
Ways Into the Design Space of Butterflies in the Stomach

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ABSTRACT

This work presents ways into a design space of butterflies in the stomach; a qualia of belly tingling sensation possible of pleasure, discomfort and presence heightening. Three design instances are presented. From and within those are three conceptual directions drawn and exemplified. *Conditional availability* involves tuning the availability of an interaction to certain geographic locations, environmental conditions and time-of-day in strive for particular aesthetics. *Erratic and dubious presence* is about making interactions unpredictable and/or feeding a doubt whether the user is engaged in an interaction or not, in strive for confusion and startle. *Sensorial evidence of interaction* is a way of thinking about narratives within an interaction through elements of planning, exploration and suddenness in strive for experiential qualities like anticipation, surprise, and fascination of discovery. My felt experiences of a two-day camping trip were used as a design resource. Reflections of these experiences were used in the design and concept development through visualizations, textual narratives, technical implementation detailing, and thematic analysis. This work is a provocative step expanding on what human-computer interaction can be in the outdoors.

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INTRODUCTION

The role of human-computer interaction (HCI) in non-urban outdoor activities has largely been to support predetermined activities [4, 8, 11, 14, 15], minimize technology's disruption [6], and to make the experience safer [10], less complex and more predictable [12]. Thus, there's unexplored potential in designing for experiential qualities of confusion, unpredictability and the unknown. This work is a provocative step towards rethinking and expanding upon what HCI can be in the outdoors. By appropriating established ideas of ambiguity [5, 13] and discomfort [1], and by delving into human fascination for mystery and vastness superseding ourselves, this work explores experiential qualities of a design space concerned with aesthetics of butterflies in the stomach.

Butterflies in the stomach is an expression for a qualia notably different from the mundane. It is generally considered an experience of a tingling sensation emerging from the stomach which could take part in the cause and to be caused of experiences of both pleasure and discomfort, with the possible consequence of heightened presence. The phenomenon of butterflies in the stomach has been explored in fields of psychology [3], but scarcely so as a design space in the field of HCI. It's a particular quality of experience that may be meaningful in itself in how it is highly valued and sought in activities like rafting, roller coaster riding and paragliding. What butterflies in the stomach can be from a designerly perspective is expanded upon in this work.

In this work I'm engaging with experience design through a pragmatic perspective, where experience is dealt with lived and felt, inclusive of a person's full relationship with her physical and social environment [9]. Using a research through design approach [16], three design instances and conceptual directions were developed, contributing with ways into the design space of butterflies in the stomach.

METHODOLOGY

This work has been carried out using a research through design method, where design methods, interactive systems and concepts can be considered contributions [16]. During the design and concept development I used my felt experiences as a design resource. A first-person perspective is a rigorous approach in designing for aesthetics [7].

I began the design process by amassing intriguing notions to use in the design context of non-urban outdoor activities, ending up with an initial scope of mystery and ephemerality. This helped me to open up the design space particularly appreciating experiential qualities of the unknown and thrill. I participated in a two-day hike and camping trip with four people in a wet and cold landscape of dense forests and lakes. Trip experiences were documented with photographs to aid subsequent reflections. Being *in situ* having a shared, felt experience of hiking and camping related activities facilitated speculations of the unknown and reminiscences about episodes of scary, mysterious and majestic experiences in the outdoors. Especially fruitful were those of scouting a lake with a flashlight

Mystery



Figure 1: A piezo microphone is placed in the waterproof dome to sense impacts. LED's are placed underneath the transparent bottom to spread light, dispersing from below. A motor with string controls vertical movement of the air-filled dome. By wireless communication with external sensors in the surroundings, the dome is informed of conditions.

at night, settling in the tent to sleep in windy conditions, and standing at an outlook of great height. Their influence is evident in the resulting three design instances. I used common design techniques of visualization, textual narratives, technical implementation detailing, and thematic analysis (TA) [2] to help define these instances. Visualization and textual narratives helped me in shaping their essences. Outlining technical implementations helped me to construct limits of the interactions and to understand the reality in which they are experienced. A loosely followed TA approach, aided by the three previous techniques, assisted a pattern understanding resulting in an identification of an experiential quality the designs have in common: butterflies in the stomach. Further TA lead me to articulate three conceptual directions in designing for butterflies in the stomach.

INSTANCES WITHIN THE DESIGN SPACE

The essence of the three design instances within the design space of butterflies in the stomach is expressed in their respective descriptive names: Mystery, Awe, and Eerie.

Mystery

Mystery is visualized in figure 1. This design was primarily derived from the activity of scouting a lake with a flashlight at night. Mystery is remotely located by a hiking and camping friendly site. In conditions of mist, cold water and darkness, occasionally a dome surfaces a fair distance out in the lake. Its dark, alien silhouette glitters quietly. As observers notice it, eventually they might come to throw something at it in exploration. At impact, light suddenly swells, and the dome submerges. They are left mystified with questions of slight unease spelled out in their meeting gazes.

How Mystery is designed to erratically surface under certain circumstances contributes with a rarity and ambiguity to the interaction, as well as keeping users from swimming up to it. Its out-of-place appearance intends to tease curiousness. The lack of affordances are deliberately designed so that the success to evoke the submerge and light-up will be of greater surprise and drama.

Awe

Awe is visualized in figure 2. This design was mainly drawn from reminiscing about outlooks of great heights. Upon finally arriving at the outlook, the hikers find satisfaction and peace. They bake *flyers* of gathered leaves and mud in a brought mold put in a fireplace. When they are baked, they together send them off the cliff, watching them in tickling serenity swan down far off to the fjord to dissolve and become floating leaves.

In the way Awe is designed as a planned and collecting activity fosters anticipation that resonates with and celebrates a typical climax of remote hikes - reaching great heights. This setting along with the uncertain fate that the flyers are launched into intends to directly promote a tingling sensation in the responsibility-surrendering launcher.

Awe



Figure 2: The Awe design instance make use of a metal mold that is brought by hikers and used to solidify leaves and mud in fly-able shapes. Solidification occurs in a baking process when the filled mold is put in a fire for a while.

Eerie

Eerie is visualized in figure 3. This design was predominantly derived from going to sleep during my trip. As the hikers go to sleep in the tents, all that is heard is the sound of the night woods: trees whispering in the wind. But, lying in the tents, there is almost as if ambient tones quaver with the rustle. What is that - is there something there? In eeriness, sleep eventually comes over them; some in cozy tingling sleep, some spooked cuddled up together.

In how Eerie drifts in and out of perception with the wind, the recognition of its peculiar sound might come a while after actually starting to hear it. This intends to create a sense of unease that together with the uncanny soundscape and context prompt particular imaginative speculations contributing to confusion and startle.

WAYS INTO THE DESIGN SPACE

Drawn from the design instances are three conceptual directions to take in designing for butterflies in the stomach. One or more of these directions can act as handles for a design process striving for such experiences. These directions may complement, work against or overlap one another, depending on how they are applied. The presented design instances offer examples of how these directions can be complementary applied. Although formulated from a non-urban outdoor context, the design space itself and the ways into it are more broadly applicable for HCI and design research and practice.

Conditional availability

The conceptual direction of *conditional availability* involves tuning the availability of an interaction to certain geographic locations, environmental conditions and time-of-day in strive for particular aesthetics. Furthermore, algorithms of unpredictability within those conditions can be applied to make the interactions even less prone to be expected and understood. A technological non-transparency can be pursued by making a design hard to get close up to, which hinders understanding and promotes mystery and curiosity.

Mystery and Eerie are available for interaction in conditions like remoteness and dark night time that promotes its mystic interaction gestalt. Awe excels at rousing heights of demanding accessibility, and requires specific natural resources and processes to be engaged with.

Like shivering invoked from resonant musical passages, designing for butterflies in the stomach could possibly take a similar approach of composers in considering the potential of rarity to greater the effect. Moreover, the ephemeral quality of the three designs contribute to instances of interactions being more concentrated and of greater significance.

Eerie



Figure 3: Microphones in the woods feed a subtractive synthesizer the sound of local wind in treetops. The synthesizer plays predetermined notes in a subtle and ambient way, broadcasting from speakers discreetly placed in trees. A note consists of an overtone series which is made up of varying open bandpass filters. This lets selected parts of the fed sound through and thereby making musical qualities out of the wind.

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Erratic and dubious presence

Erratic and dubious presence is about making interactions unpredictable and/or feeding a doubt whether the user is engaged in an interaction or not, in strive for confusion and startle. It is interweaving the dimension of the unknown as a cornerstone to a design. It builds on established notions of ambiguity [5, 13] by expanding it into ambiguously perceiving an engagement with an interaction. This conceptual direction promotes speculation and a personalized meaning-making process.

Mystery behaves unpredictably and lacks clear purpose in its lack of affordances. Awe flyers soar any way the wind happens to blow in unknown distances. Eerie erratically drifts in and out of discernability.

Erratic and dubious presence may under certain circumstances evoke a sense of lack of control, which can lead to discomfort. Additional dimensions of discomfort could be possible where the ambiguity has personal or cultural resonance [1].

Sensorial evidence of interaction

Sensorial evidence of interaction is a way of thinking about narratives for an interaction through elements of planning, exploration and suddenness, in strive for particular experiential qualities like anticipation, surprise, and fascination of discovery. This is an appropriation of the common engagement with narratives for the design space of butterflies in the stomach.

Mystery, Awe and Eerie have contrasting narratives. Where Awe has a narrative of a more planning characteristic, Mystery exhibits a narrative of unstructured exploratory character, and Eerie has more of a narrative in terms of suddenness; suddenly (and dubiously) finding oneself in the midst of something.

With the gathering of materials in Awe, the sensorial evidence of a narrative is very tangible from the beginning, which helps in promoting anticipation. With the discreetly emerging dome of Mystery, the discovery and exploration both use anticipation and surprise as a way to butterflies in the stomach. Eerie utilizes a suddenness in the narrative where there might be a realization that a something has been ongoing for a while without it being recognized. This introduces the user to the interaction in the midst of it and engages with surprise, disbelief and anticipation.

CONCLUSION AND FUTURE WORK

This work is a provocative step towards rethinking and expanding upon what HCI can be in the outdoors. I contribute with three conceptual directions into the design space of butterflies in the stomach. They are *conditional availability*, *erratic and dubious presence* and *sensorial evidence of interaction*. These concepts are drawn from and exemplified in three design instances. The presented conceptual directions are applicable beyond the sphere of the outdoors.

Further critical inquiry should look into ethical concerns of covert interactions that encourages unsettling experiences in public and possibly dangerous spaces. What are those concerns and how should they be addressed, also from a non-anthropocentric perspective?

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