Laughter: Psychological Mechanisms, Considerations, Future Directions

Lee CH[1*], Won Y[1], Park JY[3] and Lim J[2]

[1]Department of Psychology, Sogang University, Seoul, Korea

[2]School of Communication, Sogang University, Seoul, Korea

[3]Department of Mechanical Engineering, Sogang University, Seoul, Korea

[*]**Corresponding author:** Chang H. Lee, Department of Psychology, Sogang University, Shinsu-Dong, Mapo-Gu, Seoul, 121-742, Korea, Tel: +82 2 705 8833; E-mail: changhwan4017@sogang.ac.kr

Jeongsub Lim, School of Communication, Sogang University, Shinsu-Dong, Mapo-Gu, Seoul, 121-742, Korea, E-mail: limj@sogang.ac.kr.

Citation: Lee CH, Won Y, Park JY, Lim J (2018) Laughter: Psychological Mechanisms, Considerations, Future Directions. J Brain Behav Cogn Sci Vol.1 No.2: 07

Abstract

The psychological studies about laughter have become one of important trends in emotional psychology. Major previous studies and theories are reviewed about the positive effects and the cognitive mechanisms of the laughter. Several limitations of the previous studies and some thinking points were discussed. As future directions of the laughter study, more elaborated topics are suggested including AI based emotional detection.

Keywords: Laughter; Laughter mechanism; Positive effect; Main considerations; Limitations; Future directions

Introduction

Laughter is one of unique characteristics of human emotional and nonverbal social interactions. Psychologists, neuroscientists, and more recently engineers and computer scientists have been investigating the effects of humor and its corresponding response of laughter for over 30 years. Generally, laughter has been proven to affect human social functions, health, and psychological wellbeing in a positive way. Several theories on how humor and laughter have been elicited psychologically have been proposed, and tried to apply the findings to the daily life and industrial realms. This short review is conducted to introduce the main studies on the positive effects of laughter and its explaining theories. Subsequently, some significant limitations of previous studies were discussed and we suggest on how the limitations can be substantially overcome.

Laughter means the joy and smiling face that comes from certain words or funny behaviors [1]. Laughter usually comes from comic, satire, and humor. Comic is usually the story that is against the schema or a common concept. In contrast, the satire is related with interpersonal interactions in which the words pick out weakpoints or mistakes of people. Finally, humor comes from compassion and attention toward a person or a context rather than the critical aspects. Humor is rather complex concept and described in details in the following sections.

Recently, the major impetus for the popularity of laughter's encouragement in developing countries is due to various laughter training programs. The laughter training programs perform several sessions of educations and training to general public. The common part of the training programs is conducting an intentional laughing in which the attendees smile with loud sound and prolonged durations. The following question is then on what mechanisms this kind of laughing could affect us positively, eventually improving our psychological wellbeing. At the same time, it is a question on what types of laughing would be more effective, and the previous studies did not deal with this question sufficiently.

Several Theories about Laughter

Laughter commonly happens when inversion and repetition occur in daily life. For example, the exchange of the roles between an owner and a slave in TV comedy elicits laughter. And meeting same person in totally different places elicits laughter. Acknowledging the laughter can happen in many different contexts, many theories have been proposed on why the laughter was elicited.

Incongruity resolution theory

Most daily life events and concepts are well suited to our expectation and schemas. When the incongruity among events and concepts sometimes happen, and we try to interpret and understand these incongruities. In this context, a portion of incongruity elicits laughter to us. When disparate planes of thought and meaning are related with same events, the humor can be elicited [2]. One of typical examples of this kind of incongruity to an event happens many time in once popular TV program, the Hidden Camera. The actor or actress perceive the incongruity of concepts on the corresponding event and perplexed. These incongruities elicit laughter to the TV watchers

frequently in the sense the concepts do not match each other and the actor (or the actress) is perplexed. The actor and the actress also usually laugh a lot when he/she found out it was a hidden camera set up.

The superiority theory

It argues that Humor is assumed to arise when we feel superiority and mastery on others or situations. This type of humor related with the traditional comedy programs in which the actor or actress behave silly. Even these days, when the celebrities make a joke or talk about his/her former experience in a lower level manner, we experience the laughter. In addition, the effect is greater when the target person is higher in social status or respected by many people. They are usually a king or famous politician, and behaving silly way like a street layperson makes us laugh. The underlying mechanism is the release of tension from oppression of various social regulations and hierarchy. Specifically, the general public is under strict regulations to abide by and some authority to follow the orders. If this kind of top down influences is broken and the other way around, the people can feel release from tension and thus experience the positive affection.

Arousal and arousal reduction theory

This theory argues that human pursues optimum amounts of arousal in life and humor is elicited when the peak arousal is released [3]. Relatedly, we experience the arousal changes when we listen a unpredictable scenario and experience a humor with the punchline [4]. The scenario before the punchline gradually increases the arousal level and finally the punchline leads us to a more pleasant level of humor. In daily life, when we experience some stressful events or hardship, we sometimes laugh when it is solved without the serious effort or time we expected. For example, when we expected that a certain interview would be very hard and difficult so that we prepared and studied a lot for the possible questions, if the interview was nothing serious, then we laugh with a perplexed feeling.

Social facilitation theory

Another famous theory about laughter, although it is not the one about the very processes of laughter, is about the outcome of laughter. It argues that the laughter is the moderating variable to the social stress, eliciting better human relationship. Specifically, against various types of stress, the laughter plays a role to lessen such type of stress so that it makes more harmonious relationship with others. Isen [5] showed that the group exposed to humor show higher social interaction and more creative problem solving than the control group. Positive emotion related with humor works toward the creative problem solving [6]. The internal mechanism would be that human usually think and act in a positive way or a negative way on most social interactions and events. Here, the humor turns the key toward interpreting the interactions and events as a positive manner.

Positive Effects of the Laughter

Laughter is defined as that certain language or behaviour is perceived to be funny, eliciting joy and smiling face. Laughter has been proven to have several positive effects in our life. They are positive social function, emotional wellbeing, and health. Emotional benefits have been also proven in many studies. Humor and laughter have the positive effect on psychological wellbeing, promoting individual growth, and positive perspectives [7]. Especially, laughter moderates stress and thus reduce the aggressive tendency due to stress [8]. Finally, self-esteem and life satisfaction are also higher for the people with lots of smiling [9].

Secondly, laughter has been proven to have the positive effect for social functioning. In company environment, the boss with high sense of humor have the staff with high job satisfaction and high loyalty to the company [10]. Relatedly, Lee and Kim [11] humor sense resolve the anti-feeling among company workers and lesson the criticism, eventually leading to reduction of tension. They argue that the laughter provides a kind of facilitator to the appropriate communication in these processes. In college school environment, humor related with reliability and openness in personality and better communication ability and life satisfaction. Relatedly, self-criticism without laughter were proven to have negative effect to intimacy and life satisfaction [1].

Finally, laughter has the positive effect to physical health. Cha et al. [12] compared the changes of immune indexes in the blood before and after the laughter therapy. It showed that the blood substances related with strong immune system such as IgN, IgA, and IgM significantly increases after the therapy. Recently, Choi et al. [13] found that the stress related index of Cortisol is significantly reduced just by the behavior of laughing. Park [14] showed that the self-esteem and humor ability are postively correlated, and the person using the humor as the main strategy in stress management showed higher self-esteem than others who use different strategies.

Measurement Techniques for Laughter

Human emotion including laughter can be detected by a number of methods such as speech and face recognitions, gestures and body movements, biosensors etc. Majority of emotional detection methods are speech and and face recognition, and many previous studies have been peformed with these techniques [15]. Some companies appeared to develop softwares and mobile applications for emotion detection. In January 2016, Apple acquired Emotient, an emotion detection technology company. Emotient has a patent for a method of collecting and labeling up to 100,000 facial images a day, supporting a computer's ability to recognize facial expressions. It will be fair to believe that Emotient's emotion recognition technology will start appearing in iPhones and iPads soon. Another company, called Affectiva, claims to have built the world's largest database of facial expressions and their corresponding emotions. It is using its innovations to help media companies, market research firms, and brands get more detailed consumer insights. By 2020, the emotional detection tech

market will be worth over $20 billion and hence would be a highly investible area. Companies like Unilever, P&G, Mars, Honda, Kellogg, and Coca-Cola are using emotion analysis for their audiences [16].

Biosensor based emotion recognition has been less studied compared to speech and face recognition, but has the strong advantage, that is, robustness against environmental conditions. For example, biosensing is less disturbing than being "watched" by a camera as is the case with facial expression recognition, and difficulties exist when recognising emotion from speech, where users are listening to or watching music or movies [17]. Until now, several types of biosensor has been used for emotion detection. Bodily reactions over certain emotion can be monitored and measured by electromyography (EMG), electrodermal activity, skin temperature, blood volume pulse (BVP), electrocardiogram (ECG), and respiration sensors. These bio-signal can be also combined for better and more precise recognition, and moreover, owing to advances in AI, robust and exact emotion recognition is possible soon.

Limitations of the Previous Laughter Studies: Control and Long-term Measurement Issues

Some studies raised the question on the effect of laughter, showing that the positive emotion raised by laughter is same as a control condition. For example, Shahidi, Mojtahed, Modabbernia and Honari [18] did a study comparing the positive effect of laughter and the control activity, physical exercise. They found that the positive effect elicited by the two conditions were pretty much same, showing that laughter is not a special thing to elicit a positive effect in daily life. There is, however, the possibility that the laughter has an additional positive effect such as social wellbeing in a long-term basis.

Secondly, most laughter studies have focused on the short-term effect of a manipulation, lacking the long-term effect of consistent laugh. The study about the effect of the long-term effect of laugh is needed in the fields of medical treatment and personal wellbeing. The primary reason that the long-term laughter study cannot be done is the measurement issues. In other words, it is very hard to measure the laughter in daily life in a long-term basis, because vision or voice based long term measurement induce the privacy issue for person. Therefore, the manipulation effect can be more clarified if there is an improvement in the long term measurement of a positive psychological variables.

The best way of testing the laughter effect in a long-term basis is measuring the psychological wellbeing changes before and after the laughter training, and monitoring the change constantly. If the positive psychological effect is maintained in the laughter training group as compared to a control group in which non laugher materials are trained, then we can make a reasonable inferences that the laughter training made that longterm effect. It is a reasonable conclusion that the training contributes to the long-term effect. A possible problem we can think about is that the psychological change happens because of

changing some attitude on life because of laughter training, not by laughter itself afterward. In other words, the frequencies and the strength of laughter might have not increased after training, but only some attitude toward life changed. Thus, it is still vague the activity of laughter is related with long-term positive effect in our daily life.

Future Directions of Laughter Studies

The long-term effect of laughter

As discussed, the long-term effect of laughter should be studied to sustain the various laughter therapy or laughter training. One way of investigating the long-term effect could be introducing a type of training that ask the subjects to laugh more than usual, and tally the frequencies of laughter by himself (herself). An experimental group is exposed to a training session in which the effective ways and importance of laughing are taught, and practiced in several sessions. And then they are instructed to make a note whenever they laugh in daily life in a long term such months or a year. The control group is exposed to a training session in which nothing related with laughing is trained. If the experimental group showed better indexes of psychological wellbeing and even health parameters, then we can infer the laughter plays a role in these positive outcomes.

Another way of inducing the subject to laugh more in a long term is attaching a kind of device that measure the frequency and the strength of laughing. It has been shown that wearing the pedometer itself can make the person to walk more than not wearing it. Related studies indicate that the psychological consciousness that a target behavior is being measured can motivate the person perform the target behavior [19]. Thus, we can introduce a kind of pedometer that can measure the laughter. Recent advance of nano-technology enable us to make a patch type device that an measure the movement of muscle in face. Several face expression studies have already informed us on the location of the muscle that control the laughter. Thus, if we can develop a sensitive patch that can signal the movement of the muscle reliably and accumulate the signals, then we can obtain one's overall frequencies and strength of laughing in a long-term basis with much objective manner.

Is artificial laughing effective?

Assuming the genuine laughing has positive effects in psychological wellbeing, a next challenging question is on whether the artificial laughing can also have some positive effect or not. The artificial laughing is that the person laughs or smiles intentionally. Some popular laughing training program promote an artificial laughing by encouraging the participants to laugh intentionally and teach them how to laugh effectively. Many participants in the program actually report the change of psychological welling being after participating the program.

An experimental study is needed to know the effect of the training program. One way to test the effectiveness of the training program is dividing the participants of the program randomly and assign one group to the laughing training program, and the other to the control group in which the

training contents is nothing to do with laughing. The problem is that the participants come to the training program expecting the laughing training but receiving contents nothing to do laughing might cause some negative effect.

Another way of testing the effect of artificial laughing is doing pure experimental study in which several groups are divided and then the manipulations are executed. For example, one group is asked to laugh certain number of laughing a day, and the other group is asked to writing something nothing to do with laughing. And then psychological tests related with wellbeing are performed to these subjects before and after the experiment.

What is more effective laughing?

There are many types of laughing. Many criteria can be there to categorize the laughing, but the main two criteria are length and the presence of a sound with laughing. Some laughs are very long, and others are relatively short. Some laughs make a sound, and others make no sound. It is very hard to set up an experiment to manipulate these variables by an instruction.

The most effective way of investigating the effect of type of laughing would be conducting a quasi-experiment for the laughing training group. A group can be assigned to the condition in which laughing with sound is instructed, and the other group can be assigned to the one in which laughing without sound is instructed. And the subgroup in each condition the duration of the laughing is differently instructed. We can know the effect of the different way of laughing in the sense that the contents of training is same and the instruction curriculums are same. The only main problem of this kind of study is that the participants to the laughing training program are ready to laugh from the start. Thus, the results cannot be widely applied to the general public many of whom might not laugh a lot in their daily life. The ideal way of investigating the effect of different types of laughing would be measuring the pattern of laughing by a kind of nano-patches attached to the face. By this way, we can obtain the accumulated individual laughing profiles for a long-term, and analyze them on which laughing styles are related with various psychological welling measures.

Evaluating laughter in a cultural basis

It has been discussed earlier according to the social facilitation and superiority theory that laughter serves discernibly as a social function. Taken into account that laughter fosters a harmonious relationship within a given group or an individual, and may even be influenced under certain signals of dominance/submission or acceptance/rejection, accumulated data may display dissimilar tendencies across cultural variations.

East Asian cultures, for instance, are known to have high power distance and put high value on the harmonious integration of group members. This proximity demands the members to voluntarily interpret and apprehend a given context, thereby expecting a pertinent role or status. According to an extant cultural study, maintaining conformity within a group would lead to a higher self-esteem [20], whilst failure to achieving harmony may provoke perpetual stress.

How may such communication style be combined with nonverbal cues? Laughter may plausibly show a predictable pattern depending on the conveyed emotional information and social meaning. Different tendencies will inevitably require disparate training programs under a certain cultural cluster. Since laughter types according to their communicative meaning or cultural background cannot be rigidly compartmentalized, further studies require background from different fields.

AI based Emotional Detection on Laughter

Of importance to the way of measuring laughing is the current level of technology to measure the emotional types of a human face. The importance of measuring emotion based on the human face has been treated as one of most important future AI technology, and the new field of emotional detection has emerged [21].

As measuring emotional expression including laughter has been developing, the AI based technology on laughter can be applied in our daily life. One area of main interest is making a robot system which can perceive human laughter and possibly express laughter itself. For example, the robot system can analyze the human facial movement and determine which basic emotion the human is expressing. And then the robot can produce an appropriate response (verbal or action) to communicate with the human. If the robot laughs with facial expression or with an appropriate sound, then the emotional common ground can be formed between the robot and the human so that the possible loneliness of human can be reduced up to certain degrees. It has been proven that the robot with emotional communication capability is much more suitable for the family robot than the one without.

IOT based system can be also beneficial to human in the sense that the IOT can detect human emotional state. For example, the audio system IOT can be matched with human emotional state and suggests appropriate music types to elevate the joy or reduce the sadness Similarly, if it is the theater system, it can suggest a movie or a drama that match with human's ongoing emotional state.

A leading emotional detection company, the Affectivia, has developed the smart phone-based face recognition system. It measures the various movement of human face muscle, and can tell the basic emotion such as joy, sadness, surprise, disgusting, and so on. This kind of technology, however, only catch temporary emotion so that the long-term monitoring of the emotion is not possible. Furthermore, the privacy of a user can be violated.

Funding Information

References

1. Jang HS, Lee M (2014) Influence of humor sense and styles on interpersonal relationship. Speech and Communication 25: 308-334.

2. Koestler A (1964) The act of creation. Hutchinson, London, England.

3. Freud S (1926) Inhibitions, symptoms and anxiety. The standard edition of the complete psychological works of Sigmund Freud London: The Hogarth Press pp. 77-175.

4. Berlyne DE (1971) Aesthetics and Psychobiology, Appleton Century Crofts, New York, USA.

5. Isen AM (2003) Positive affect as a source of human strength, In I. G. Aspinwall & U. M. Staudinger (Eds.), A psychology of human strengths: Fundamental questions and future directions for a positive psychology. Washington, DC: American Psychological Association pp. 179-195.

6. Fredrickson BL (2001) The role of positive emotions in positive psychology: The broaden and build theory of positive emotions. Am Psychol 56: 218-226.

7. Min HG (2008) Effects of the coping with humor and humor style of the undergraduate students on the psychological well-being. Master's dissertation, Myongji University, Seoul, South Korea.

8. Martin RA, Lefcourt HM (1983) Sense of humor as a moderator of relation between stressors and moods. J Pers Soc Psychol 45: 1313-1324.

9. Kuiper NA, Grim Shaw M, Leite C, Kirsh G (2004) Humor is not always the best medicine: Specific components of sense of humor and psychological well-being. Humor: Int J Humor Res 17: 135-168.

10. Koo BJ (2008) The effects of humor styles on supervisor to the effectiveness of organization. Doctoral Dissertation, Kyungwon University, South Korea.

11. Lee D, Kim T (2009) The effects of humor sense to the achievement of companies. Business Res 38: 643-667.

12. Cha MY, Na YK, Hong HS (2012) An effect of optimism, self-esteem and depression on laughter therapy program of menopausal women. Korean J Women Health Nurs 18:248-256.

13. Choi JH, Kim KH, Cha SJ, Pyo HJ, Kim YK (2010) Effects of laughter therapy on mood, pain, and stress of mastectomy patients. J Korean Clin Nurs Res 16: 83-93.

14. Park MS (2010) The relationship among humor sense, humor response, perception of stress and self-esteem. Korean J Adult Nurs 22: 418-429.

15. Pantic M, Rothkrantz L (2000) Automatic Analysis of Facial Expressions: The State of the Art. IEEE Trans Pattern Anal Mach Intell 22: 1424-1445.

16. Sharma G (2017) How Emotion Detection Technology Can Make Marketing More Effective. Paralleldots, Gurugram, India.

17. Haag A, Goronzy S, Schaich P, Williams J (2004) Emotion Recognition Using Bio-sensors: First Steps towards an Automatic System. Affective Dialogue Systems 3068: 36-48.

18. Shahidi M, Mojtahed A, Modabbernia A, Honari H (2011) Laughter Yoga versus group exercise program in elderly depressed women: a randomized controlled trial. Int J Geriatr Psychiatry 26: 322-327.

19. Lutes LD, Steinbaugh EK (2010) Theoretical models for pedometer use in physical activity interventions. Phys Ther 15: 143-153.

20. Hall ET, MR Hall (1990) Understanding cultural differences: Germans, French and Americans. Boston: Intercultural Press.

21. Shin D (2007) The technological trends for the emotional detection. IITA Technological Trends 1283: 33-47.