Supporting Notifications and User Guidance through Subtle Cues

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Abstract

In this paper, we present our idea of supporting user guidance (e.g., for unfamiliar user interfaces) and user notification (e.g., informing about incoming messages or an upcoming appointment) using subtle information cues. The idea is to provide usable hints to users without actively distracting them. While various subtle information concepts like subliminal communication and subtle gaze direction have already been studied, previous research partly reports conflicting results about the effectiveness of such systems or is limited to certain application domains. Therefore, we aim at exploring and extending the design space between subliminal, subtle / ambient, and clearly visible cues and want to investigate how such cues can be integrated into everyday user interfaces to form a type of peripheral communication.

Author Keywords
Peripheral information cues; subliminal interaction; desktop notifications

ACM Classification Keywords
H.5.2 [Information interfaces and presentation (e.g., HCI)]: User Interfaces.

Introduction and Concept

When using traditional computers or mobile devices, users often experience situations where they execute a certain task such as writing a text document or e-mail but are distracted by notifications of other applications running in the background (messaging, etc.).

User Notification

Most applications provide more or less visible notifications that visualize for instance if a new message arrives or that the next meeting begins soon. Oftentimes, these notifications distract the user from the original task which is currently solved in a different application: The user pays attention to the notification and switches to the initiating application. Thus, the initial task is interrupted and needs to be continued later even if the remaining time to do so was only a few seconds. In these cases, the remaining task completion time will often increase as the user needs additional time to get back into the initial task context and resume this task [5]. As mentioned by Iqbal et al. [5] one idea is to defer such notification to "best" moments.

While a method to defer notifications requires a workload-aligned task model, our approach is instead to look for methods that are less distracting than current, obvious notifications. The idea is to make the user aware of a certain notification (content or type of message / notification) without distracting from the current task. As a consequence, the users might be able to decide on their own when to react to a certain notification instead of doing so immediately due to the 'annoying pop-up'. As an example, we imagine a subtle visualization method that can be used to notify the user about an upcoming calendar event. Our hope is that this information can then subconsciously be processed so that the user will be able to leave the office at the right time without having noticed a real notification. An initial sketch of the concept is shown in Figure 1. By using the notification method as described before we hope that such notifications become *peripheral* such that the user can actually receive and understand the content of a message while doing a different task.

User Guidance

A second use case is related to the guidance of novice users: When a user interacts with an interfaces of a certain complexity that s/he is rather unfamiliar with, task completion time is often longer than for expert users. In such situation, different options to guide a user are possible, such as instructions, dialog boxes, online help [9], or customized views that contain less information. However, these approaches can annoy the user, either due to their distraction potential or simply because they transmit the feeling of being a novice user. Therefore, our goal is to employ a less obvious technology such as subtle cues that still guide the user (e.g., directing the user's gaze), but without causing him or her feeling distracted. The idea is that this makes the user feel empowered and at the same time less distracted. The concept of subconsciously directing the user's gaze could also be integrated in situations where applications today offer a visible hint to the user. This idea could not only help to distract the user less than current methods, but also to save screen space, which is still important, e.g., when using mobile devices. For instance this could be used to remind the user about a mandatory field that still needs to be filled or to not forget to attach the document just mentioned in the email. In this case, the user's gaze should be attracted to the corresponding elements of the UI (i.e., the form field or the attachment button) so that s/he remembers to start the interaction.
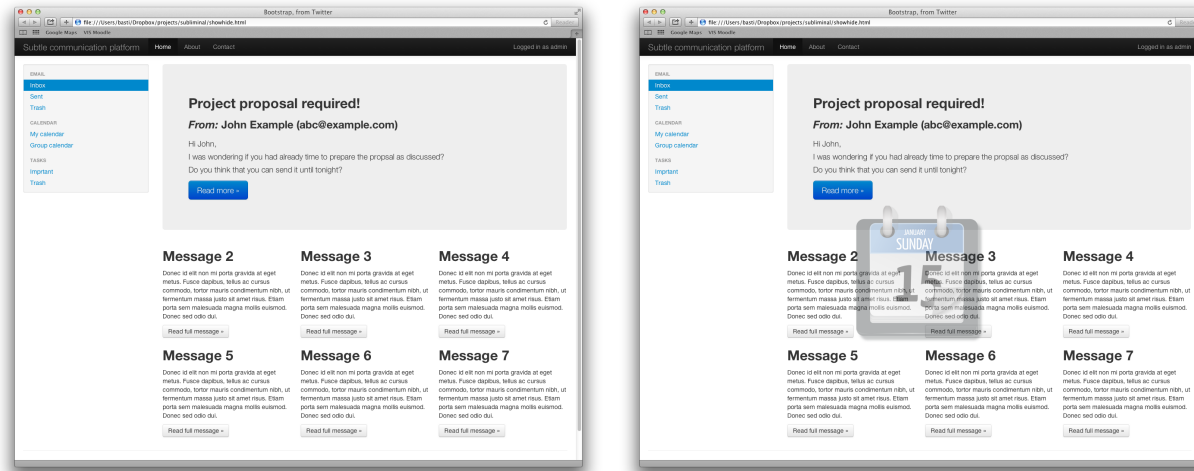
Figure 1: Example of an e-mail interface with subtle notifications. On the left, the normal interface is shown. The right illustration shows an (exaggerated) example on how to notify the user about an event that is about to start. The idea is that in a real interface this message is almost unperceivable to not distract the user (e.g., by using a much lower opacity). To explore the design space of subtle notifications, we aim at testing different methods to show such notifications, e.g., regarding repetitions, masking and fading mechanisms, and visibility durations.

In order to achieve the concepts of user guidance and user notification, we explore the space of notifications and cues between visible, ambient, subtle, and subliminal display methods. The idea is to find suitable visualization and notification concepts that do not distract but at the same time allow to notify or guide the user.

Technology and Visualization
As our concept should be applicable to many different applications and situations, the aim is to develop a framework that allows existing applications to extend their capabilities through such subtle notifications. Therefore, we first of all need to find a suitable notification method.

The following section considers potentially interesting technologies that have already been investigated and how they could be applied to our concept.

The least noticeable method is probably the idea of subliminal information communication. Previous work in this domain looked successfully for instance at providing textual help to users [4, 10] or to support learning solution strategies [3]. In contrast, other projects could not prove an effect of subliminal interfaces [2]. As at least some concepts seemed to be successful, it will be interesting to see if this method is suitable to notify the user.

For subtle cues, first concepts emerged [1, 6, 7] to use such concepts for specific applications. In these projects, *subtle gaze direction* was employed to direct the user's gaze. However, this technique has only been applied to specific tasks / visualizations and not to ordinary user interfaces. The idea of subtle gaze direction was taken up by Pfleging et al. [8]. They tried to extend the concept to non-blinking cues and apply this to basic shapes as an abstraction of typical user interfaces. However, they could only find an effect for clearly visible cues. Therefore, the investigation of mostly visible cues or advance subtle cues is one idea that could be used in our concept.

Conclusion

While some concepts for unobtrusive communication and support have already been explored in previous projects, the ideas have not yet been investigated for guidance and notification in ordinary graphical user interfaces. We hope to fill this gap with our research and aim at providing detailed insights in how to allow subtle, unobtrusive user guidance or less distracting notifications.

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