

Chapter 117

Fuzzy Causal Patterns of Humor and Jokes for Cognitive and Affective Computing

Yingxu Wang
University of Calgary, Canada

ABSTRACT

Humor is an advanced emotional and cognitive ability of mankind that involves complex semantic inference and deep passionate appreciation. This paper presents the cognitive foundations of amusement and a general theory of humor based on the recent advances in cognitive informatics, cognitive linguistics, cognitive computing, and fuzzy causal analyses. A theory of fuzzy false causation (FFC) is introduced that reveals humor and jokes as false causations in fuzzy causal inferences. Base on the FFC theory, a general pattern of humor (GPH) is formalized for analyzing the settings and appreciations of a set of sample jokes. A formal measurement of the degree of amusement in jokes and humor is quantitatively described towards the rational explanation of jokes based on cognitive affective assessment. The formal models of humor and jokes enable machines for humor comprehension and appreciation in artificial intelligence, cognitive computing, computational intelligence, and cognitive robots.

1. INTRODUCTION

Humor and jokes, as well as their comprehension and appreciation, are a special and advanced emotional and cognitive ability of humans that involves complex semantic inferences and deep passionate cognitions. Humor and jokes have been studied since the early phase of human civilization as a curious mental phenomenon. Studies on humor and jokes can be traced back to Aristotle's era where humor was perceived as a comparison between a noble and ignoble person, thing, or behavior in about 330 B.C. (Aristotle 1989; Hurley et al. 2011). Darwin has compared the similarity between the pair of humor and laughter with the pair of tickling and laughter in 1872, which led to the Darwin-Hecker hypothesis of the play metaphor on humor (Darwin 1872; Hecker 1873). Descartes expressed that humor is a mixture of joy and shock in 1649 (Descartes 1649). Since then, scientific studies on humor and jokes have at-

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tracted a wide range of interests in philosophy, psychology, linguistics, cognitive science, brain science, sociology, artificial intelligence, cognitive informatics, and affective computing.

A number of categories of metaphors and hypotheses of humor have been developed such as those of the superiority, surprise, play, incongruity, relief, and semantics metaphors (Minsky 1984; Raskin 1985; Attardo 1994; Ritchie 2001, 2004; Martin 2006; Mihalcea and Strapparava 2006; Hurley et al. 2011; Wang, 2013a). The *superiority* metaphor of humor (Hobbes 1840) describes the comparative aspect of humor by pointing out unrealized problem, mistake, and imperfectness of states, behaviors, or appearance. The *surprise* metaphor of humor describes that the cause of humor is an effect of an unanticipated occurrence of an event. The *play* metaphor of humor considers the biological link between tickling stimuli and laughter where a play is extended from physical to physiological stimuli known as the Darwin-Hecker hypothesis (Darwin 1872; Hecker 1973; Gervais and Wilson, 2005). The *incongruity* metaphor of humor describes a pattern where reasons gone mad (Marx, 2009) by incongruous setting resolved subsequently. The *relief* metaphor of humor describes humor as a releasing process of an emotional tension that causes funny behaviors (Spencer 1860). The *semantics* metaphor of humor is proposed in recent years towards the conceptual models of jokes using *ontology* (Raskin 1985; Wang, 2013a; Taylor and Raskin 2013), *concept algebra* (Wang, 2008, 2011; Tian et al. 2009; Lin & Wang, 2014), *semantic algebra* (Wang 2012b, 2013a), as well as cognitive informatics and cognitive computing (Wang 2002, 2003, 2013b, 2013c, 2014c; Wang & Berwick 2013; Wang & Tian, 2013; Wang et al. 2013).

The sense of humor is one of the origins of human passion and emotions that classifies certain external stimuli into the categories of pleasant or unpleasant. Amusement has direct connection to the deep root cognition and perceptual senses of humans such as emotions, passions, motivations, attitudes, perceptions, and causal inferences.

Definition 1: *Humor* is affective and pleasant effect expressed in human communication that stimulates amusement, jocularity, fun, and laughter.

Humor can be expressed or affected in multiple ways by multiple means to affect the receivers. Humor triggers both laughter and the sense of amusement.

Definition 2: *Amusement* is a basic cognitive state that reflects the recognition of a pleasant event in situation comprehension or a joyful surprise of a misleading causation in thought and inference.

The biological and neurophysiological foundation of the sense of humor is based on the sensory of tickle and stroke stimuli in a peaceful and pleasant environment. The tickle sense is developed in the early phase of lives of infants during interactions with parents and friends. Laughter is a state of passion that expresses pleasant, friendship, and safeness. People share laughter will get closer in a pleasant atmosphere. Therefore, humor and amusement are deeply existed at the root of human emotions and perceptions so that every baby has a funny bone.

Definition 3: A *joke* is a humor expressed in languages or behavior.

Humor making and appreciation are a creative process that exercises the wit sense of humans in an amusing manor. From this point of view, joke and wit are a special creativity that generates novel cross words with ambiguous semantics where the true causation is hidden for realization.

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