



## Full length article

## Types of humor that robots can play

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## ARTICLE INFO

## Article history:

Received 26 April 2015

Received in revised form

18 November 2015

Accepted 29 January 2016

Available online xxx

## Keywords:

Social robots

Humor

Social presence

Social attraction

Facial expression

## ABSTRACT

Although humor is a well-known social lubricant defusing a complicated conflict between two parties, the efficacy of humor in human–robot interaction has barely been tested yet. This study compared the characteristics of humor performed by a robot and human to identify the possible type of jokes that a robot may play.

In the experiment, a human actor performed disparaging – racist and sexist jokes, and non-disparaging (human condition and sexual) jokes, and a robot counterpart mimicked the same performance. Fifty-eight university students, 30 male and 28 female with mean age 23.10 ( $SD = 2.00$ ), watched the randomly assigned jokes performed either by the robot or the human actor. The participants rated perceived humorousness, offensiveness, and willingness to share the joke with others, the perceived social presence and social attractions of the actor. The result showed that participants perceived non-disparaging jokes to be more humorous when performed by the human actor. On the other hand, the participants exhibited less disgust toward disparaging jokes when they were performed by the robot actor. This shows that humor can be used as an effective way to enrich the interaction between human and robot; but the acceptable types of humor should be carefully selected.

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## 1. Introduction

The shift of robots from the manufacturing sector to various other commercial domains, including the service sector, has raised the issue of the general public, who are unfamiliar with robots, learning how to interact with robots (Breazeal, 2003a; Dautenhahn, 2001; Kahn, Gary, & Shen, 2013; Kahn et al., 2012). Interacting with a robot in a social setting is different from the conventional human–machine interaction; the robot should perform social activities that satisfy the user not only functionally but also emotionally. One notable way to improve the interaction between humans and technological systems is to design an artificial agent that mimics the behavior of another real being (Lee, Peng, Jin, & Yan, 2006; Nass, Steuer, & Tauber, 1994). Social presence of an agent is the extent to which people treat the embodied agent as a social being (Bickmore & Schulman, 2006; DiSalvo, Gemperle, Forlizzi, & Kiesler, 2002), and this has been associated with

enjoyment and acceptance of the technology (Heerink, Kröse, Evers, & Wielinga, 2009). Social presence has also been found to encourage users to treat robots like social agents (Lee, Jung, Kim, & Kim, 2006; Lee, Peng, et al., 2006). By treating a receptionist robot as they would a human receptionist, for example, users can apply existing interpersonal social skills to human–robot interaction. Thus, a number of attempts have been made to combine human characteristics with social robots, such as anthropomorphizing the external shape (Bartneck, Kanda, Mubin, & Al Mahmud, 2009; Lee, Jung, et al., 2006), implementing a natural voice communication (Isbister & Nass, 2000), promoting emotional expressions (Breazeal, 2003a), embedding a personality (Lee, Jung, et al., 2006; Lee, Peng, et al., 2006; Tay, Jung, & Park, 2014), etc. This is an important dimension in human–machine interaction, especially for novice users, to help users overcome anxiety and poor self-efficacy produced by inexperience and limited knowledge of technologies.

Among the anthropomorphic social traits introduced to improve the social presence of a robot in human–robot interactions, emotion has been considered as one of the most effective and important factors to facilitate and enrich communications. However, the application of emotion in human–robot interaction is not as simple as replicating the findings of interpersonal

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communication between humans, as several studies have reported that they *do* have differences (MacDorman, Green, Ho, & Koch, 2009; Tinwell, Grimshaw, Nabi, & Williams, 2011). These phenomena underlie Mori's (1970) Uncanny Valley, which asserts that familiarity increases steadily as perceived human-likeness increases, then drastically decreases just prior to absolute likeness, causing a valley-shaped dip. Users' responses become positive if a robot looks or behaves similar to a human. However, when the robot becomes almost, but not perfectly, like human beings, users tend to show strongly negative responses. Along this line, it is necessary to test whether certain emotional communication is effective when applied to the human–robot interaction since humans' emotional responses are neither simple nor straightforward. Of the various emotions, this study focuses on humor since it is able to generate strong, positive results when used appropriately in interpersonal communication by, for example, improving relationships in the workplace (Mesmer-Magnus, Glew, & Viswesvaran, 2012), encouraging creativity and attentiveness, and facilitating comprehension in a college classroom (Lei, Cohen, & Russler, 2010). Similarly compelling and encouraging results have been discovered when humor is used both at organizational and intrapersonal levels (Blackford, Gentry, Harrison, & Carlson, 2011; Capps, 2006; Humphreys, 1990; Szabo, Ainsworth, & Danks, 2005). Humor has been used as an effective tool to achieve various mediated communication goals, such as enhancing attention, comprehension, persuasion, source credibility, and source liking in advertising and marketing campaigns (Weinberger & Gulas, 1992). Despite the great potential of humor, whether humor can potentially facilitate social interactions between humans and robots, too, has not been tested thoroughly. With only a handful of studies focusing on this area (Knight, Satkin, Ramakrishna, & Divvala, 2011; Niculescu, Dijk, Nijholt, Li, & See, 2013; Nijholt, 2007), this potential is still far from being realized. Thus, this study investigates the factors making possible a successful humor interaction between humans and robot. To fulfill this objective, this research will compare and contrast the effect of using different types of humor on both human–human and human–robot interactions.

## 2. Background

### 2.1. Theory of humor—the incongruity resolution theory

Understanding the mysteries of humor has fascinated many researchers for a long time, as evidenced by the wealth of literature on the subject. In spite of the several plausible theories explaining humor, the general consensus is that we have yet to reach a neat model that can predict humor in any circumstance. Arguably one of the most accepted theories is the Incongruity-Resolution theory, which hypothesizes that humor is experienced when an incongruity is presented, usually in the punch line of the joke, and the recipient is able to resolve it, thereby understanding the joke. There are several interpretations of the theory alone, as was reviewed by McGhee (1979). It is reduced to a sound-bite by Wolff, Smith, and Murray (1934), who describe it as “the sudden presentation of a novel, pleasurable contrast to an expectation” (Pg. 342; Wolff et al., 1934). Here, it is important to note the use of the term “pleasurable”, as it is only when the recipient is able to resolve the joke and they can appreciate the humor in the joke.

However, while incongruence and resolution play large roles in eliciting humor, they are not sufficient to fully explain why things are funny or not. For example, we are regularly surprised by suggestions from others that we have not thought of, but we do not always find ourselves amused because of it. The missing element proposed to be diminishment (Apter, 1982). The concept is that the

reinterpreted information should be in some way diminished compared to the initial assumption. One example of this is the following two lines.

1. Are you a parking ticket?
2. You've got fine written all over you.

Reading the lines in sequence would yield a pick-up line that would probably not elicit much humor. However, if they were to be read in reverse, we can theoretically expect the lines to be more humorous. This is because the first sentence introduces a diminished impression relative to the second one. Diminishment has many forms; so long as the reinterpretation is in some way of less importance or value as the previous interpretation, diminishment is present. This is illustrated in a study where participants were informed that they were to either pick up a rat or drawing blood from one. In the elaborately staged experiment, the participants eventually find that the rat is actually just a rubber rat. Subjects who had expected to draw blood from the rat rated the situation as being significantly more amusing than those who had expected only to hold the rat (Shurcliff, 1968). This disparity is plausibly due to the group expecting to pick up the rat experiencing much greater diminishment in their renewed perception of reality.

While the three factors, incongruity, resolution, and diminishment, can make a joke humorous, the perceived humor can also be undermined by another factor which is closely related to diminishment — perceived offensiveness. Although jokes share the aforementioned humor cues, there are many different ways they can be used to elicit humor. These usually form recognizable themes around which the joke can revolve. First, some jokes consistently denigrate, belittle, or malign a social group. These disparaging jokes tackle social restrictions by eliciting humor with exaggerated discriminations such as racism and sexism (Ford & Ferguson, 2004). This may lower the appreciation of the joke because the audience feels as if the joke is a personal attack or it offends their sensibilities or morals (LaFrance & Woodzicka, 1998). An earlier study showed that participants rated the same incident as more humorous when they considered it less sexist (Bill & Naus, 1992). As disparagement often carries negative social consequences, sugar-coating a prejudiced message with humor facilitates the forming of non-serious mindsets, also known as fantasy assimilation, thereby making the perceived disparagement and aggression to be less threatening (Ford & Ferguson, 2004). Thus, it is a balance between how far the joke pushes what is acceptable.

Compared to disparaging themes, which are oftentimes explicitly aggressive and hostile, there are non-disparaging themes that elicit humor by making fun of common, shared human features such as human condition and sexuality (Ferguson & Ford, 2008; Wilson & Patterson, 1969; Wyer & Collins, 1992). These two broad categories of humor are important in social interactions since the implicit messages of these jokes indirectly inform our interaction partner of our views of various subjects. A review of existing literature casted light on different representative types of jokes (Ferguson & Ford, 2008; Wilson & Patterson, 1969; Wyer & Collins, 1992). In Table 1 below, each theme is accompanied by a joke that can be classified under it.

### 2.2. Functions of humor in interpersonal communications

Humor is widely known to play a significant role in society and in both interpersonal and intra-personal relationships (Holmes & Marra, 2002; Nilsen, 1990; Obrdlik, 1942; Stocking & Zillmann, 1976). Frequent use of humor between dating partners, regardless of the geographic distance between them, results in “greater coping efficacy, reduced levels of relationship stress, and increased

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