Do individuals with autism lack a sense of humor? A study of humor comprehension, appreciation, and styles among high school students with autism

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Humor helps to build interpersonal bonds and allows individuals to feel closer. Previous research has generally claimed that individuals with autism have difficulty with interpersonal communication and social contacts, but there has been no such consensus regarding the sense of humor among individuals with autism. To address this issue, the present study aimed to compare the comprehension of, appreciation for, and preferred styles of humor between students with and without autism. The samples consisted of 177 high school students with autism and 177 control high school students. Every participant was within the normal range of intelligence. The gender ratio and age ratio of the two groups were maintained through pairwise sampling. The research tools were a questionnaire regarding the comprehension of and appreciation for nonsense and incongruity-resolution jokes, and the Humor Styles Questionnaire. The results show that the students with autism did not comprehend the nonsense jokes and incongruity-resolution jokes as well as the control students did, but they felt greater enjoyment when reading nonsense jokes. The students with autism preferred the nonsense jokes which is featured of less logical reasoning and using homophones for double-meaning. The tendencies toward affiliative humor, self-enhancing humor, and self-defeating humor among the students with autism were not as strong as those among the control students. Only the tendency toward aggressive humor was equal between two groups, showing that the students with autism still have sense of humor but tend to use hostile humor style. It is suggested to investigate the tendency of hostile humor in people with autism, and to provide them with affiliative humor to break the interpersonal stalemate experienced by individuals with autism.

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1. Introduction

Humor plays a key role in social exchanges, as it can serve as an interpersonal buffer and enliven interactions (Zand, Spreen, & Lavalle, 1999). However, individuals with autism generally experience barriers to communication and social
connections (APA, 2013). Consequently, they are thought to be unable to form strong relationship bonds. It has been proposed that these interpersonal challenges could benefit from the charm provided by humor. However, it is not clear how high school students with autism interpret and handle humor. In previous studies, there has been little agreement about the ways in which individuals with autism comprehend and employ humor due the differences in the stimuli employed in the studies, and studying humor in autistic individuals is complicated by the fact that high school subjects are neither children nor adults (James & Tager-Flusberg, 1994; Reddy, Williams, & Vaughan, 2002; Werth, Perkins, & Boucher, 2001). During adolescence, teenagers with autism spend more time in school with their peers, where interpersonal relationships tend to be predominant. Therefore, the present study compared the differences in humor comprehension, humor appreciation and humor utilization of verbal jokes between students with and without autism to examine how individuals with autism experience humor.

1.1. Humor in life

Humor helps individuals feel connected and helps relieve pressure and release anger (Kuchner, 1991). Humor perception and presentation can be studied using the constructs of humor appreciation and humor style (Chan, Chou, Chen, & Liang, 2012; Chan et al., 2013; Martin, 2000; Martin, Puhlik-Doris, Larsen, Gray, & Weir, 2003). The former is defined as an individual’s interpretation of the content of humor, and thus amusement, while the latter is defined as the tendency to adopt a particular style of humor.

Humor appreciation is the ability of individual to sense the funniness of information and recognize it as being humorous (Ruch & Hehl, 1998). Wyer & Collins (1992) proposed the comprehension–elaboration theory of humor, which states that individuals reinterpret the contents of jokes and resolve them after perceiving an incongruity, an action requiring two processes: comprehension and elaboration. Using textual jokes as experimental material, Chan et al. (2013) discriminated between these two processes using an fMRI technique and defined these two processes as the cognition and emotion of the humor. Comprehension is related to the cognition of humor, while appreciation is related to the emotion of humor.

Ruch (1992) categorized humor appreciation materials into three types: incongruity-resolution humor, nonsense humor, and sexual humor. Incongruity-resolution humor is characterized by an incongruity caused by a punch line that must be resolved by logically thinking over the content of the joke. Nonsense humor occurs when the surprising and incongruous elements of a joke cannot be fully resolved even after reflecting over the parts of the joke. Sexual humor is differentiated from the other types by its sexual content. According to these definitions, both incongruity-resolution humor and nonsense humor are amusing to the audience. The main difference between these two types of jokes is the logic of the content, which leads to different strategies of reasoning and the resolution of jokes. Sexual humor is specific in its content, but does not differ from the other types of humor in terms of structure. Thus, in the present study, only incongruity-resolution humor and nonsense humor were investigated to examine the differences among individuals in humor comprehension and humor appreciation of various types of jokes.

Humor style is defined as the expression of a person’s sense of humor (Chan, Chen, Cho, & Martin, 2011). Most researchers have been unable to measure the positive and negative expression of humor (Martin, 2007; Martin & Lefcourt, 1984; Svebak, 1974; Thorson & Powell, 1993). Martin et al. (2003) was the first to suggest the existence of two dimensions of sense of humor: “toward oneself or toward others” and “kind-hearted or malicious”. These two dimensions yield four types of humor: affiliative humor, self-enhancing humor, aggressive humor, and self-defeating humor. The former two are positive humor styles, whereas the latter two are negative humor styles. The Humor Styles Questionnaire (HSQ) was developed to discriminate kind-hearted and malicious humor styles (Martin et al., 2003). The focus of the questionnaire is the measurement of humor styles that spontaneously emerge in real life, especially those styles that are associated with coping with social interactions and pressures.

1.2. How does autism influence the understanding and use of humor?

It is generally accepted that individuals with autism tend to focus on details and do not “see the forest for the trees” – i.e., they tend to ignore the context of information. This tendency makes it difficult to understand jokes (Lyons & Fitzgerald, 2004; Samson & Hegenloh, 2010; Samson, Huber, & Ruch, 2013). Corresponding results from previous studies have shown that individuals with autism also have difficulty comprehending humorous content (Emerich, Creaghead, Grether, Murray, & Grasha, 2003; Ricks & Wing, 1975; Samson & Hegenloh, 2010; Van Bourgondien & Mesibov, 1987). The Theory of Weak Central Coherence attempts to explain why individuals with autism experience deficits in cognitive ability, social interaction, and language (Frith, 1989). It is generally accepted that human information processing uses central and peripheral routes. The central route is responsible for integrating message streams into a complete mental picture. Without the central route, the data perceived by the human brain are just unconnected pieces of information. Individuals with autism have difficulty determining the meaning of an entire message stream due to deficits in central coherence abilities. Therefore, integrating the message at different levels and categories is challenging for individuals with autism. Failures in the use of context for interpretation, due to impaired language abilities, can result in great difficulties in understanding the implications of a message. An over-focus on partial data causes individuals with autism to miss the context of information and reflects relatively weak integration abilities. Thus, the comprehension of verbal jokes is more difficult than pictorial jokes in individuals with autism because the former involve more verbal information (Emerich et al., 2003). How an individual with autism understands verbal jokes is an important topic, as verbal communication is commonly used in social interactions.
People with autism lack a theory of mind, which makes it difficult to recognize the mental state of other people (Baron-Cohen, Leslie, & Frith, 1985; Baron-Cohen, Wheelwright, Hill, Raste, & Plumb, 2001); past research has noted that this lack may lead to favoring comedy and simple jokes (Ricks & Wing, 1975). In one study, the jokes that individuals with autism found funny contained a sequence that was difficult to anticipate from reasoning through the text of the joke, and the types of preferred jokes were neither consistent nor humorous (Emerich et al., 2003). In other words, individuals with autism can still appreciate jokes using different logical concepts, even if they are not able to understand the content. Notwithstanding, Samson et al. (2013), using the 3 Witz-Dimensionen humor test (Ruch, 1992) as the stimuli, found that adults with autism had less appreciation for nonsense jokes and incongruity-resolution humor than a control group did; that is, people with autism did not show more amusement than a control group with such material, despite favoring simple and illogical jokes. However, Emerich et al. demonstrated that people with autism perceived PUN humor pictures to be as funny as a control group did. There is diversity in the reception of different humor materials by people with autism, even if the category is nonsense humor. Furthermore, certain types of nonsense verbal humor jokes feature homophonic double-meanings (Cheng, Chen, Chan, Su, & Tseng, 2013). In sum, it is worth investigating the appreciation and comprehension of nonsense verbal humor by people with autism due to shortcomings in past research and nonsense humor’s frequent reliance on homophonic double-meanings (Cheng et al., 2013). As aforementioned, people with autism have difficulty understanding nonsense verbal humor, and a deeper investigation into the humor appreciation in this group is required.

Previous studies have found that the tendency and intention to use humor appears to be reduced among preschool children with autism (James & Tager-Flusberg, 1994; Reddy et al., 2002; Werth et al., 2001). An increase in the ability to use humor, even after reaching adulthood, has not been found, and similar trajectories have been shown with regard to the quality and quantity of humor (James & Tager-Flusberg, 1994). Moreover, the topics of humor expression used by children with autism mainly reflect personal interests. Neither socially oriented humor nor daily conversation tend to interest individuals with autism (Werth et al., 2001). Samson et al. (2013), in an examination of the humor styles among adults with autism, reported that adults with autism used positive humor less and negative humor similarly relative to a control group. People with autism are not skilled at using affiliative humor, which is beneficial to the establishment and maintenance of interpersonal connections, but their use of aggressive humor, which is harmful to interpersonal connections, is equivalent to the use by a control group. These results are representative of the social relationship dilemmas faced by individuals with autism.

1.3. The present study

Many previous studies have focused pre-school children (Emerich et al., 2003; James & Tager-Flusberg, 1994; Samson & Hegenloh, 2010; Samson et al., 2013; Werth et al., 2001), which highlights the need for more studies on older school-age children. Moreover, these studies contained humor material with both verbal and pictorial elements, which makes it difficult to attribute the understanding or appreciation of jokes to either verbal or pictorial elements. To address these issues, our study included a large sample of high school students and investigated differences in humor comprehension, humor appreciation, and styles of humor found in various types of verbal jokes between students with and without autism. In this way, we can gain a comprehensive picture on humor understanding, enjoyment, and use by people with autism.

According to the Theory of Weak Central Coherence (Frith, 1989) and the theory of mind construct (Baron-Cohen et al., 1985, 2001), students with autism cannot comprehend jokes as well as students without autism do, but they can enjoy jokes that use unusual logic. Although the funniness ratings by students with autism of verbal and pictorial nonsense jokes are lower than the ratings of a control group, students with autism rate double-meaning homophonic jokes to be as funny as a control group did (Emerich et al., 2003; Ricks & Wing, 1975) Because verbal expression is important to interpersonal communication, and because homophonic double-meaning is commonly found among verbal nonsense jokes (Chan et al., 2013), the present study hypothesized that joke comprehension would be lower among students with autism than among students without autism. We also hypothesized that students with autism would prefer nonsense jokes, a humor style characteristic of students with autism. Moreover, previous studies have reported that students with autism tend to use less humor than students without autism do. Because high school students start to engage more with peers and develop social groups, the present study compared the humor of students with autism with that of adults.

Our study consisted of two sets of analyses. To evaluate the comprehension and appreciation of humor, a 2 × 2 mixed design was used. The independent variables were groups (viz., students with and without autism) and joke types (viz., nonsense humor and incongruity-resolution humor). The dependent variables were the degree of joke appreciation and comprehension. Humor styles were evaluated using a 2 × 4 mixed design with groups (viz., students with autism and control students) and humor styles (viz., affiliative, self-enhancing, aggressive, and self-defeating humor) as independent variables and humor style as the dependent variable.

2. Method

2.1. Participants

The participants were 328 high school students, including 164 students with autism and 164 students without autism. Their ages ranged from 12 to 18 years, with an average age of 13.79 years (SD = 1.66). The gender ratio was proportionate to the ratio of the group with autism: 5.83 times as many males as females (male: 140; female: 24). Every participant with
autism was identified by the Clancy Behavior Scale (Hsieh, Sung, & Hsu, 1969) or Behavioral Rating Scale for Children with Autism (Chang & Wang, 2005), as well as being recognized by government special education workers or psychiatrists and receiving a diagnosis according to DSM-IV criteria. All students with autism had (1) a notable impairment in verbal and non-verbal communication, (2) a notable impairment in social interaction, (3) restricted and repetitive behavior, (4) a disability manual issued by the authorities, and (5) an IQ of 70 or above. Each participant with autism was age-, gender- and intelligence-matched with a control student. Every student was invited to participate by their teacher and received a stationary set as a gift after the experiment was completed.

The study was reviewed and approved by the Institution Review Board (IRB) of Taipei Medical University. All participants were informed of the nature of the experiment and provided informed consent before the experiment began.

2.2. Materials and procedures

The materials included two questionnaires: a questionnaire about the comprehension and appreciation of nonsense and incongruity-resolution jokes and the Humor Styles Questionnaire. The items in the questionnaire assessing the comprehension of and appreciation for nonsense and incongruity-resolution jokes were randomly sampled from a set of normal Chinese jokes compiled by Cheng et al. (2013). The comprehension (funniness) of each joke was rated on a 9-point scale after it was read. The mean score of every joke type was calculated; a higher mean score was associated with a greater comprehension of the joke (samples are given in Table 1).

The Humor Styles Questionnaire discriminates four styles of humor: affiliative humor, self-enhancing humor, aggressive humor, and self-defeating humor (Chan et al., 2011). There are 32 items on the scale; each humor style is measured by 8 items and rated on a 7-point scale. Higher scores indicate a stronger tendency to use a particular style of humor (samples are given in Table 1). The internal reliabilities for each humor style ranged from 0.73 to 0.88. A high level of correlation between the score of the Humor Styles Questionnaire and personality, aggressive behavior, and self-esteem assessments has been found in previous studies.

The experiment was counterbalanced: one-half of the participants completed the Humor Styles Questionnaire before reading the humor appreciation materials, and one-half performed completed the tasks in the reverse order.

3. Results

3.1. Comprehension and appreciation of humor

Table 2 shows the means, SD, skewness, and kurtosis of comprehension and appreciation of nonsense and incongruity jokes of participants with and without autism. The value of skewness in the comprehension and appreciation of the different materials were negative, indicating that participants in both groups could understand the point of the jokes presented. The kurtosis value of humor comprehension was leptokurtic in the control group but platykurtic for the individuals with autism; the distribution of the control group scores was more centralized. The distribution of the funniness ratings of the jokes was platykurtic in both groups.

We conducted a 2 x 2 repeated measures ANOVA analysis with humor comprehension score as the dependent variable. Because there were only two types of stimuli, the Greenhouse–Geiss F-value was calculated instead of the sphericity assumption F-value. The interaction of group and joke type was not significant (F(1,326) = 3.32, p = 0.07, η² = 0.01). However, both the main effects of group and joke type were both significant (group: F(1,326) = 25.05, p < 0.001, η² = 0.07; joke type (F(1,326) = 19.22, p < 0.001, η² = 0.06). These results were consistent with our hypotheses (Fig. 1a); the control students

<table>
<thead>
<tr>
<th>Materials</th>
<th>Sample items</th>
</tr>
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<tbody>
<tr>
<td><strong>Humor style</strong></td>
<td></td>
</tr>
<tr>
<td>Affiliative humor</td>
<td>I don't have to work very hard at making other individuals laugh – I seem to be a naturally funny person.</td>
</tr>
<tr>
<td>Self-enhancing humor</td>
<td>If I am feeling depressed, I can usually cheer myself up with humor.</td>
</tr>
<tr>
<td>Aggressive humor</td>
<td>If someone makes a mistake, I will often tease them about it.</td>
</tr>
<tr>
<td>Self-defeating humor</td>
<td>I often try to make individuals like or accept me more by saying something funny about my own weaknesses, mistakes, or faults.</td>
</tr>
<tr>
<td><strong>Humor appreciation</strong></td>
<td></td>
</tr>
<tr>
<td>Nonsense joke</td>
<td>A Chinese unicorn leaves home and flies northwards. He flies to the Arctic where it is so cold that he becomes an ice cream. His two younger brothers don't know where to find him. So, they walk southwards. Finally, they arrive the South Pole and become soft serve ice cream (Note: Chinese unicorn and ice cream have same pronunciation in Chinese).</td>
</tr>
<tr>
<td>Incongruity-resolution joke</td>
<td>A woman walked in to a pharmacy and asked for a bottle of poison. The pharmacist asked why she needed the poison. The woman said was planning to kill her husband. The pharmacist refused to give her the poison. The lady reached into her purse and pulled out a picture of her husband in bed with the pharmacist's wife. The pharmacist looked at the picture and replied, 'Well, now. You didn't tell me you had a prescription.'</td>
</tr>
</tbody>
</table>
understood both types of jokes better than students with autism did, although all participants appreciated the incongruity-resolution jokes more than the nonsense jokes.

Funniness was also analyzed by a 2 × 2 repeated measures ANOVA analysis, and the Greenhouse–Geisser F-value was used again instead of the sphericity assumption F-value. With funniness as the dependent variable, the interaction of group and joke type was significant (F(1,326) = 15.63, p < 0.001, η² = 0.05), as was the main effect of joke type (F(1,326) = 4.16, p = 0.04, η² = 0.01). However, the main effect of group was not significant (F(1,326) = 1.24, p = 0.27, η² < 0.01). Analysis of the simple main effect showed that the funniness of an incongruity-resolution joke was rated lower by the students with autism than by control students (F(1,327) = 6.07, p = 0.01, η² = 0.02), but the funniness of a nonsense joke was not rated differently than an incongruity-resolution joke among the students with autism (F(1,327) = 0.15, p = 0.69, η² < 0.01). Regarding the assessment of funniness of the two types of jokes by group, the nonsense joke was rated as funnier than the incongruity-resolution jokes by students with autism (F(1,327) = 17.96, p < 0.001, η² = 0.05), which indicates that the nonsense jokes were more enjoyable to these students. There was no difference in the funniness ratings of the two types of jokes in the control group (F(1,327) = 1.83, p = 0.18, η² < 0.01).

3.2. Humor style

The means, SD, skewness, and kurtosis of the humor style tendencies of students with and without autism are shown in Table 3. The humor styles of the two groups are normally distributed; only the distribution of aggressive humor in the control group is somewhat centralized.

The assumption of sphericity was examined before the 2 × 4 repeated measures ANOVA analysis was conducted; the value of Mauchly’s W was 0.82 (p < 0.001), which indicates the sphericity was not confirmed. Therefore, the Greenhouse–Geisser F-value was calculated. The interaction of group and humor style was significant (F(3,981) = 19.04, p < 0.001, η² = 0.06). The main effect of group was significant (F(1,327) = 25.18, p < 0.001, η² = 0.07), as was the main effect of humor style (F(3,981) = 173.93, p < 0.001, η² = 0.35).

The results for the humor style tendencies are shown in Fig. 2. Confirming a hypothesis of the present study, the tendency to us positive humor styles was greater in the control students than among the students with autism (Fs(1,1308) > 6.97, ps < 0.05, η² > 0.01); this difference was most apparent for the affiliative humor style. However, no significant difference was

![Fig. 1. Means of comprehension (a) and appreciation (b) ratings of incongruity-resolution jokes and nonsense jokes by students with and without autism.](image-url)
found for the negative humor styles ($F(1,1308) < 2.39, ps > 0.13, \eta^2 < 0.01$). The preference of humor style for the students with autism was the same as that of the control students: all preferred to use a positive humor style over a negative humor style ($F(1,981) > 49.50, ps < 0.001, \eta^2 > 0.10$). Control students were more likely to use an affiliative humor style than a self-enhancing humor style; no difference between the two positive humor styles was found among students with autism.

### 4. Discussion

Previous research has been conducted on humor in individuals with autism from the perspective of humor cognition or humor dispositions (James & Tager-Flusberg, 1994; Reddy et al., 2002; Werth et al., 2001). In this study, a comprehensive view was presented. Humor comprehension and appreciation (the cognition approach) as well as humor styles (the disposition approach) were investigated in high school students with and without autism. Several of the present study’s hypotheses were generally supported by the results. The students with autism exhibited less comprehension of all types of jokes than the control students did. Students with autism favored nonsense jokes over incongruity-resolution jokes, and they preferred nonsense jokes at the same level as the control group participants did. In regard to humor styles, the tendency toward positive humor was less in students with autism than in the control group, but the tendency toward negative humor was the same in both groups.

Consistent with the Theory of Weak Central Coherence, individuals with autism have difficulties integrating partial information from sections of the brain into a central route processing system (Frith, 1989). Individuals with autism tend to focus on small details to the detriment of the big-picture context, making it difficult to understand the implications of jokes (Lyons & Fitzgerald, 2004; Samson & Hegenholz, 2010). As for their social interaction, individuals with autism are generally considered to be lacking in the mental ability to perceive the mental states of others or even their own mental states. Therefore, individuals with autism have difficulty understanding the punch line necessary to get joke (Baron-Cohen, 1997; Samson, Zysset, & Huber, 2008) and, more generally, have trouble with social relationships. This limitation notwithstanding, individuals with autism still have a certain sense of humor, as they tend to appreciate nonsense jokes with inconsistent logic, with particular appreciation for pictures with humorous double meanings. Their ratings of funniness of certain type of jokes are not different from high school students without autism (Emerich et al., 2003). Our study sampled high school students with autism and used the stimuli of verbal jokes, which are more difficult for individuals with autism to understand. The results showed that, despite a weakness in information integrations, high school students with autism could still get verbal nonsense jokes and found these as funny as control students did, even if they did not get the logic or meaning behind the joke. Their preference for verbal nonsense jokes was consistent with the description by Samson et al. (2013). We also found that the funniness of verbal nonsense humor was the same in high school students with and without autism. Thus, people with autism may have similar humor preferences as people without autism within certain humor categories.

People with autism generally have difficulty in communication and social interaction, which leads to fewer positive connections with others (Carter, 2009; Myles & Simpson, 2003). This may be partially accounted for by their humorlessness compared to individuals without autism (Asperger, 1944), particularly with affiliative humor, which helps to build social
connections. Certain mental abilities (Samson et al., 2008), such as regulating one's own psychological status through reflection, are limited in people with autism (Samson et al., 2013). However, we found that individuals with autism did not completely lack a sense of humor; the tendency to use hostile or aggressive humor was the same as the control group tendency. This finding corresponds with past research on teasing directed at people with autism (Samson, Huber, & Ruch, 2011). Due to persistence in behavior styles and social communication, individuals with autism are easily mocked or bullied by peers. During these interactions, individuals with autism may learn and copy the aggressive humor from peers, increasing their tendency to use hostile humor. The results of our study with high school participants are consistent with past research using adult samples (Samson et al., 2011, 2013). Not only does this study support previous results, but it also demonstrates stability across ages for the tendency for individuals with autism to use less positive humor and more negative humor.

4.1. Implications and future directions

The results of this study show that adolescents with autism were unable to understand the implications of the humorous materials as well as high school students without autism and that their comprehension of humorous materials was also lower. However, the present study found that they could appreciate nonsense humor and were also happier while reading examples of such humor than control students were. In other words, individuals with autism prefer nonsense humor featuring inconsistent logic more than individuals without autism (Emerich et al., 2003). Further research is required on how punch lines are perceived by individuals with autism.

Because students with autism showed a tendency toward a specific humor style, they may express a sense of humor as frequently as students without autism do. Aggressive humor is negative, and its explicit humor style features mocking and sneering for one's own benefit. In comparison to the other three humor styles, aggressive humor is more easily observed, followed, and applied by those who are not good at observation and imitation – even by students with autism. In this case, students with autism exhibited the potential to learn to use humor. With training in humor skills and awareness of inner cues, the use of humor by individuals with autism might be improved to address some of the interpersonal challenges they face.

4.2. Limitations

The sampling of the present study was purposive, which limits the inferences that can be drawn from the study results. Moreover, data collection was limited to a self-report questionnaire. Future studies should gather more complete information from multiple sources, such as teachers, peers, field observations, or individual interviews. Random sampling is also suggested to confirm the validity and improve the generalizability of results.

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