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Review article

HUMOUR AND AUTISM SPECTRUM DISORDERS

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Abstract. Humour is universal and one of the most important topics in the study of communication. Humour is also a crucial and essential component in many different contexts of everyday life. One population that encounters difficulties with humour individuals with Autism Spectrum Disorders (ASD). This article describes the factors that play a role in understanding humour for individuals with ASD. A review of articles is presented that focuses on the comprehension of humour. Humour-training intervention for individuals with ASD is also discussed.

Keywords: Autism Spectrum Disorder (ASD), humour, intervention

1 Introduction

Humour is an essential element in everyday life. School-age children use humour to form relationships, to celebrate life through expressions of laughter, to play with words, and as a way of coping with growing up and daily life stress (Dowling, 2013). The effective use of humour can build relationships, improve the quality of life, and promote positive well-being (Martin, 2007). This article explores research that focuses on individuals with an Autism Spectrum Disorder and the effect that this condition has on their ability to detect and comprehend humour. Individuals with ASD have difficulty with social communication and interaction as well as social reciprocity (Diagnostic and American Psychiatric Association, 2013). In addition, individuals with ASD have difficulty with novel situations and social interests.

Early research found that individuals with ASD have difficulty detecting and understanding humour (Asperger & Frith, 1991). However, they have better ability with humour found in slapstick comedy and the less complex language found in simple jokes (Ricks & Wing, 1975). Difficulty

in understanding jokes could be mainly due to literal understanding of irony and sarcasm, as well as difficulty with resolving incongruities.

2 Humour Categories

There are several categories of humour: puns, riddles, and nonsense jokes. A pun is a joke that makes use of the different possible meanings of a word (e.g., *A skunk fell in the river and stank to the bottom*). Riddles contain words that may be used in an unexpected manner (*I have a face and two hands, but no arms or legs. What am I? A clock*). Nonsense jokes may appear at younger ages (e.g., *Knock-Knock. Who's there? Banana. Banana who? Banana peel*). Some jokes contain homophones, i.e. words that sound the same (e.g. What did the chess piece say before bed? Knight knight). Humour that features homophones creates difficulty for individuals with ASD. However, nonsense jokes generally lack homophones, allowing individuals with ASD to better understand these jokes (Wu et al., 2014).

There are different types of homophones (Literary Devices, 2018). Homographs are words that are spelled the same but have different meanings (e.g., *hail* as in an ice storm and *hail* as used in a greeting); homonyms are words with the same pronunciation but different meanings (e.g., *cite, sight, site*); heterographs are words that have different spellings but are pronounced the same way (e.g., *write-right*); and oronyms are words or phrases that sound similar to each other (e.g., *ice cream-I scream*). Nonsense jokes often lack homophones. Given the absence of homophones in nonsense jokes, they are better understood by individuals with ASD (Wu et al., 2014). There are also four humour styles that play a significant role in social interaction.

3 Humour Styles and Social Interaction

There are four humour styles that are relevant for psychosocial well-being (Martin, Puhlik-Doris, Larsen, Gray & Weir, 2003). The Humour Style Questionnaire (HSQ) was developed as a self-report questionnaire to assess these four humour styles. The two main functions are enhancing

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oneself and enhancing relationships with others. This can be achieved adaptively (affiliative and self-enhancing) or maladaptively (aggressive and self-defeating). Affiliative humour is used in supporting group interrelation, such as jokes and humorous comments. Self-enhancing humour is used for stressful circumstances. Affiliative and self-enhancing humour are typically found to be positively correlated with self-esteem and negatively correlated with depression and anxiety. In contrast, self-defeating humour is associated with high levels of anxiety and depression and with low self-esteem (Martin et al., 2003). Aggressive humour involves put-downs or insults targeted toward individuals (*If you think people are laughing at you, they probably are*).

Fox, Dean and Lyford (2013) looked at the use of the HSQ with children. Surprisingly, self-enhancing humour was unrelated to measures of psychosocial adjustment. Aggressive humour was associated with measures of psychosocial adjustment but there were some important gender differences. For boys, use of aggressive humour was associated with high self-perceived social competence and lower anxiety. However, for girls, it was linked with lower global self-worth and higher depression.

4 Understanding Humour in Figurative Language

Figurative humour contains abstract language that expresses irony or a meaning that requires understanding of words that are different from literal meaning. An idiom is an expression with a meaning that cannot be identified by the words that are used. Some idioms are transparent (e.g., *Don't trust them as they will stab you in the back*), and may be more easily understood. There are also idioms that are opaque (e.g., *They are barking up the wrong tree*). The opaque idioms are less well understood by younger children (Nippold & Duthie, 2003). Similes make a comparison between two different subjects (e.g., *He is as stubborn as a mule*), which requires understanding word meanings and entities' characteristics. Metaphors make a comparison between two unrelated entities (e.g., *The exam was a breeze*).

Children aged 5–12 were studied for their comprehension of idioms (Whyte, Nelson & Scherf, 2014). Their syntax, vocabulary, and theory of mind (TOM) abilities were assessed, and children were placed into three groups: 26 children with ASD, 26 typically developing (TD) children matched on chronological age, and 26 TD children matched on syntax age-equivalence but not on chronological age. Children were presented with idioms and answers to assess their understanding. An example of one of the idiom stimuli follows.

I was supposed to go to my friend's house after school on Friday. However, I didn't make it to my friend's house because it slipped my mind.

Children were given possible answers to assess their comprehension of the idiom (p. 130):

You forgot about it (correct answer)
You don't think about it (related figurative answer)
Slip on soap or banana peel (literal answer)
Slipped your mind (restated answer)
I had to do chores (not related).

Findings showed that children with ASD had difficulty comprehending idioms compared to the TD age-matched group. However, the children with ASD showed comparable comprehension with the TD syntax group, showing that linguistic abilities play a role in understanding idioms. Findings also showed that both linguistic and advanced TOM abilities supported children with ASD's understanding of idioms.

Pexman, Rostad, McMorris, Climie, Stowkowy and Glenwright (2011) examined the processing of ironic language for ASD high-functioning children. This study consisted of three groups aged 7;8 to 11, including 18 high-functioning children with ASD, 18 TD children matched with the children with ASD's verbal ability, and 18 TD children matched to the children with ASD for chronological age. Puppets were used to show familiar activities (e.g., hide and seek). In one example, one puppet kicked a ball and scored and the other puppet commented either that it was a terrible play (ironic comment) or a great play (literal comment). The speakers' tones conveyed literal (great play) or ironic intent or criticism (terrible play) or compliment (great play). Findings showed that ASD high-functioning children were able to comprehend irony, most likely due to the speakers' tone (literal vs. ironic). However, children with ASD did not understand that ironic critiques (terrible play) were intended to be humorous, suggesting that these children did not truly understand a speaker's intent. This ties in with the fact that TOM is affected in individuals with ASD.

Another study of children with ASD's understanding of humour presented children with two types of sequenced pictures: literal-literal (a sequence in which a neutral picture was followed by a neutral picture) and literal-humorous (in which a humorous picture followed a neutral picture) (Silva, Da Fonseca, Esteves & Deruelle, 2017). Children and young adults were placed in two groups that consisted of 20 children and young adults with ASD, age 11–20, and 25 TD children and young adults, age 10–22. Participants were presented with stimuli that consisted of objects, landscapes, characters, animals, and actions. Findings were that the participants with ASD responded similarly to the TD participants, as long as the stimuli did not reflect social cues. In other words, there was greater appreciation for the stimuli that portrayed animals rather than humans. This finding showed that the understanding of participants with ASD was more successful for non-social rather than for social actions or events. This study also showed that social interaction abilities also depend on TOM skills to understand speakers' intents.

Wu et al. (2014) examined 177 high school-aged with ASD and 177 TD children's abilities to comprehend nonsense and incongruity-resolution jokes. Humour consisted of affiliative, self-enhancing, aggressive, and self-defeating humour, along

with nonsense jokes and incongruity-resolution humour stimuli. Affiliative humour is characterized by its use in promoting group cohesion through jokes and making fun of things that are humorous to all. Self-enhancing humour involves finding humour in a stressful situation. Aggressive humour is marked by sarcasm, teasing, and ridicule of others. Self-defeating humour involves putting yourself down to gain approval from others. Nonsense jokes are those that employ absurdities to create humour (e.g., "What does a grape say when you step on it?" "Nothing. It just gives a little whine."). Incongruity involves an unexpected shift of outlook, such as an event or story resulting in an illogical conclusion or action. Examples of the stimuli used in this study follow (p. 1389).

Affiliative humour: I don't have to work very hard at making other individuals laugh—I seem to be a naturally funny person.

Self-enhancing humour: If I am feeling depressed, I can usually cheer myself up with humour.

Aggressive humour: If someone makes a mistake, I often tease them about it.

Self-defeating humour: I often try to make individuals like or accept me more by saying something funny about my own weaknesses, mistakes, or faults.

An example of a nonsense joke that was used in this study follows.

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 at the South Pole and become soft serve ice cream (Note: unicorn and ice cream have the same pronunciation in Chinese).

Examples of incongruity-resolution jokes follow. In this type of humour, there is an unexpected shift in perspective (Boyd, 2004). Humour is understood when the listener becomes aware of the incongruity between a concept involved in a certain situation and the real objects thought to be in some relation to the concept. The cognitive ability to detect this type of humour involves the incongruence between a punch line and experience with the concept used in the joke.

I went to a *general* store. They wouldn't let me buy anything *specifically*.

Why do birds *fly* south in winter? It's too far to *walk*.

Children with ASD did not comprehend nonsense and incongruity resolution jokes at the same rate as TD students. However, the children with ASD did enjoy nonsense jokes

that required less logical reasoning and lacked homophones that required understanding meaning. There was equal comprehension of the aggressive humour stimuli for the groups with ASD and TD. This finding is consistent with the theory that the humour associated with individuals with ASD is more aggressive (Asperger, 1944). This may be based on poor mind reading skills (Eriksson, 2013). The absence of mind reading abilities may result in less sensitivity to other people's emotions or feelings (Samson, Huber & Ruch, 2011).

Kana and Wadsworth (2012) examined neural responses associated with puns in a functional magnetic resonance imaging (fMRI) study. Participants consisted of high-functioning ASD and TD individuals, 16–35 years of age. A pun is a joke that makes use of the different possible meanings of a word. Examples of puns used in this study consisted of *My advanced geometry class is full of squares* and *To write with a broken pencil is pointless*. Findings showed an overall activation in brain activity for participants with ASD, mainly within the right hemisphere and in the relatively posterior brain area. However, there was a decrease in the activation in the left hemisphere for the participants with ASD compared with the TD participants. The lack of activation in the left hemisphere may affect the comprehension of ambiguous meaning associated with figurative humour language. The ability to understand abstract language meanings is essential for the comprehension of figurative language humour.

Jones (2009) found that children with ASD produce and appreciate humour to a limited extent based on simpler examples of humour (i.e., rhyme, slapstick, and funny sounds). An interesting study by Weiss et al. (2013) examined whether children with Asperger's syndrome differ from typically developing children in appreciation of simple slapstick humour. Slapstick humour involves some type of boisterous action, such as visual actions (throwing pies in someone's face or other silly actions). Short slapstick scenes and matched non-humorous control scenes were extracted from the animated movies *Ice Age* and *Madagascar*. Twenty-four boys with Asperger's syndrome and 24 age-matched TD controls were tested. Results showed that children with Asperger's syndrome enjoy humorous material as much as typically developing children.

A visual study in which cartoons (line drawings) were presented to adults with Asperger's Syndrome (Samson & Hegenloh, 2010) showed possible difficulty with visual perception. In this study, line drawings may have tempted the participants to focus on visual details rather than on the whole picture. According to Loukusa and Moilanen (2009), individuals with ASD often do not use contextual cues to understand the meaning of what they see. The Theory of Weak Central Coherence proposes that individuals with ASD focus on details rather than a coherent whole. This theory would thus also explain their performance in Samson and Hegenloh's study.

A study by Samson and Antonelli (2013) examined the importance of humour in individuals with Asperger's Syndrome/High Functioning Autism (AS/HFA) and how it relates to life satisfaction and happiness. Thirty-three individuals with ASD were matched with typically developing (TD) participants. Participants filled out scales assessing

character strengths, life satisfaction, and orientation to happiness. Humour was found to be the 8th highest out of 24 character strengths in TD, but only at the 16th position in individuals with ASD. For the TD participants, humour was related to life of pleasure, life of engagement, life of meaning, and life satisfaction. For individuals with ASD, humour was only related to life of pleasure.

5 Humour Intervention for Individuals with Autism Spectrum Disorders (ASD)

5.1 *The Comprehension of Affiliative, Self-enhancing, Aggressive, and Self-defeating Humour*

Wu et al. (2016) developed a training program for adolescents with ASD who were placed into an experimental group and a control group. Training focused on affiliative, self-enhancing, aggressive, and self-defeating humour (described earlier in this paper). Examples of other training stimuli follow, beginning with a nonsense joke and followed by an incongruity-resolution joke (p. 27).

A male deer is walking in a vast forest alone. While walking, it begins running faster and faster and finally becomes a highway (In Chinese, "highway" and "deer" are pronounced in the same way).

After dinner, a mother and daughter are washing dishes, and the father and son are watching TV in the living room. Suddenly, there is the sound of broken dishes. After a moment of silence, the son tells the father that his mother must take responsibility for the broken dish. The father asks, "How do you know?" The son replies, "My mother did not scold anyone."

Findings were that the comprehension of nonsense humour increased in the experimental group, with less progress for incongruity-resolution humour. Incongruity presents difficulty in that the comprehension of this type of humour involves two stages (Vrticka, Black, & Reiss, 2013): comprehension and appreciation. In the first stage, the listener must be able to detect incongruity. In the second stage, the listener must be able to integrate the new information with a positive emotional response. This process is supported by cognitive, emotional, psychological, and social abilities (Martin, 2007), along with the ability to recognize incongruity. These factors may play a role in the difficulty found in individuals with ASD for comprehending incongruity, given the absence of TOM. Following training, the ASD participants utilised affiliative humour. This is an essential type of humour when interacting with others as it involves promoting group cohesion through the use of humour appreciated by all.

A factor that may play a role in assessment or intervention is that individuals with ASD may lack global or integrative

processing (i.e., processing or consideration of a whole entity or a scene) (Simmons et al., 2009). Instead, there is a detail-based style that may not allow for the processing of a full scene (Happé & Frith, 2006). This may affect an evidence-based assessment or intervention of humour when employing visual stimuli. In this case, clinicians can assure that the ASD individual is able to view all the details in a picture and process the visual details. Clinicians should also assess and focus on syntax and TOM abilities (Whyte et al., 2014). In this way, the individuals with ASD will better understand listeners. Clinicians can also teach individuals with ASD to decode word meanings (Kana & Wadsworth, 2012), and teach them words that have similar sounds but different meanings (e.g., *ate-eight*, *write-right*, and *bare-bear*). Better understanding of ASD will help clinicians find the strategies that will support these individuals' understanding of humour.

5.2 *The Comprehension of Irony*

An intervention study examined the comprehension of irony by adults with ASD (Saban-Bezael & Mashal, 2015a), in addition to the study of hemispheric processing of irony. Irony is a type of figurative language often involved in humour and criticism, as in the example of the mother's comment on her child's room. The mother's utterance is ironic because it is based on the fact that the child's room is very messy.

"You should win an award for your clean room."

Participants consisted of 29 adults with ASD and 22 typical adults, with all participants assessed with non-verbal intelligence and vocabulary tests. Initially, all participants were given a questionnaire that contained passages intended to assess their understanding of irony. An example of an ironic passage follows.

"Dan wanted to lose weight and consulted a nutritionist. The nutritionist recommended an appropriate diet and suggested that he begin exercising. Dan likes eating and hates physical activity, and so he did not follow these recommendations. The nutritionist was frustrated with Dan's lack of progression. On their last meeting, she weighed Dan and saw no change. She then said: "Wonderful Dan, keep it up!"

In the intervention phase, adults with ASD viewed irony used in videos, stories, and comic strips. Each clip displayed a situation that ended with an ironic expression. Intervention was based on small groups of 3 to 5 members, with sessions lasting for 30-45 minutes once a week for five consecutive weeks. Sessions began with the introduction of figurative language and irony, with focus on the use of irony in social contexts. Each session presented videos, with participants asked to identify irony in the videos. The sessions also presented participants with short stories that had open endings. Participants were asked to produce either a literal ending or an ironic ending to each story.

Participants were also asked to describe situations that contained irony. Following this intervention, participants completed the same irony questionnaire. Findings were that adults with ASD showed significant improvement in irony comprehension.

The same study examined hemispheric processing by the adults with ASD, using the approach of Saban-Bezalel and Mashal (2015b). This approach employed a divided visual field paradigm (DVF) based on the anatomy of the visual system. In this paradigm, stimuli presented to one visual field are transmitted to the opposite hemisphere only. This makes it possible to stimulate each hemisphere separately. Visual stimuli presented in the right field are projected to the left visual cortex. In the current study, participants were presented with 28 ironic passages, 28 literal passages, and 28 meaningless passages. Each passage could be completed with one of these interpretations (ironic, literal, or meaningless). The following example presents one of the experimental passages, with the ironic ending consisting of the word "perfect."

"Exhausted after a long day at work, David planned to go to bed early. Just as he was ready for bed, he heard a knock on the front door. David opened the door and saw that some friends came by for a visit. David said: "The timing is..."

Participants sat in front of a computer screen, A fixation point appeared at the center of the screen, followed by the appearance of the passage. Next, a fixation point was presented followed by the appearance of the target word. Target words were presented at the right or the left of the fixation point, with processing occurring either in the LH or the RH. When stimuli are presented to the left visual field (LVF), processing occurs in the RH, while information presented in the right visual field is processed by the LH. Findings were that intervention led to hemispheric processing changes in the ASD participants. Following intervention, ASD participants exhibited faster responses for ironic targets relative to literal target words when stimuli were presented to the RH. Findings have shown that adults with ASD process stimuli bilaterally (Saban-Bezalel & Mashal, 2015b) However, processing figurative language with the RH might be less efficient than with the LH. Thus, the intervention study showed that there was a positive change in the abilities of the adults with ASD to process irony, based on the results of the questionnaire and the hemispheric finding. This is an important finding, given that irony is encountered frequently in communication.

5.3 The Understanding of Lexical Humour

An intervention study focused on the understanding of lexical humour by children with autism (Gill, White & Allman, 2011). Lexical humour is based on words with multiple meanings that are frequently found in riddles. Participants consisted of six high-functioning children with autism ranging from

10 to 13 years of age. Prior to intervention, participants were presented with a set of 175 multiple-meaning words followed by a set of six pictures, with vocabulary based on progressive difficulty. In this programme, participants were asked to point to two pictures that corresponded to the meanings for a target word that was printed at the top of the page. This word was also read to participants to assure their understanding. If participants pointed to only one picture, they were asked to point to the other picture that corresponded to the meaning of the target word. This task was administered until children were able to identify at least 40 words that were selected for two meanings and 40 words that children could not identify as having two meanings. Children were then presented with a set of riddles in the Baseline Humour Pool that included multiple-meaning words, as shown in a riddle from this pool.

Where do snowmen keep their money?

- (a) They don't have any money.
- (b) In a purse.
- (c) In a safe.
- (d) In snow banks.

Assessment was followed by teaching children riddles. Instruction consisted of the instructor reading a riddle and circling the associated meaning. Then, it was explained that the target word could be used in two ways. Next, children and instructor made up a sentence using the first meaning of the word. This approach was then used for the second meaning of the word. Children were also asked to draw a picture that illustrated these meanings. Children attended speech-language sessions, with half of sessions devoted to riddle comprehension. Findings were that children made gains in their comprehension of multiple meanings and in their ability to understand lexical riddles. These findings suggest that intervention should consider the use of lexical riddles for developing a better understanding of humour by children with autism.

6 Discussion

Humour can be seen as a social *glue* that helps to foster relationships (Samson, 2013). A better understanding of humour in individuals with ASD helps us understand emotions in ASD. In addition, it is important that we understand which cognitive, social, and affective deficits in individuals with ASD affect the processing and expression of humour. This will help in the understanding of the components that contribute to humour in TD individuals (Samson, 2013). Asperger (1944) described individuals with Asperger's syndrome as humourless and not able to understand jokes. Humour in ASD is becoming increasingly better understood (Samson, 2013). Clinicians could consider the humour styles of children with ASD and work to support their use of humour as a tool to establish friendships and relationships. 7 funding, 8 conflicts of interest and the relevant statements.

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