

De+re: A Design Concept For Provoking Meaningful Interactive Experiences

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ABSTRACT

While much effort in interactive system design is centered on the recognition and representation of precise contextual information, where ambiguity or missing information is considered disruptive, other work has sought to play with notions of contextual ambiguity as deliberate design strategies. In this paper, we build on the latter idea by intentionally removing contextual cues to explore the concept of *de- and re-contextualization (de+re)* for creating thought-provoking experiences through ‘contextual puzzles’. In particular, we introduce the interactive installation *Hearsay*, which presents readers’ comments (i.e., texts) on online news stories (i.e., context) as decontextualized items of information to be interpreted by the user. Our study suggests that this activity of recontextualization or “putting the puzzle back into place” captured the participants’ attention and engaged them in deep considerations of the presented information. Drawing on these findings and on further examples from the literature, we propose the principal of de+re as a *Strong Concept* in interaction design.

Author Keywords

Interactive installation; interactive art piece; Strong Concept; qualitative study; interaction design; context; Critical Design; derStandard.

ACM Classification Keywords

H.5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

INTRODUCTION

In interactive system design much effort is centered on context. On the system side, context is to be recognized as precisely as possible, for example, by sensor technology. On the user side, suitable indicators of the current interaction context are displayed to facilitate optimal system usage. Inaccuracy, ambiguity or missing contextual

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information are considered inadequate and disruptive to the user experience (cf. Gaver et al. [11]). In this paper, we present related work as well as our own data that together suggest that certain applications might well exist, which gain a powerful interaction mechanism if contextual information is not ‘served on a silver platter’, but has to be discovered by the user gradually. In this course, we propose *de- and re-contextualization (de+re)* as a *Strong Concept* [13] for creating thought-provoking interactive experiences based on the manipulation of context. At its core, the Strong Concept of de+re aims to capture the attention of the user by deliberately omitting or displacing contextual information and hence cause system engagement of the user when making sense of this data, or “putting the puzzle back into place” (to quote one of our participants). Thus, the design concept moves in the opposite direction of what we are commonly used to from the literature and from practice.

We employed closely related working principles such as using “ambiguity as a resource for design” [11] together with our own critical interactive design piece *Hearsay* to support, illustrate, and to elaborate the Strong Concept of de+re. In particular, the *Hearsay* installation addressed the consumption of online news stories and corresponding user comments (social commenting)¹. By means of the decontextualization of these comments, that is, separating them from the corresponding news articles, the installation provided a novel experience for reading the news including the potential to open new perspectives. We describe how *Hearsay* invited the users to reflect on their online newspaper consumption and on the role of the often-embedded social commenting functions in influencing the perception of the reported events.

On a more abstract level, *Hearsay* illustrated how isolated bits of information or texts (i.e., isolated comments or triggers presented without further contextual information / ‘out-of-context-information’) let the users reconstruct context (i.e., the original and broader text) or hypothesize about missing contextual information and thus engage in reflection and meaningful interactive experiences. As our dataset suggests, this kind of de-contextualized presentation of data can lead to intellectual effort and mental processes

¹ In detail, our installation used online news stories and reader comments from the Austrian newspaper derStandard (www.derStandard.at).

such as self-reflection, curiosity, speculation and reconstruction of context. We argue that capabilities like these constitute the power or potential of de+re in functioning as a Strong Concept and therefore we made Hearsay a case for supporting it.

Before going on to discuss background literature and to describe the user study and its findings, we first introduce the Hearsay installation and its broader concept.

THE HEARSAY INSTALLATION

In this paper, we use the experience with the interactive Hearsay installation to draw out and illustrate the concept of de+re as a “resource for design” and Strong Concept [13]. The idea for this particular installation or interactive art piece springs from a known creativity or ideation method as outlined, for example, by Mangold [19]. Here the author described how two originally unrelated stimuli, for example, an image and some written words, could be juxtaposed and associated together to generate new meaning and ideas, which did not arise from reading the isolated stimuli. In Hearsay, instead of creating new meaning by combining two stimuli, we applied a ‘reverse strategy’. By removing one stimulus from its context (a piece of text from the broader context where it was embedded), while at the same time indicating its removal, we aimed to spark the observer’s imagination when attempting to reconstruct the origin of the isolated bit of information. In the following, we also refer to the isolated stimulus as cue, because of its function to hint at the original context and to trigger mental processes. This leads to the question but what is it all good for?

As it emerged in the subsequent user study and related literature, there is a space for the proposed concept in interaction design as it can foster user engagement and thought-provoking experiences, which are otherwise hard to generate. To make this easier to understand, we go on to present detailed information about this application before moving to the background literature.

Hearsay is an interactive installation that downloads user content from the Internet (www.derStandard.at) and presents this information in a de-contextualized fashion on the touch of a button (see Figure 1 and 2). More precisely, user comments about news articles are presented via audio without access to the corresponding news items. By employing a specific algorithm, Hearsay only selects user comments, which contain rather polarizing or extreme statements (i.e., comments, which were either strongly approved or disapproved by the community). In the subsequent case study, we report how participants recontextualized these comments (i.e., deducing the original news item), and how this process of ‘puzzling’ lead to deep engagement and reconsiderations of the actual statement that was presented out of its original context.

One important design feature of Hearsay is the application of randomness as part of the user experience. This is



Figure 1. Hearsay speaker box with two illuminated buttons for playing random comments on news items.

because the user has no control in the choice of the presented cue (comment) apart from choosing between a red and green button, representing a positive or negative polarization respectively (i.e., the comments are selected randomly). This idea is not new to interaction design and purposeful randomness and unpredictability was applied to enrich different application domains such as photography, web blogs, music playback and web search [18]. To explain the creative power of randomness, Leong et al. drew on examples from the arts, as ”it encouraged the use of free association, fragmentary trains of thought, and unexpected juxtapositions” [16, p.17]. As supported by these observations and considerations, there is perhaps a linkage between the concept of randomness and de+re. While randomness can lead to interesting juxtapositions and ‘out-of-context experiences’, de+re describes situations in which de-contextualization has specifically taken place. Our aim now is, by means of Hearsay, to investigate how to design for this particular situation and take advantage of it for creating engaging user experiences such as critical self-reflection. Finally, we take a closer look on de+re from the theoretical perspective of Strong Concepts [13].

The Hearsay installation consisted of a wooden ‘nostalgic’ speaker, with two illuminated push buttons, one green, the other red, located in a semi-public location. As described above, pushing either one of the buttons triggered a female voice reading out random comments on news items that have been posted by the (mostly anonymous) readers of the online newspaper derStandard. The green button played comments that have been highly positively rated by the readers, whereas, the red button triggered comments that were highly negatively rated. Following every comment, the voice also read out the corresponding number of positive and negative votes. The votes are named ‘notches’ and evolved as a kind of ‘trademark’ for derStandard. Therefore, using this language (‘notch’) together with the colors green and red was a *hint* about the origin of the data.

As there was no other *clear* information provided by Hearsay about the origin of the comments, the data was decontextualized in multiple ways: (a) the comments were separated from the corresponding news article; (b) besides calling the votes ‘notches’ there was no hint for the origin or purpose of the comments/device so listeners had no other

specific cues to these even being newspaper comments; (c) in a broader sense, the actual print medium to be consumed on a computer screen was transformed into audio and thus removed from its conventional interactional media context.

Details on Hearsay's Motivation and Design Rationale

We decided to create a provocative installation called Hearsay around the topic of social commenting, as we repeatedly caught ourselves spending considerable amounts of time reading comments on news items, at times even favoring them over the actual articles. Often, these comments are emotionally charged and laden with content that many users can relate to. As many people follow the news, this kind of content gives ideal (recognizable and meaningful to many people) cues and so provides a good argument for employing online news articles and comments. With Hearsay we have a precious reservoir of relevant items. In a way, comments on news articles reflect (certain parts of) society, or at least constitute decontextualized snapshots of issues that a society is currently dealing with and thus provides an alternative approach to reading the news. The idea now was to investigate how these comments can provoke thoughts and engagement by presenting them with only limited contextual cues (no information about the original newspaper article/text). The involved news comments were taken, as mentioned above, from the online version of the nationwide newspaper derStandard. Besides posting own comments on news items, the online readers can also rate the other users' comments by assigning positive or negative votes (green or red 'notches'), as previously noted.

Below is an exemplary user comment with a high number of positive ratings (53 green, 1 red). It was posted in the context of an article about a former minister of finance, who got into legal issues and aggravated almost the whole country:

"Waterboarding... – will not be necessary. For a complete confession threatening with a shower but no hair dryer should suffice."

This comment ironically refers to the minister's alleged vanity and sumptuous haircut. Its irony seems to be understood and appreciated by many readers, as indicated by the many positive ratings. At this time, 'waterboarding' was a discussed cruelty that has attracted the broad attention of the public and that thus also made its way into this user comment as a side blow. Another highly rated posting is displayed below. As the preceding and the subsequent comment show, a lot of recommended comments involve a decent amount of humor and often irony (the original article that is commented on in the following refers to a computer game that was finally released 14 years after its announcement):

"Since the first announcement of Duke [Nukem Forever] I started saving up my pocket money. Since than I have finished school, became a father, finished my university

degree, started my PhD, my son finished preschool and now the game is going to be published. I hope they will still accept old coins and notes of our former currency."

With 74 positive and 0 negative votes, this is the comment with the highest rating that has been posted within the study period. (Note, that even if the comment might appear a bit 'geeky', the general online/offline audience of the newspaper does not seem to have a particular affinity to technology.) At the negative end of the ratings, comments are found such as the following two examples:

"Good luck – It can't get any worse than with the current president!"

"I hope they have to pay for the rescue team. I don't want to waste my taxes on such jerks."

While the first comment was posted with regard to the US presidential election in 2012 and Michele Bachmann (8 positive votes, 49 negative votes), the second posting (6 positive votes, 61 negative votes) relates to a tragedy where two students died in a trial of courage. Negative comments typically reflect offending opinions (e.g., extreme political positions, racism or a lack of empathy) or statements that convey totally wrong facts. Evenly balanced negative and positive ratings point to controversies among the readers.

Implementation

The Hearsay installation was built as a wooden speaker with two illuminated push buttons and a small personal computer (PC) for running the software. The PC was not visible to the users as it was connected to the speaker with hidden wires and located in a different room. The buttons of the speaker were operated by an additional *Arduino* microprocessor that was also connected to the PC. A custom-developed Java software 'crawled' the website of the national newspaper once a day and stored all newer comments including ratings into a database. 165.854 comments were downloaded over the study period of one month. A commercially available text-to-speech software was used to read out the randomly chosen positive/negative comments. The quality of this female voice was described as very good and rather charming by the study participants.

BACKGROUND

Related interactive Systems

There are various other systems that draw strongly on the notion of context, a concept of great significance in interaction design and in particular in ubiquitous computing applications. It is the functioning of the human mind that demands designers to consider contextual factors when creating purposeful systems, because we as the user need to make sense of the available information and integrate it with our assumptions and perceptions of reality.

In the following, we review work that served as a source of inspiration for Hearsay. However, we also quote this research in support for developing de+re as a Strong Concept that draws on Hearsay and these related systems.

According to Höök and Löwgren, a Strong Concept is a theoretical construct that constitutes “intermediate-level design knowledge” [13]. Thus, it encapsulates design knowledge, which is more abstract than design-lessons embodied in particular instances or exemplary artifacts, however without being a ‘fully grown’ theory yet. This is, for instance, the case in the interaction concepts of Social Navigation and Seamfulness according to the researchers [13]. For a design concept to qualify as a Strong Concept, it needs to be drawn out from, and grounded in, successful examples, which embody the design knowledge or principle across different application domains. We suggest that the following related work points to the usefulness of de+re in interaction design as it together with Hearsay, illustrates similar features of de+re. (Hence, in the instance of this paper, shared similarities between the to-be-presented work and prior work don’t hint at a lack of originality or uniqueness; rather, similarities are a prerequisite to draw out a Strong Concept across different applications.) This will become more evident when the findings on Hearsay are presented in the study section. We will also return to considerations about de+re as a Strong Concepts in the discussion section.

Gaver et al. proposed “ambiguity as a resource for design” [11] and thereby dealt with contextual information in a formerly uncommon way. While ambiguity of information is quite naturally avoided by any means in interactive design, these authors played with the idea of deliberately ‘causing confusion’ for the sake of creating “intriguing, mysterious and delightful” [11, p.233] user experiences. Still, they did not intend to encourage fuzzy and hence bad design (of course). Instead, they proposed blocking easy system interpretations and letting the user participate in “making meaning” [11] for the sake of deeper system engagements and novel perspectives into socio-digital systems. As a consequence, it is the user who defines the end purpose of the system by interpreting proposed interactions and adapting the system according to their current interest [21].

Some years later, Gaver et al. again explored contextual issues when describing the design of their “threshold devices” [9] (digital systems for connecting the inside home to the outside world). They proposed two devices, which each captured data from the outer world and imported it into the house in the form of abstract information displays. Their first threshold device displayed the flight routes of planes passing over the house and allowed to look up their destination and thus to daydream about this particular place: “recontextualising found data to a particular location is a powerful method for developing engaging systems, and key to the strengths (and some of the weakness) of those we report here” [9, p.1430]. The second threshold device displayed fragments of local (communal) online advertisements on small screens in different locations of the home. While the threshold devices extracted the fragmented information from its original context without detailed

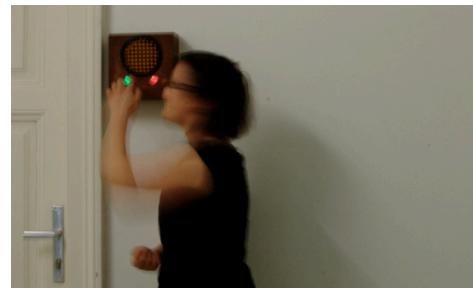


Figure 2. User pressing a button on the speaker to listen to a random newspaper reader comment.

explanations, the systems still afforded enough ‘hints’ and a balanced dose of randomness for the participants to create their own value from using the devices and putting information into a context.

Interestingly, the authors did not link this newer research project to the ‘ambiguity paper’ in order to elaborate further on the ‘re-contextualization theme’. Nevertheless, these design concepts are clearly related to Hearsay, where user comments on newspaper articles are removed from their conventional context to be read out by a ‘text-to-speech’ software. In a way this concept is also similar to Gaver et al.’s prayer companion [7], which crawled news headlines (RSS feeds) from the Internet and displayed them as inspirations for the spiritual activities of nuns. Recently, the same group created in collaboration with other colleagues a interactive piece named Energy Babble [10]. Here, online content such as *Twitter tweets* or governmental reports was scanned for messages about energy and the environment. This information was then synthesized by a text-to-speech voice and presented to users or participants. The authors summarized that Energy Babble functioned both as a ludic design product and as a research tool for understanding sustainability concerns of specific communities they were interested in as it offered interesting new perspectives into their research interest. We see all these instances as also illustrating different ways of playing with contextual information.

Hearsay has also been inspired by Hansen’s and Rubin’s Listening Post [12] which showed random online communication on displays. Furthermore, it relates to the Photostroller device [8], which depicted random photos from the Internet on a screen located in a care home. Again, others have employed de-contextualization of information (“out-of-context” use of sounds) for evoking curiosity [22].

Having used the term context frequently above, it is now appropriate to clarify theoretical key considerations regarding this important notion in HCI and related fields.

The Notion of Context in HCI and related Fields

The notion of context has a long history in HCI and the related field of CSCW and has been defined in diverse ways. Most HCI research from ubiquitous computing or context aware systems employed a more technological perspective with an emphasis on features that can be

recorded by sensor technology [4] (e.g., the position of the user, objects surrounding the user or the current state of a smart house). The most often-cited definition of context from context-aware computing is provided by Dey [5].

Many works in CSCW, on the other hand, have a broader (going beyond technological implications) and less ‘computational’ understanding of context, focusing on “intersubjective aspects of context, constructed in and through the dynamic of each individual’s social interaction, and defends against reductionism and objectification” [4, p.223] or on past user experiences that might influence the way in which current contexts and situations are perceived [4]. Dourish incorporated the viewpoint of *embodied interaction* to complement design practice in context-aware systems with ideas and insights from the social sciences [6]. Thereby, Dourish raised the question of “how and why, in the course of their interactions, do people achieve and maintain a mutual understanding of the context for their actions?” [6, p.22] This question implies that this author did not consider context as a “representational problem” (how can we track relevant data and represent certain properties of an interactive system?), but as an “interactional problem” (context emerges from interactions and is negotiated by the subjects) [6]. Further, Dourish argued that context and content cannot be separated, as context is created through the user’s performance of an activity [6].

The Definition of Context in this Paper

In this paper we refer to the latter conceptualization of context and see it as something that is established by the user in the course of interaction. However, the Hearsay installation is an example of an interactive system that plays with a very specific application of context with regard to two particular aspects:

(1) While most systems that are typically examined through Dourish’s embodied interaction lens feature loops of user-system-interactions (from which context eventually emerges), the most significant interactional processes of the Hearsay installation are mental or internal, and only triggered externally by the audio stimulus (a ‘riddle’ or puzzle to be solved). More precisely, our proposed system does not feature direct user interaction loops, instead, information has to be put together by cognitive work, the puzzle has to be solved within a process of re-contextualization.

(2) The information to be processed and mentally rearranged by the user is fragments of text. Each text (user comment) stems from a broader context, that is, a corresponding news item. Hence, context in our sense primarily denotes texts and their original broader context. While text in Hearsay can be read and spoken, we employ a more comprehensive definition of text drawn from literary theory in this paper for the concept of de+re: *text* can be anything that can be *read* (e.g., a word, a message, a video, a picture, an audio message, etc.). De+re plays with context by presenting only fragments of the original text and letting

the user speculate about the missing information (the origin of the text or a larger text where the stimuli text came from).

Usually, designers try hard to assist the users in negotiating context and minimizing the effort for doing so (cf., e.g. [11]). In this paper, we deliberately played with the users’ desire to (re-)establish context for the sake of creating engaging and at times thought-provocative experiences. We let the users be in charge of this process, but carefully designed a hint to support them re-contextualizing (cf. explanation of green and red ‘notches’). We go on to describe the corresponding user study.

STUDY

The interactive Hearsay installation was available in a (semi-)public space (a corridor within a university institute) for 4 weeks or 20 workdays. This corridor connects the rooms of a small working group in computer science (approximately 15 employees) and it is neither overly crowded nor is it abandoned. Besides the members of the working group, mainly students are passing by to visit faculty and some additional external visitors (approximately an average of 15 persons a day). While a university floor seems to only allow access to a limited population, we like to point out that the Hearsay study is only one of multiple examples we use to draw out de+re’s standing as a Strong Concept. In addition, our participants entailed subjects with various backgrounds ranging from Interaction Design (IXD) experts ($n=3$) to IXD beginners ($n=3$) or having no relation to IXD at all ($n=3$). The Hearsay speaker was deployed without any announcements or explanations. Figure 2 shows the speaker box as it was installed on a wall and used by people passing by. All interactions were saved to a log file.

After the installation had been available to the public for 4 weeks 9 participants were recruited for interviews (3 females, 6 males, aged between 20 and 49). In order to be eligible as interview participants, they must have had used Hearsay at least 8 times (according to their self report) out of their own interest during the 4 weeks study period. (We asked people whom we observed listening to the installation until we identified ‘heavy Hearsay users’ who were also willing to participate in an interview.) 5 participants were part of the faculty, 4 participants were interested students who requested information on the installation. They were not financially remunerated.

The interviews were semi-structured and the questions were formulated openly, because we were interested in the participants’ reactions to Hearsay and its de-contextualized triggers without steering the participants’ answers to a particular direction. The interviews lasted 15 to 43 minutes and were structured by the following four primary questions, which were able to stimulate engaged feedback:

- (1) Can you describe your first encounter with the box?
- (2) What do you use the box for?

(3) What do you think is the purpose of the box?

(4) Do you read online newspapers?

Each one of the 9 user-feedback sessions was initialized in the corridor in front of the Hearsay speaker to provide the participant with the opportunity to listen to a couple more comments and refresh their Hearsay user experience before the interview. After this short introduction, the participant was invited into a quiet room across the floor and an audio recording device was switched on. All of these interview recordings have later been transcribed for the analysis.

Analysis

The analysis of the transcripts followed an adapted thematic analysis approach [3]. The researchers read through the text assigning codes to label interesting passages. These passages or codes were revisited and then summarized to higher-level themes, which are used to structure the presentation of the findings in the following section. Thus, the contribution of the present work comprises a qualitative account of the observations we made. In accordance with the standards of qualitative research, we provide the reader in the next section with a rich selection of original quotes from the participants in order to reflect their experience.

Findings

We start with reporting findings regarding the general use and appeal of the Hearsay installation. Hence, these observations deal with the design and particular aesthetics of this specific device. Then, we go on to summarize user feedback and reactions that point to the capability of de+re in engaging the user in meaningful experiences. These are primarily findings from the interviews, which illustrate how Hearsay facilitated a critical reflection on the participants' own reading habits and self-reflection, and hence illustrate the potential of the proposed Strong Concept de+re. In this course, we also consider phenomena in the data set that deal with de+re as a means to provoke engaging thoughts, in particular with regard to remembering, solving puzzles, curiosity or similar related mental activities.

Hearsay from a Design and General User Experience Perspective

Within the study period, both buttons were pressed a total of 292 times (147x green, 145x red, i.e., a rounded 15 times per day) according to the log files. Overall, the participants (P) complimented the design and described it as "elegant and simple" (P2), "looking retro" (P3) and stated that the "buttons were clearly an invitation for use" (P3). Furthermore, Hearsay was understood as an art piece by P1 and P4: "It looks like an exhibit" (P4). P3, on the other hand, was reminded of some sort of intercom, however, the buttons were astonishing to him:

"But why red and green? – This does not match an intercom. This was my first thought" (P3).

Nevertheless, as all participants except one person (P2) read this particular online newspaper (derStandard) at least a couple of times per week, everybody except P2 figured out

surprisingly quickly where the messages (comments) originated from (www.derStandard.at). This was due to the characteristic red and green 'notches' of the rating system, which have been translated to the red and green buttons and were also called 'notches' by the text-to-speech computer voice. The quality of this voice (pronunciation, etc.) was perceived as "surprisingly pleasant" (P8) by all participants. P6, for example, associated "official announcements" with Hearsay because of the flawless voice quality:

"Because it is read out by such a professional computer voice, it has a formal appeal ... like an official announcement." (P6)

From a general user experience perspective common descriptions for interacting with Hearsay were very different, for example, "suspenseful", "amusing" and "provocative", and the system was said "to put the users into a curious frame of mind" (P4).

Provocations and Food for Thought

This 'provocation' in Hearsay *inter alia* had to do with the presorting and selection of reader comments that were "polarizing" (P3) or extreme in their ratings. P3, for instance, put it like this:

"Yes, I read [online] newspaper comments. In particular, those of derStandard, because they are easily accessible. And above all I think the rating system is pretty enthralling. Somehow it's really fun to have a directed look at the green or red ones, because it's them, who polarize [...]." (P3)

These 'extreme' comments or opinions often left the participants in amusement, agreement or disagreement. In any case, Hearsay engaged the participants in a kind of 'meta' or reflective thinking about their own newspaper reading behaviors and the role of user comments in news sites. Some of the participants, for instance, admitted that they regularly spent more time reading the article comments than they actually intended to. Likewise, P3, cited in the paragraph above, continues:

"I also think it is a pity that other news sites don't feature this commenting and rating system ... On the other hand, now that I think about it ... the system actually is a bit bothersome, because often time you find yourself drifting away, even though you intended to read one article for 3 minutes only [...] and then you get lost in the comments and spend much more time on the article than you wanted to, because you read them all ... and they weren't even that enlightening in the end." (P3)

Similar, P6 asked himself:

"I question myself why I read the comments at all, because actually I think they are foolish or cruel. [...] It's addictive to read the comments [...]." (P6)

There was also evidence from the interviews that the reader comments can have an influence, positive as well as

negative, on the own opinion about a certain topic. P7 sees this in a positive light:

"[The comments] give you a new angle on the topic." (P7)

In contrast, P9 realizes that he does not appreciate the way his opinion shifts so easily:

"Sometimes it is a bit bothering me, how easily I float with the tide. One comment with a lot of greens can immediately change my opinion by 180 degrees." (P9)

P3 and P2 experienced the comments as follows:

"If you get a, for instance, very populist comment on a certain topic, then you may certainly think 'yes, he is right'. However, if someone argues against this populist thinking in a reasonable fashion, then you might think 'well, maybe it's not that simple'. Sometimes you become too opportunistic when reading the comments. You should be careful when reading these populist comments." (P3)

"It makes you question whether you share an opinion or not. You relate yourself to the comments and ask 'where is my position.' " (P2)

"The device was thought-provoking at times ... I remember clearly about that one comment. It was a bit longer. It made me think. And then I went back down the corridor and kept thinking about it ... It wasn't a foolish comment, it was appropriate. And then I went slowly back to business." (P3)

Specific Reflections on Society

Other quotes revealed that reading user comments resulted both in thinking about societal issues and about society itself. Participants dealt with the content of the messages, however, they also asked about the senders of these messages:

"The comments are influencing my opinion ... not on the article, but on the society I live in. It gives me a sense of what's going on. The users would not post the comments if they weren't an issue to them. [...] Sometimes I even ask myself how could one possibly post such a comment." (P4)

P1 and P2 expressed related considerations with the following words:

"I think by myself 'cool' this is what the people are currently struggling with... this is online democracy ... they either applaud or yell 'boo' [...]. " (P1)

"[...] You are requested to listen to a variety of different opinions ... and all of this in a playful manner and randomized ... so you cannot restrict yourself to the most convenient topics, but you are listening to a multitude of different opinions on different topics, which you never would have heard of and you get to know what people are currently thinking about and what is moving them." (P2)

Like magnified detail shots, these individual comments give a glance on certain aspects of what is currently being

discussed among the people, and Hearsay directed the attention of the participants to these voices.

Remembering

Besides these examples of how the participants dealt with societal issues, there is also evidence for Hearsay's potential to trigger individual or personal memory processes by means of its de-contextualized comments. Some of the participants (P1, P2, P5, P6, P9) directly related some of the news comments to their own life, for example:

"I remember this one comment quite vividly. I am a pretty sure that I have even read the corresponding article on the newspaper. That's one reason why I remember well. [...] It was about the poor conditions of the subway [...] all the dirt on this one particular line and so on ... It made me remember this one particular hot day and it was so crowded [in the subway], it was exhausting and rather nasty." (P9)

"Well, they were talking about waste and shopping. Something about planned obsolescence. This made me a bit annoyed, because it reminded me that I have recently bought a phone that broke after a couple of weeks. Damn planned obsolescence. I think I also read the news article to this comment." (P8)

Putting the Pieces together, 'Puzzling'

As mentioned before, Hearsay aroused the participants' curiosity. P5 explained his own theory about this:

"[...] It's because the comment is a puzzle ... it's the puzzle that makes me listen to it. Actually it's two puzzles. First, 'what kind of device actually is this'? ... With its illuminated buttons and so inviting ... Then you press one of the buttons and try to figure out, what's coming out of the box. And that's the second puzzle ... which news article belongs to that comment?" (P5)

"There are two sides to each puzzle. The first side is, 'do you really want to figure it out'? And the second one is, 'are you actually able to figure it out'? The first one is a prerequisite and the second one is a question about skills or knowledge." (P5)

This 'puzzling activity' was enjoyed by all of the participants. Some of them reported that they tried to "deduce the bigger picture starting from the details" and finally aimed to put "the puzzle back into place" (P8).

Out of Context

We were very cautious in the interview not to mention phrases like 'out of context' or 'removed from its original setting' or similar expressions, because we were interested to see whether the participants would refer to Hearsay's underlying design concept without being prompted. Nevertheless, all but one participant (P7) directly referred to the *de-contextualization* principal within the interviews. P1, for example, made the following related observation:

"I think it is a transformation regarding the medium. It is transformed from comments to text-to-speech. That is the first transformation. The second one is, that it is removed from the context ... from the website as well as from the article and the other comments." (P1)

P4, P5 and P6 had similar considerations, for example:

"I think it [Hearsay] is original. The comments fall out of line, because I only know them from the Internet and news sites. You usually don't have it like this. It is removed from its everyday context, so to speak. That's why it caught my attention." (P4)

"I think the idea of de-contextualization heavily depends on the fact that it is being read out." (P5)

"The speaker appeals to me most, because it sets up a whole new context." (P6)

P5 elaborated further (on request of the researcher):

"Creating context is one of our very strengths ... to give things a meaning. This is such a strong instinct ... We make meaning all the time. [...] The funny radio is the trigger, if you ask me. [...] It's an invitation to make sense." (P5)

In summary, the participants surprisingly often used wordings such as “out-of-context” during the interviews. They admitted that at times interpreting the comments was hard, however, they enjoyed trying to reconstruct the missing information and found “[...] it fascinating that some arguments perfectly make sense without context” (P1) and to most of them it “was enthralling to try figure out the original context” (P8).

DISCUSSION

In this paper we have presented the Hearsay system and offered it as an example, along with others, of the Strong Concept of de+re and how it can be employed for creating thought-provoking interactive systems. We (as designers) introduced three instances of *de-contextualization*: (a) the removal of the comments from its original news story, (b) the separation of the online newspaper as a whole with only ‘notches’ as hints to the original context, (c) the transformation of text into speech. On the user or participant side, again, this initiated a process of *re-contextualization* and sense-making of the presented information. We go on to discuss what the findings in this paper meant to the participants as well as what should be taken into consideration by designers when incorporating this instrument or method into their repertoire and systems.

Specific Reflections on the Hearsay Installation

Although the primary contribution of this paper is the elaboration of the de+re concept, for completeness we briefly recapitulate specific insights on Hearsay in relation to online news. Admittedly, some useful functions of the installation might spring from its overall design and topic domain, and not solely from the principal of de+re. Nevertheless, de+re might well have functioned as a

powerful catalyst for unveiling specific aspects of our online news consumption, and *made* the Hearsay installation.

On a variety of occasions Hearsay stimulated its users to reflect on things people said or posted, as the installation confronted them with random and different opinions. In many cases, their reaction was being amused or entertained, however, some comments also made the participants angry or let them revisit their own opinion on certain topic aspects. Also, the intervention led to considerations on societal issues. After all, Hearsay can be said to have functioned as a multipurpose tool that at times was uncomfortable and thus was able to open up new perspectives. This was particularly true regarding the participants' consumption behavior of news articles.

This finding interestingly points to a well-cited evaluation of news consumption. Iyengar and Hahn [15] showed that consumers selected their favored news source on anticipated agreement. As a consequence, Republicans ended up with ‘Republican TV’ (e.g., *Fox News* is widely considered *conservative*) and Democrats consumed ‘Democrat TV’ (e.g., *CNN*) [15]. This kind of selective exposure and polarization, however, minimizes the encounter of different, maybe inconvenient opinions. Admittedly, Hearsay obtained its comments from only one particular news source. Still, we hypothesize that one specific strength of the application was to break *selective exposure* against *attitude homophily* and to promote greater reflection about what opinions we usually pay more attention to.

In addition to the occasions where participants encountered unfamiliar news items and different opinions, there were also some situations in which a participant remembered reading one particular article, at times relating it to their own life even. Hence, the comments served as a memory trigger, both supporting remembering the article and autobiographical remembering. The process of *re-contextualization* was in this instance a re-matching between comment and article, and also recalling information from a broad context.

Admittedly, it can be argued that the participants' reflections were caused by the interview and not by the installation. However, for this reason we kept the interviews as open as possible and let the participants talk with very few interruptions. Moreover, on many occasions the participants described reflections they already had before the actual interview session.

Reflections on de+re as a Strong Concept

As P5 stated, we seem to have a strong desire to make meaning of our surrounds. It can be hypothesized that this is the most important underlying principle or motor of de+re as a concept for the design of thought-provocative interactive systems. Similar considerations were brought

forward by Leong et al., who investigated the use of randomness as a resource for design:

"Encounters with randomness exploit our natural urge to interpret and our tendency to try to make sense of things when engaging with content in unpredictable and unexpected ways." [16, p.16]

Similarly, the de+re concept, as illustrated in Hearsay, challenged the curiosity of the users and a desire to make sense of the presented information. Besides this intellectual effort in sense-making, people also engaged in the already mentioned processes of self-reflection.

We have seen a number of illustrative examples for the usefulness of the proposed concept. But how to theoretically proceed with de- and re-contextualization as a resource for design and to establish it as a provocative design strategy? As indicated throughout the paper, a promising chance for developing the design principal might be offered by Höök and Löwgren's Strong Concepts [13]. The authors describe this theoretical construct as "intermediate-level design knowledge", because it involves insights that are more abstract than particular design pieces, and yet does not constitute a full theory. They summarize that a Strong Concept

"... is generative and carries a core design idea, cutting across particular use situations and even application domains; concerned with interactive behavior, not static appearance; is a design element and a part of an artifact and, at the same time, speaks of a use practice and behavior over time; and finally, resides on an abstraction level above particular instances." [13, p.1]

While in this paper we have provided one particular instance – the Hearsay installation – we propose (see *Possible Application Domains*) that there are many more use situations and application domains, which can benefit from de+re as a resource for interaction design. This is also evident from our literature review, where in particular Gaver et al. [11] already employed notions of contextual ambiguity in interaction design. Leong et al.'s [16] considerations into randomness also involve context, as arbitrary encounters generate unusual combinations and hence de- and re-contextualize meaning. All this research, including Hearsay, plays in various ways with notions of de- and re-contextualization. Thus, on a more abstract level these experiences can support the drawing out of de+re as a Strong Concept. If we succeed in strengthening de+re by creating additional useful instances in different domains and reflecting on them, the concept can become intermediate-level design knowledge, that is, be part of the interaction design repertoire, and improve or inspire interactive applications.

De+re in Practice: How to employ de+re in Design?

We consider the following three factors important for employing de+re in a successful design, and use the Hearsay example to illustrate.

First, the design of the interactive system should set up the right frame of mind for its intended use. Hearsay, for example, was perceived as "retro", "homey" and "inviting". Also, the synthetic voice was perceived as pleasant or realistic and thus supported a positive user experience. At the same time, the installation was a bit mysterious. This combination appeared to be just right and the participants knew how to encounter it. In addition, the medium was transferred from text to audio, which hinted at the 'out-of-context' theme according to the participants, and also contributed to creating the appropriate aesthetic for the particular ends of the installation. So far, we have referred to the users when reporting processes of re-contextualization (e.g., matching comment and news story). However, it is interesting to note that re-contextualization was also carefully applied by us as designers. For instance, textual reader comments were re-contextualized in a voice and also found a new 'housing' in the wooden Hearsay Box.

Second, the application should give hints on its purpose or function. All participants except P2 realized very quickly what Hearsay was about and soon began to engage with the system. P2, on the other hand, who did not read the corresponding newspaper with its well-known social commenting system, initially lost interest in the installation. When a friend explained to her what the purpose of the device was, she picked up interest in the installation and even started to read the related online news. The lesson learnt from a designer's perspective is to try not to be too mysterious and provide clear indicators for the system's intentions and functions. Otherwise, these snippets of out-of-context data will be experienced by the users as random material only, which can lead to less engagement [17]. In the present work, we tried to make the point that de+re is not 'just' randomness or ambiguity in the sense the concept demands to carefully design the experience of de- and re-contextualizing by choosing appropriate hints.

Third, the trigger or cue per se must be appropriate. In the case of Hearsay, many of the successful cues were amusing and the participants could relate to them, or interpret them in their own manner [21]. Thus, this entertaining element was motivating and the process of re-contextualization did not end in frustration. Other successful triggers were the provocative ones, because of their extreme positions (viewpoints) that challenged the participants. Also, with Hearsay's huge database, there were enough cues for browsing and finding interesting ones. In summary, there is clear evidence in our data that the participants enjoyed the activity of making sense and 'putting the puzzle together'. Interestingly, it was not necessary for the participants to figure out the *correct* context of each reader comment to have a meaningful user experience. Wrong deductions or no ideas about the origin at all could also lead to insights.

Possible Application Domains

From the findings above, it can be argued that Hearsay functioned as a piece of Critical Design [2]. Nevertheless, there are many additional system domains, which pose promising ground to ‘play with context’ (cf. *Background*).

One application area that has attracted increased attention recently, is *augmented memory systems* or *lifelogging*, see for example [14, 20]. These systems are designed to support us in remembering past events, facts, or similar information by creating digital records (*texts*). Currently, researchers postulated to *deliberately capture memory retrieval cues* instead of attempting to record as much data as possible (“total capture”). These cues (*texts*) then can be revisited and employed by the user to engage in activities such as recollection, reminiscing, or reflection [20], and to reconstruct and relive memories in their mind [14, 20]. André et al. [1], for instance, used random public images such as old advertisements to trigger reminiscence and nostalgic feelings. As we have observed processes of (autobiographical) remembering within the Hearsay study, we propose that ‘out-of-context’ display of such cues can be employed to support reflection on one’s past. Thus, de+re as a strategy might be particular useful in the service of augmented memory systems. To facilitate such recall and reflection, de+re presentation might be a powerful alternative to revealing all available cue data at once and immediately. The concept could, for instance, be instantiated in a special kind of image viewer software. Given that the cue data of a *lifelogging* system is visual photos, parts of these images could be extracted as a de+re cue and presented to the user. This would focus the observer’s attention and highlight specific details in the photos. The user now would have to make sense of this isolated excerpt and connect it back to the broader picture.

Other system domains that build on de+re were, for example, the above-mentioned applications (see *Background* section), which removed context to make information more interesting, suspenseful and inspiring. To this end, Gaver et al. stripped contextual information from commercial advertisements and flight routes [9], public images [8], and news headlines [7]. Tieben et al. presented ‘out-of-context’ noise, to create and study curiosity [22].

Limitations

The present work has a limited participant sample as we interviewed ‘heavy’ Hearsay users with access to the university context only. However, we argue that this fact doesn’t necessarily bias this qualitative study with regard to its purpose. We used the experiences with the Hearsay installation, together with the additional ‘classic’ examples and related work around ambiguity, randomness and curiosity, to draw out the Strong Concept of de+re. Hence, we weren’t so much interested in demonstrating the value of Hearsay *per se*. Rather, we employed the installation to illustrate the powerful capability of de+re as a design concept using data of our own. Moreover, the carefully

selected related work seems to be very familiar to Hearsay and de+re (to certain respects). Indeed, the establishment of a Strong Concept demands the identification of different applications based on the same mechanism, and from which the concept can thus be drawn, and this is key to this endeavor.

CONCLUSION AND FUTURE WORK

We have reported findings from a 4-week study of an interactive installation called Hearsay. By providing ‘out-of-context’ or de-contextualized audio triggers (*texts*), this explorative prototype was able to engage its users in a variety of intellectual efforts and mental processes such as being curious, ‘seeking to solve puzzles’ or self-reflection. The design consideration in Hearsay was that leaving out contextual information can provoke users to mentally fill in this gap and speculate about what is missing, hence, to try *re-contextualizing* the trigger, potentially leading to meaningful experiences such as self-reflection.

Our interactive installation employed cues that were downloaded from the Austrian newspaper derStandard. Consequently, the prototype revealed insights into society and the participants’ standpoint in relation to that society. Thereby, we also observed processes of autobiographical memory, as the users of Hearsay related the other people’s comments to their own life. In conclusion, we have provided a case where the design concept of de+re-contextualizing memory cues was employed for creating a thought-provoking interactive system. As a next step, we plan to study an augmented memory system, which explicitly aims at supporting autobiographical memory by employing de+re as a design concept. The idea of this new prototype is to partially mask personal photographs and thus put selected parts of these images *out of context*.

From a theoretical perspective, the Hearsay installation represents one particular instance or design artifact, which employs the potential Strong Concept of de+re. The development and success of additional systems (e.g., an augmented memory system as suggested in the above-paragraph) will show whether the proposed design concept of de+re is useful in more general terms and whether the principal one day ‘proves’ as ‘true’ intermediate-level design knowledge (i.e., whether it proves to be a ‘true’ Strong Concept).

While we conducted this study to explore de+re as a Strong Concept, for future work, it seems also fruitful to focus on Hearsay as piece from Critical Design [2]. The installation’s great potential in unveiling use habits in the consumption of news stories including social commenting functions and its influence on public opinion was already evident, for example, in section *Provocations and Food for Thought*.

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