Infusing Humor in Unexpected Events

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Abstract. In this paper, we focus on humor facilitators, a type of humorous agents meant to act as mediators between unexpected events occurring in smart environments and the human agents. More specifically, we present a case study in which fictional ideation and narrative dramatization are combined to achieve humor facilitation. We implemented a test bed for the simulation of an interactive environment. Then, we carried out an empirical evaluation with human subjects, aimed to assess the contribution of narrative comments to the humorous effect. The results show first evidence that fictional comments, delivered as dialogue acts, increase the humor response in a statistically significant way.

1 Introduction

> A comedian does funny things. A good comedian does things funny. — *Buster Keaton*

A humorous agent in a smart environment should be able to detect potentially hilarious events and communicate them in such a way to induce humor appreciation in human agents. Nevertheless, humor detection in interactive and dynamic contexts is a challenging task and no significant progress has been done in the past decade.

Nijholt [14] discussed a possible methodological direction for connecting event detection in smart environments and humor generation and proposed to focus on the incongruity of events. Instead of detecting humor directly, the humorous agent should identify incongruous events and use comic strategies to reframe the incongruity as humorous. It would act as a mediator between unexpected events and humans so that even events not typically perceived as funny could be reframed as funny. The underlying claim is that what makes an event seen as humorous depends not only on the event itself but also on its interpretation. We refer to this type of humorous agents as *humor facilitators*. At best of our knowledge, no substantial attempts have been made to advance computational humor in this direction.

In this paper, we present a case study in which fictional ideation and narrative dramatization are combined to perform humor facilitation. More specifically, we hypothesize that a creative narrative re-interpretation of unexpected events occurring in smart environments, expressed as narrative comments or dialogue

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acts, can reframe the ongoing situation as humorous. We implemented a system for the simulation of a smart environments as a canvas showing interactive animations of geometrical shapes. Then, we carried out an empirical evaluation with human subjects of the contribution of narrative comments to the induction of humor appreciation. The results show first evidence that verbal comments, communicated as a narrative and dramatized as dialogue acts, increase the humor response in a statistically significant way.

The remainder of this paper is organized as follows. In Sect. 2, we give an overview of the previous work on humor facilitation and related topics. In Sect. 3, we describe the proposed approach. Section 4 presents the exploratory evaluation. Finally, conclusions are discussed in Sect. 5.

2 Background

2.1 Smart Environments, Interactive Humor and Unpredictability

A Smart Environment may be defined as a region of the real world that is extensively equipped with sensors, actuators and computing components [16]. Over the years, smart environments are becoming a common aspect of the real world. Web-connected smartphones, social networks, internet of things, or multiplayer online games are producing a society in which humans and computational devices are constantly interacting. Smart environments are conceived as spaces in which "networked devices work continuously and collaboratively to make lives of inhabitants more comfortable" [3]. Therefore, it is natural to consider humor as a potentially effective way to improve the human experience in a smart space.

As widely reported in the literature, there are several types of humor and, for each type, an impressive number of humorous techniques. However, only a selected subset of them seems to naturally fit to smart environments. For the sake of simplicity, we cluster the main types of humor in two groups. The first group contains joke and pun generation, which have been the dominant subject of research so far in computational humor [6,12,17]. We refer to this group as *non-interactive verbally expressed humor*. The term "verbally expressed", as discussed by Ritchie [18], includes both verbal and referential humor. The second group contains humor types that seem more naturally occurring in interactive and social environments: *conversational humor*, *physical humor*, *spontaneous humor*, *incidental humor*, and *visual humor*. We refer to this group as *interactive humor*.

Real world environments are largely unpredictable. Most actions, such as kicking a ball or turning over an omelette are, to a good extent, indeterministic. Only a subset of world events can be modeled computationally. This is the reason even the most sophisticated robot "struggles" to act in an open environment with non-determinism and partial observability [1]. On the other hand, unpredictability is a potential source of humor. Unexpected events and, in particular, unexpected outcomes of either human or computational agents can, in specific contexts, be perceived not only as surprising but also as funny. Humor is a social phenomenon, and real-world environments are typically populated by

more than one human to either laugh with or at. Therefore, smart environments are suitable for exploring interactive humor.

2.2 Humor Facilitation

In his characterization of computational-humor generators as humorous agents, Nijholt identifies two key aspects. The first one is the appropriateness of humorous acts. A humorous act can be a witty remark or a joke uttered during the conversation. The quality of a humorous act is not only in the content but also in its appropriateness, based on "an assessment whether or not to produce the remark at that particular moment" [13]. The second aspect is the possible role of the humorous system as a facilitator of humor. A humor facilitator is a type of humorous agent capable of detecting events occurring in a social environment and unexpected for human agents, and make them perceived as funny [14,15]. In the context of distributed computing, mediators and facilitators are components designed to ease the coordination and the communication among agents [19]. In the case of humorous agents, the term 'facilitator' refers to the capability to increase either the probability or the intensity of the humor response.

An early attempt to mediate user's experience of information spaces with interface characters was performed with *Agneta and Frida* [7]. They are "two animated female characters – mother and daughter –[...] watching the browser more or less like watching television". Now and then, they utter previously scripted comments most of which are intentionally humorous. The comments are produced as response to user's activity such as clicking a link or dragging the mouse over an image.

The combination of humor and interface characters has been increasingly included in the design of computer games [5]. *Game presenters* are artificial characters delivering comments based on game actions and adapted to players' social profile [9]. A step forward in the achievement of humor facilitation is the game Portal. It is a computer game, developed in 1997, in which the player is engaged to interact not only with a virtual environment but also with a number of synthetic characters [2]. The main character is GLaDOS, playing the role of the antagonist. During the game, the player delivers comments, most of which humorous, in response to the player's actions or other types of events. Most interestingly, it employes comedic strategies and forms of conversational humor, in some cases combining deception and sarcastic comments to make fun of the player [8]. The main limitation of this system is that the comments are manually scripted, since the system has not the capability of autonomously analyze a new event and interpret it in a funny way.

2.3 Fictional Ideation

In our research, we explored fictional ideation as a strategy for humor facilitation. Fictional ideation is a process consisting of the production of novel and valuable ideas meant to describe some aspect of an imaginary world. The generation of fictional ideas is often used as the inspirational basis for the production

of artifacts such as poems, paintings, songs, or games. In the context of computer science, automated fictional ideation has been studied as a computational creativity task. A large-scale study of automated fictional ideation is the research subject of the WHIM Project[1] [10]. Although the project is mainly focused on the generation of narratives, it aims to generalize its achievements to a broader class of creative artifacts.

Several strategies of ideation are currently under study. However, all of them are meant to generate a simple narrative idea, represented as a short sequence of story steps called *mini-narrative*. These short plots are represented in abstract form, yet capable of being "textually rendered" in different possible ways. For example, one of the components of the What-If Machine is @MetaphorMagnet, a Twitter bot designed to produce and deliver fictional ideas as tweets [23]. The What-If Machine employs several knowledge resources, such as ConceptNet [11], a collection of causal links expressing either promotion or demotion [24], or a set of narrative arcs representing the transformation of fictional characters in a story [21]. Either the availability or the specific development of these resources allowed us to implement several ideation strategies, based on subversion [22], irony [20], or the adaptive response to events from breaking news [23].

3 Proposed Approach

Our research on humor facilitation is aimed to investigate to what extent it is possible to transform a non-humorous event in a humorous event. To restrict the context more precisely, we make two assumptions: (1) The event under study is not typically recognizable as humorous; (2) the facilitator's comments increase the humorous performance (i.e. humorous rate or average funniness) in a significant way; (3) the event is unpredictable.

3.1 Observed and User-Caused Events

The humor facilitator induces (and reacts to) two types of events: *observed events*, occurring without intervention by users, and *user-caused events* consisting of user actions on the interactive canvas.

By running a procedure for the fictional narrative ideation, the humor facilitator represents the animated objects and their interactions as fictional characters and their interactions as fictional events. For example, if the animation shows two colliding objects, one larger than other, their collision may be interpreted as the smaller one is being hit or punched so that it will be described as vulnerable or miserable. Moreover, narrative generation may employ irony to express disparagement toward the target character. For instance, if a nice geometrical figure collides and then becomes smaller and flattened, the humorous agent may present this event in an ironic way, describing the transformation of a "beautiful star" into a "useless junk".

[1] www.whim-project.eu.

In the case of user-caused events, the user behavior is the source of the ironic narrative generation. User interaction consists of clicking and dragging the mouse on the screen. To transform drawing actions in unexpected and potentially funny provoked events, the agent could display a form of deceptive behavior, showing unexpected consequences of the user's action. In the design of this functionality, we were inspired by *FugPaint*, an "antagonist" or "misbehaving" painting tool developed as a creative project [4]. In this system, the painting markers are displayed in different ways respect to the pointer position, thus producing unexpected drawings. According to Fry, the program is aimed to tense users, keep them engaged for an extended amount of time, and induce humor.

3.2 Humor Facilitation by Fictional Ideation

We focus on fictional ideation process as the core functional element for achieving a form of humor facilitation. An "ideation-based" humor facilitator should be able to detect a potentially humorous ongoing situation or unexpected event and, then, generate an appropriate sequence of narrative comments. The automated fictional idea generator would perform a narrative interpretation such that the event could be represented as a fictional event and the entities involved in the event described as fictional characters.

4 Evaluation

As a preliminary experiment, we implemented a simple virtual simulation of a smart environment, which allows us to develop easily a set of interactive animations of simple geometrical figures. Then, we performed an empirical evaluation with human judges, aimed to study the humor facilitation through narrative comments. More specifically, we hypothesize that the communication of narrative comments can produce a significant increase of the humor response.

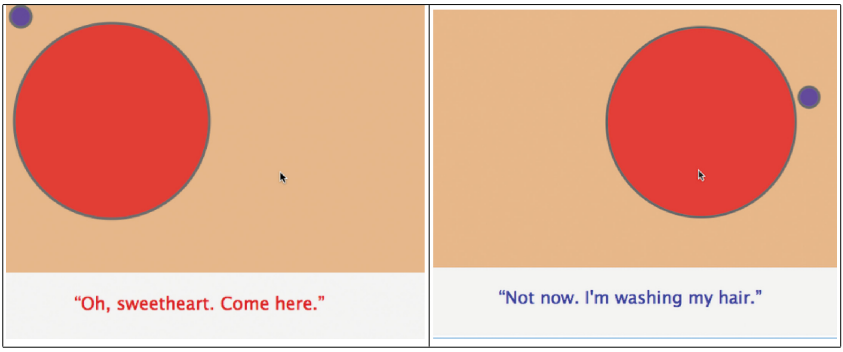

Fig. 1. Two screenshots of the animation and related textual comments.

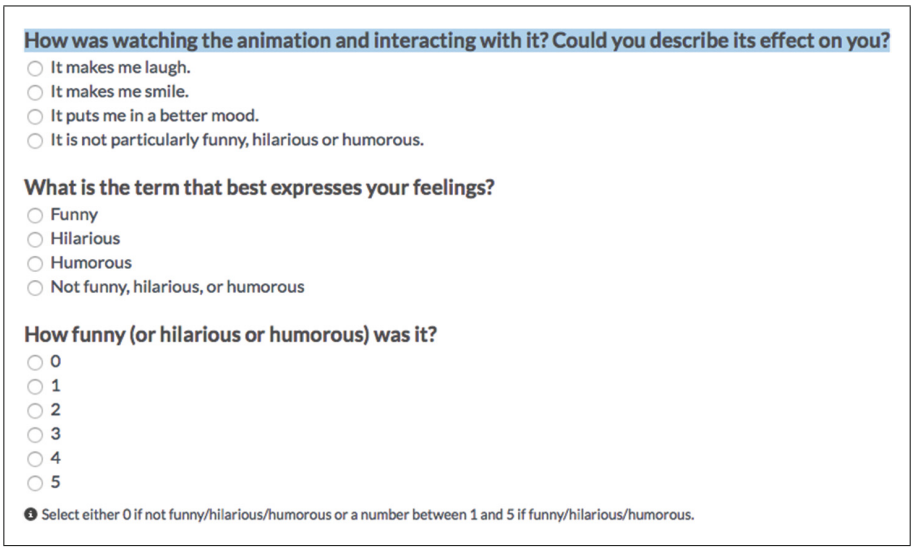

Fig. 2. Questions to the subjects.

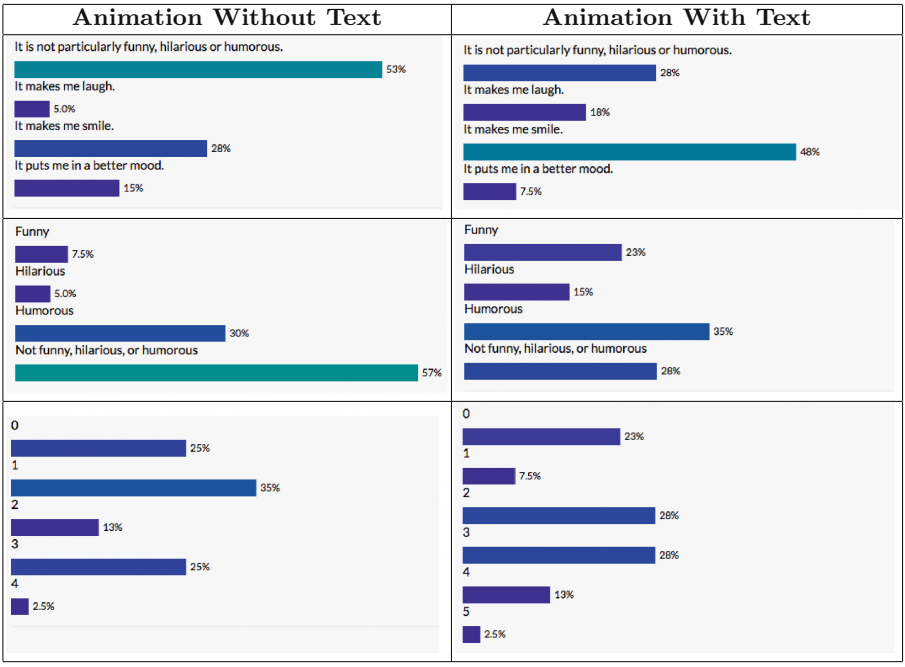

Fig. 3. Histograms cumulating the responses of the subjects to the animation without and with textual comments.

First, we developed an interactive animation in two different versions, each displayed in a canvas and uploaded as a web application[2]. In both versions, the animation shows two circles with different sizes and colors, moving around the canvas area. The large blue circle tends to follow the smaller red one and collides repetitively. After a few seconds, the user is requested to click on the screen. Suddenly, the size of the two circles changes until they invert sizes and behaviors: now the red circle is attracted by the blue one and tends to collide. The overall behavior of the two circles makes them look as living entities. The change of behavior after the click is supposedly unexpected, yet not meant to be humorous.

In the second version, the interactive animation is paired with a textual description expressing a fictional idea: the blue circle is "in love" with the red one. After clicking, the two circles are claimed to have been married and, then, the roles are inverted. The red circle is described as a wife nagging a lazy husband. The narrative comments, dramatized as dialogue acts, aim to depict the two circles as fictional characters, and the overall situation as a short narrative. In this experiment, we scripted the dialogue by hand, even though with the aim to employ fully automatic fictional ideation and textual rendering in the future next stages of this research (Fig. 1).

We used CrowdFlower[3], a crowdsourcing service, to hire subjects and collect their judgments. We performed two assessments, one for the animation without text, and the other one for the version with text. 40 different subjects evaluated each animation. Each participant was invited to look at the animation, to click when requested and to report the numeric code displayed at the end of the animation. This trick allowed us to filter same possible scammers. Then, the subjects were invited to assess their experience of the animation after clicking.

The questionnaire reported five questions, three of which (shown in Fig. 2) about humor appreciation and the other two about surprise. The first question assesses the occurrence and the type of humor response (*binary funniness*). The second question evaluates the lexicon used to express humor appreciation. Finally, the third question aims to assess the intensity of the humor response (*graded funniness*) on a scale from 1 to 5. We checked the coherence across the answers as another way to filter potential scammers. The last two questions were asked to assess the possible surprisingness of the animation (*binary surprise*) following the user's action and its intensity (*graded surprise*). The aim was to study a possible correlation of surprisingness and humor appreciation. For the analysis of the results, we then measured the effectiveness of the humorous effect using two derived variables: *funniness* and the *humorousness*. The former is defined as the average value of the graded funniness for a given sample of judgments. The latter is defined as the rate of judgments of binary funniness with value "Yes". In this way, we have two different dimensions respectively representing the intensity of the humor appreciation and the probability to induce the humor response (Table 1).

[2] The animations can be accessed at http://valitutti.it/papers/hcii-2016/index.html.
[3] Available at www.crowdflower.com.

Table 1. Values of humorousness, funniness, and surprisingness according to the animations respectively without and with textual comments.

	Humorousness	Funniness	Surprisingness
NO-TEXT	0.44	1.44	1.62
WITH-TEXT	0.71	2.47	2.39

We carried out a permutation-based statistical analysis of the variation of humorousness and funniness. We implemented the null hypothesis that a constraint has no effect by randomly swapping results between the two sets. In this way, we obtained empirical p-values for each variable and a corresponding couple of samples. All the variations are statistically significant ($p < 0.02$ for humorousness and <0.005 for funniness). Moreover, we applied the Wilcoxon Sum Rank test to the two sets of graded funniness. Even in this case, we obtained a p-value <0.005 by the permutation test. Applying Wilcoxon Sum Rank test to the variation of mean surprisingness, we obtained $p < 0.02$. Finally, we measured the correlation between graded funniness and surprisingness in both samples. The value of correlation is 0.68 in the case of NO-TEXT sample and 0.90 in the case of WITH-TEXT sample (Fig. 3).

5 Conclusions and Future Work

We focused on a particular type of humor facilitation, consisting of a two-step process: detection of an unexpected event and its reframing by delivery of fictional comments. The approach is based on the use of fictional ideation as a way to re-interpret the unexpected situation as potentially funny. To perform and test a computational implementation of the proposed approach, we adopted a simple way to simulate a smart environment as a canvas displaying interactive animations.

We conducted an exploratory study about the role of fictional comments, dramatized as dialogue acts, to the process of humor facilitation. We defined two variables as measure of the humorous effect – humorousness and funniness – meant to express, respectively, the probability and the intensity of the humor response. The results of the experiment show that both variables increase significantly if the situation is described and dramatized with fictional comments.

In principle, several types of humor facilitation could be designed for smart environments. A major problem is the unpredictability of potentially humorous events. We proposed to transform this limitation into a strength and focus on unpredicted events. In the proposed approach, we separate the detection of unexpected and potentially incongruous and humorous events from the process of providing a semantic frame, emphasize their incongruity and reframe incongruity as funny.

The system implemented for this research is meant to be the first step of a larger class of prototypes capable of simulating different types of smart environments, and employing various techniques for modeling and reframing events

as humorous. We need to test the effect of the narrative interpretation and the impact of the dramatization through dialogue acts. We will develop a resource for connecting a large set of visual objects – such as geometrical shapes, properties, dynamic behaviors – and interactive events as fictional characters and narrative events, respectively. Finally, we aim to develop a robust and scalable computational framework for the design and implementation of automated humor-facilitation scripts for a wide variety of smart environments.

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