field frame colour. The button for form submission featured an animation which was activated when the button was pressed, indicating that the data was being

processed by the system and preventing subsequent submissions while the system was working. After the data was finished processing, the animation morphed into a checkmark element. The modal window for confirmation of registration was also animated.

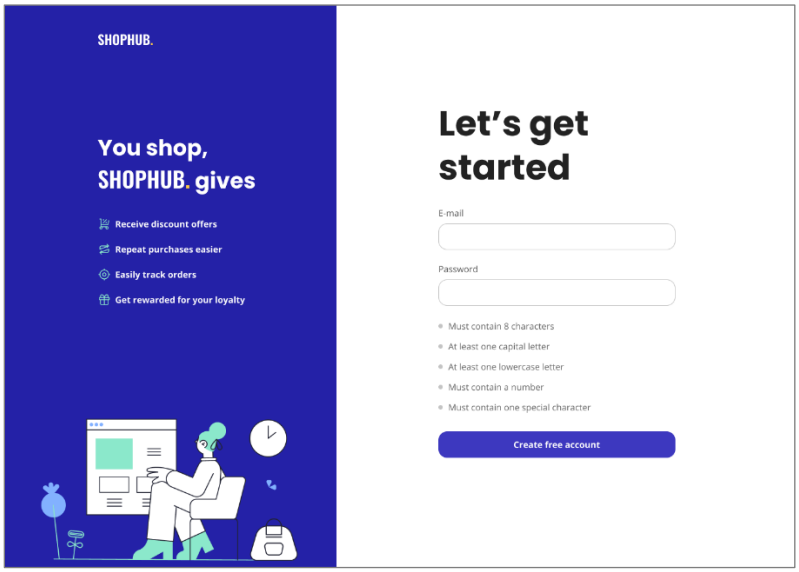

Figure 1 *Design of the prototype with affective microinteractions (P3)*

The third prototype (P3) had the same number and functionality of microinteractions as the P2; however, it used less formal microcopy and depictions of certain elements (Figure 1). Along with text labels, the password strength meter also showed emoticons which were related to the strength of the password (Figure 2). Animation of the submission button also featured more whimsical elements, morphing into a smiley emoticon when the processing was finished. The animated modal window featured a more elaborate animation which featured illustrations in the brand's style.

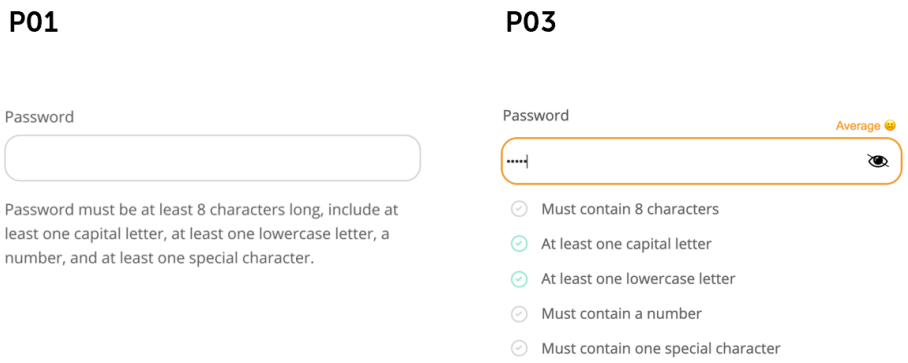

Figure 2 *Design of password input fields for P1 (left) and P3 (right)*

3.3. Methods and design

The stimuli were reproduced on a computer display in front of the subject in a controlled environment. The users could interact with the displayed prototype freely by using mouse and

keyboard. To minimize the learning effects, the order of prototypes was varied between participants.

Both objective usability testing and subjective evaluation of the user experience were performed on each prototype. In the first part, the task analysis method was used to objectively measure user performance in completing the registration process for each prototype. Measured were the task time, number of errors and completion rate. The results were analysed using SPSS software.

Subjective measurement of user experience was conducted after completion of the task for each prototype. For this experiment, User Experience Questionnaire (UEQ) was used [17]. This standardized questionnaire measures the impression of user experience based on the semantic differential method and consists of 26 word pairs divided into six categories: Attractiveness, Perspicuity, Efficiency, Dependability, Stimulation, and Novelty. While Attractiveness is a pure valence dimension, Perspicuity, Efficiency, and Dependability are pragmatic quality aspects, while Stimulation and Novelty represent hedonic quality aspects [18]. Participants graded each item on the questionnaire using a Likert scale ranging from -3 to +3. The questionnaire was administered in paper form immediately after the task, and the results were analyzed using analysis tools provided by the authors of the questionnaire.

4. Results and discussion

4.1 Usability testing

All participants successfully completed the task in every prototype. Prior to inferential statistics for the duration and number of errors, the datasets were tested for normal distribution. The Shapiro-Wilk test results indicated that the dataset for task duration is non-normally distributed. Therefore, non-parametric tests were used for task duration results analysis.

For analysis of the number of errors, paired samples t-test was used (Table 1). The results show that the participants made a significantly higher number of errors using the prototype without microinteractions compared to either prototype featuring microinteractions (Figure 3). Statistically significant differences were present in both pairs, P1-P2 (p=0.003) and P1-P3 (p=0.019), while there was no statistically significant difference between the prototypes using formal and affective microinteractions (p=0.424).

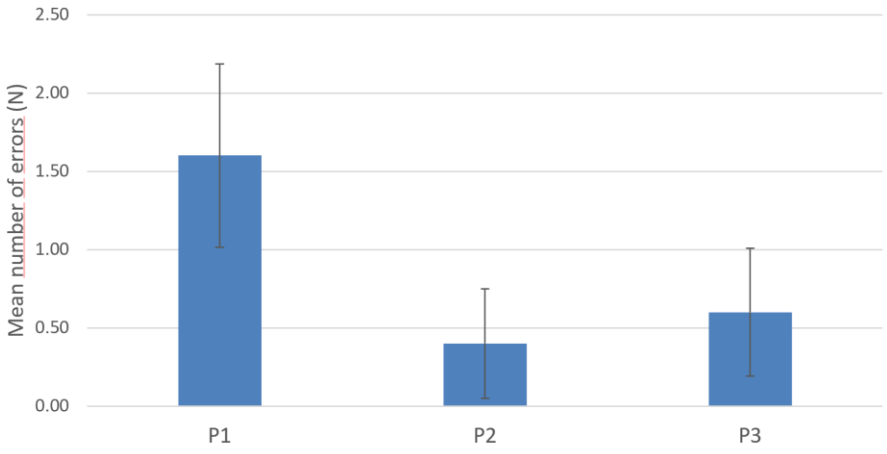

Figure 3 *Graph showing mean number of errors for each prototype*

Table 1 *Paired samples t-test results for number of errors while completing a task*

	Mean	***Std. Deviation***	***Std. Error Mean***	***t***	***df***	***Sig. (2-tailed)***
P1 - P2	*1.20000*	*1.26491*	*.32660*	*3.674*	*14*	*.003*
P1 - P3	*1.00000*	*1.46385*	*.37796*	*2.646*	*14*	*.019*
P2 - P3	*-.20000*	*.94112*	*.24300*	*-.823*	*14*	*.424*

Wilcoxon Signed Ranks Test was used to analyze the mean task duration of each prototype. The results show that there was a statistically significant difference between the mean task times of the prototype without microinteractions and both prototypes featuring microinteractions (Table 2, Figure 4). It took significantly less time for participants to complete the registration task using the prototype with formal microinteractions (t=59,47s) compared to the prototype without implemented microinteractions (t=100,93s, p=0.001). The results were similar when comparing mean duration times between prototype P1 and P3 (p=0.002), with P3 having significantly shorter mean task duration (t=60,2s). However, the difference in mean task duration between the two prototypes featuring microinteractions (P2 and P3) was not statistically significant (p=0.932), indicating that a more affective design approach to microinteraction design did not result in a significant increase in the time needed to complete the task.

Table 2 *Wilcoxon Signed Ranks Test results for the Mean task duration*

	P2 - P1	***P3 - P1***	***P3 - P2***
Z	*-3.183*	*-3.124*	*-.085*
Asymp. Sig. (2-tailed)	*.001*	*.002*	*.932*

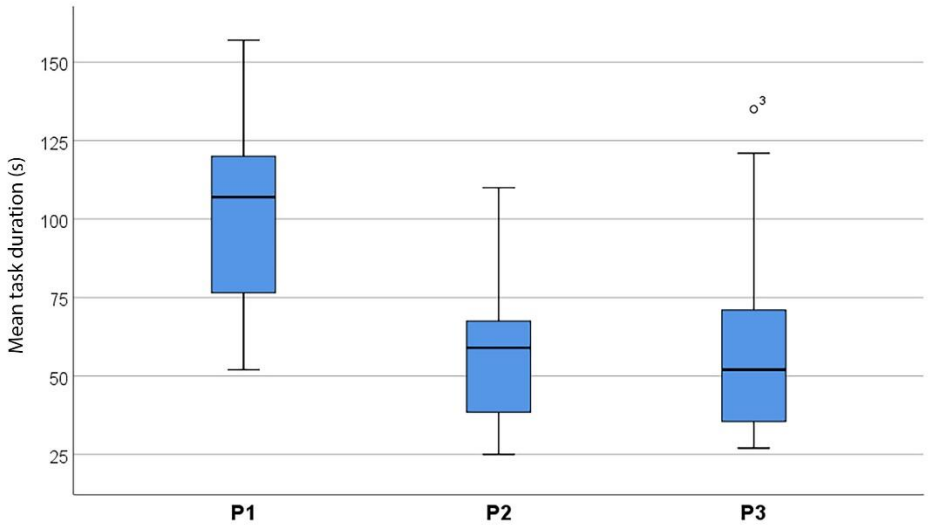

Figure 4 *Boxplots showing mean task duration for each prototype*

4.2 Subjective evaluation

The results of the subjective evaluation of user experience indicate significant differences between the registration form without microinteractions (P1) and the one with formal microinteractions (P2) for both pragmatic and hedonic qualities, as well as attractiveness. The prototype with microinteractions (P2) scored better across all categories, with the differences

being statistically significant for every category (Figure 5). The results for the evaluation of pragmatic qualities match the task analysis result, with participants seemingly being well aware of the increase in performance that microinteractions enabled them to complete the registration task. They also found the form with microinteractions more pleasurable to use and more attractive, although the overall visual style of both forms was similar.

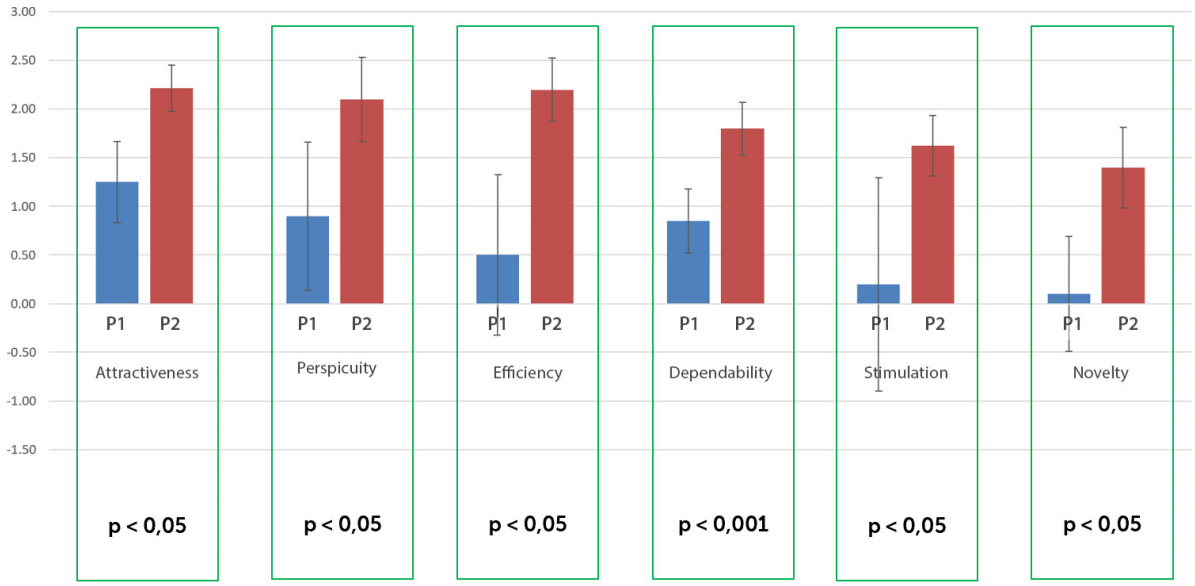

Figure 5 *Comparison of the UEQ questionnaire results between the P1 (blue) and P2 (red). Green frames mark properties with statistically significant differences between ratings*

Results for prototypes with formal and affective microinteractions (P2 and P3) were similar in most categories (Figure 6). However, the affective microinteractions in P3 showed better results in the Stimulation category, indicating that the affective design of microinteractions can increase the perception of hedonic qualities of the form interface while maintaining other aspects of quality perception.

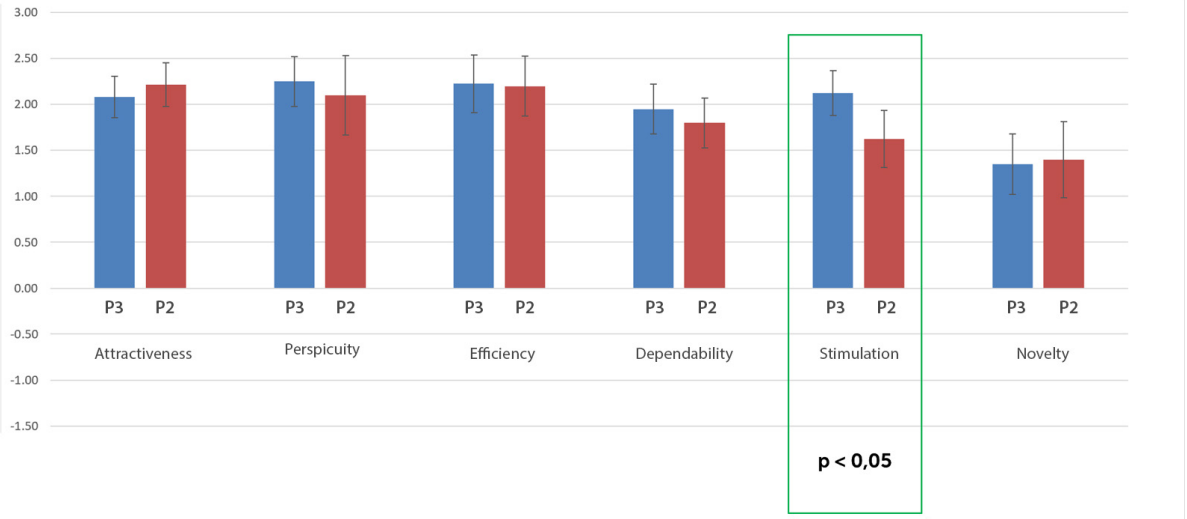

Figure 6 *Comparison of the UEQ questionnaire results between the P3 (blue) and P2 (red). Green frames mark properties with statistically significant differences between ratings*

Overall, the results of the subjective evaluation suggest that incorporating microinteractions in the form interface can improve the user experience by enhancing both pragmatic and hedonic qualities. Additionally, the results suggest that incorporating affective design of microinteractions can increase the perception of hedonic qualities without compromising other aspects of quality perception.

5. Conclusion

The study presented in this paper explored the impact of microinteractions in short online registration forms on usability and user experience. The results show significantly better performance of forms containing microinteractions compared to the form without them. Completing registration tasks in forms containing microinteractions resulted in statistically significant decrease of number of user errors and statistically shorter mean duration time. There was no statisticaly significant differences in usability metrics between using more formal tone of microinteractios compared to microinteractions designed for user affect.

Subjective evaluation of user experience also showed a clear preference for the design containing microinteractions, with statistically significant differences in all UEQ attributes in favor of forms using microinteractions. Results for the two forms utilizing microinteractions showed no significant difference in scores, with the notable exception of the Stimulation category. The form with affective microinteractions had a statistically significant advantage, indicating that affective design of microinteractions can increase the perception of hedonic qualities of registration forms.

This study doesn't come without its own limitations, particularly in the form of a limited age range of participants. Further research into the effect of affective microinteractions on a more diverse participant group is needed to test if the increased perception of hedonic quality is present in other age groups. Furthermore, future research can be focused on examining the impact of individual microinteractions the usability and user experience.

Overall, this study provides insights into the design of effective registration forms and highlights the importance of using microinteractions when approaching the form design.

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