

## **Teaching Lexical Humor to Children with Autism**

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**Abstract:** Comprehension and production of linguistic humor is an important social, linguistic, and cognitive skill for all children, but it often fails to develop in children with autism. One form of linguistic humor that is based on multiple meaning words and can take the form of riddles or jokes has been identified as “lexical humor.” This study investigated the effects of the Lexical Humor Treatment Program (Gill, White, & Reyes, 2010) on six high-functioning children with autism. All of the children increased their understanding of multiple-meaning words and their ability to answer related riddles on which they had been trained. More importantly, the children were able to transfer their skill in practiced riddles to novel riddles on which they had not been trained. These results suggest that the teaching of humor in the form of lexical riddles might be an important treatment consideration for children with autism.

**Key words:** Lexical Humor; Linguistic Humor; Autism; Asperger Syndrome; Riddles; Multiple Meaning Words; Humor Instruction

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Children with autism and Asperger syndrome (AA) frequently fail to understand, produce or appreciate humor. Studies that have reviewed humor development conclude that non-linguistic humor (such as tickling or slapstick humor) is apparent in some individuals with AA, but that generally, humor skills are not commensurate with overall development. Further, humor development for children with AA is at a much lower level than that of their typically developing peers (Mesibov, 1992; Mesibov & Stephens, 1990; Samson, Hegenloh, 2009; Reddy, Williams & Vaughan, 2002; St. James & Tager-Flusberg, 1994; Van Bourgondien & Mesibov, 1987; Williams & Minshew, 2010).

Humor is composed of so many social, emotional, and intellectual factors, that it seems logical that it is particularly difficult for children with autism (Paulos, 1980). One explanation for the lack of humor development is that children with AA fail to achieve the in-depth self understanding that underlies humor (Asperger, 1992; Frith, 1991; Wing, 1966). Another explanation is that children with AA have difficulty dealing with the occurrence of incongruity, in which the expected fails to materialize and there is a surprise or unexpected conclusion or occurrence (Paulos, 1980). Suls (1972) noted that in humorous challenges the resolution to the incongruity is basically a problem-solving or cognitive task. Children

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with AA might have some difficulty in humor comprehension due to cognitive or linguistic limitations. Additionally, the requirements for social interchange and reciprocity of sharing the humor might be the source of the difficulty for some children with autism (Reddy, Williams, & Vaughn, 2002). Emerich, Creaghead, Grether, Murray and Grasha (2003) found that the concreteness of thinking and the inability to conceive of the meaning beyond the literal verbiage creates difficulty in appreciating humor. Clearly, there are many explanations for lack of humor development in children with AA, making it difficult to pinpoint treatment approaches.

For typically developing children, humor development has been correlated with social, cognitive and linguistic development (Semrud-Clikeman & Glass, 2008; Southam, 2005.) The development of linguistic humor in most children increases with age, beginning in the preschool years and continuing on throughout adolescence and adulthood (Nippold, 2007). Linguistic humor is understandably tied to the development of language, particularly the development of metalinguistic skills and figurative language. Reading levels have also been shown to be tied to the development of humor (Cairns, Walzman & Schlisselberg, 2004; Cain, Oakhill, & Bryant, 2004). Zipke (2008) found that the ability to detect multiple meanings in lexical riddles and jokes had the potential to increase literacy development.

There are many types of humor that require higher level skills in language and cognition. Shultz and Horibe (1974) investigated the development of humor that was based on linguistic ambiguity. They identified four types of linguistic humor: phonological, lexical, syntactic surface structure and syntactic deep structure. Phonological humor is based on the fact that a sound change makes a word sound like another word (e.g., *Why is a clam mean? Because he's SHELLFISH.*) Syntactic surface structure humor occurs when segmentation changes create two possible meanings (*What flowers like to be kissed? Tulips/Two lips*) and syntactic deep structure humor occurs when an entire sentence can be understood in two ways (e.g. *It is too hot to eat.*) Finally, in lexical humor, understanding of two or more meanings of words creates the humor (*What do prisoners talk on? Cell phones*). Another type of linguistic humor, morphological humor (Nippold, 2007), requires that the listener attend to syllables within words and occurs when a bound morpheme can be understood as separate from the free morpheme (*What animal unlocks doors? A monKEY.*) Idiomatic humor (Spector, 1996) is based on understanding of both a literal and figurative meaning of an idiom (e.g. *"I'd like to give you a piece of my mind...but I can't spare it."*)

Verbal or linguistic humor can include such forms as acronym reinterpretation, faulty logic statements, stories, jokes or riddles (Nippold, 2007), and all of the forms contain some type of linguistic ambiguity. One linguistic form, the riddle, presents incongruity in a question-answer format. Schultz's (1974) study revealed that lexical riddles were the easiest type of riddle for typically developing children, ages six through twelve, to solve.

The development of humor is an essential skill for many reasons. Understanding and production of humorous interchanges have been credited with increases in many social and adaptive functions (Goldstein & McGhee, 1972), including peer acceptance, group cohesiveness and skill in interpersonal relationships (Chapman, 1983; Chapman, Smith, & Foot, 1980; Masten, 1986). Lexical humor could be especially important for children since curricula frequently require the understanding of multiple meanings. For example, in the Texas Essential Knowledge and Skills (TEA, 2010) curricula, children from kindergarten through fifth grade are required to "develop an extensive vocabulary" and interpret "figurative language and multiple-meaning words."

For children with AA, the development of linguistic humor is often delayed or nonexistent. However, the ability to understand humor could be an important part of their linguistic, cognitive, academic and social development, as well as their metalinguistic awareness, suggesting that it might be a skill worth developing. One specific linguistic humor subset, lexical humor in the form of riddles, was easily mastered by typically developing school children (Shultz, 1974) and is associated with increases in literacy (Emerich, Creaghead, Grether & Murray, 2003) and so might provide a format for enhancement of humor development for children with AA.

The current study examined the learning of lexical humor (in the form of riddles) and multiple meaning words in six high-functioning children with AA, ages ten years through thirteen years. Researchers first measured whether the children could increase their comprehension of two meanings of

a word when those words were targeted in therapy. Secondly, the study sought to determine if the children could increase their selection of correct responses to lexical riddles (CR) which were based on multiple meaning words after having been trained on those riddles. More importantly, the researchers sought to determine if the children would increase their CR if they knew the multiple meanings of words but were not taught the corresponding riddles. The overriding purpose of this investigation was to begin to tease out whether children with AA could learn how to go about solving lexical riddles, i.e., whether they could transfer the process or skill set which enabled them to answer practiced lexical riddles to the solving of novel lexical riddles.

## METHODS

### Procedures

Six students, who were completing the second year of their master's degree program in speech language pathology, and who were licensed assistants, served as the instructors for the participants. The graduate students were trained to administer the program during a 90 minute lecture and demonstration. They subsequently passed all questions on a test which measured their understanding of aspects of the treatment. Each of the instructors, i.e., graduate students, carried out the treatment in a public school setting and was supervised by a speech-language pathologist holding her state license and her Certification of Clinical Competence from the American Speech-Language Hearing Association.

This study utilized the Lexical Humor Treatment Program (Gill, White, & Reyes, 2010) in a single-subject controlled experiment using a multiple baseline design. This program utilizes a multiple meaning pool (MMP), a set of multiple-choice riddles based on those words, and instructions for teaching. Prior to treatment, the instructors administered the MMP to each of the participants. The MMP of the Lexical Humor Treatment Program consists of a set of 175 multiple meaning words which are each followed by a set of six pictures. (See Appendix A for an example.) The words are organized from least to most difficult based on approximate grade level vocabulary. Participants were asked to point to the two pictures that showed the meanings for the target word. The target word was printed at the top of the page and the examiner pronounced it out loud so that the participant could both see and hear the target word. If the participant pointed to only one picture, the examiner asked the participant to point to an additional picture that showed what the word meant. The MMP was administered until the instructor had identified at least 40 words for which the child could select two meanings (W2M) and 40 words for which the child was not able to identify two meanings (WN2M).

The examiners then administered the Baseline Humor Pool (BHP) which was a set of riddles based on the multiple meaning words. That is, if the participant knew two meanings for the word "school" the corresponding riddle was based on the word "school" (e.g., *Why are fish smarter than ants? Because they stay in schools.*) One part of the BHP included a set of riddles based on the first twenty W2M. The second part of the BHP was a set of riddles based on the first twenty WN2M. This procedure was repeated with additional sets of words as needed until the examiners had collected a list of 40 W2M, 40 WN2M, 20 riddles the child could not answer taken from the 40W2M, and 20 riddles the child could not answer taken from WN2M.

The construction of the riddle format was based on the method used by Spector's (1996) study in which researchers attempted to measure the responses of typically developing children to humor. He found that while typically developing children had trouble explaining why something was funny, they were much more adept at detecting which answer was humorous from a list of choices. In this protocol, riddles were followed by a list of choices and the participant was asked to pick the funny or silly answer. The current study used the same format and included four multiple choice answers, one of which was a literal related answer, e.g., for the question "Why are fish smarter than ants?" the literal answer might be "Because fish are bigger and so their brains are bigger."

Following collection of the responses to the MMP and the BHP, the instructors began teaching the children to answer riddles in the following manner. The riddle was read and the instructor circled the multiple meaning word that it was based on. She told the participant, "This word can be used in two

ways.” She wrote the word and explained one meaning. She then asked the child to draw a picture illustrating that meaning. Next, the instructor and the child each made up sentences using the word’s first meaning. This was repeated using the word’s second meaning. Using the child’s illustration, the instructor then discussed the joke with each of the meanings. For example, if the child had drawn a school building to illustrate the first meaning and a set of fish to illustrate the second meaning of the word *school*, the instructor would point to the pictures and ask something like, “Do you think a fish goes in this school or this school?” “If he went to this school (building), would he be smart?”... “Do fish really go to schools?”... “They really swim in a group, this kind of school.” ...“It would be funny to think they went to a school building.” She then repeated the riddle and asked the participant to circle the word that had two meanings. Then she asked him to identify which meaning was funny. This was repeated for several jokes from the W2M and the WN2M. When the child returned to his speech therapy session the next time, he and the therapist reviewed the previously learned words briefly before beginning a new set. Further, to increase understanding of additional multiple meaning words, the therapist introduced words and explained the two meanings in a similar manner when there was not a corresponding riddle.

The children attended speech/language therapy either once a week for 60 minutes or twice a week for 30 minutes. Half of that time was dedicated to the current instruction, so all children were administered the Lexical Humor Treatment Program for a total of thirty minutes a week. Following administration of the initial MMP, the BHP was administered. Two to three weeks later the BHP was re-administered to determine if there was a stable baseline. Treatment then began. After three weeks of treatment another baseline was administered to determine if the child’s ability to answer riddles had increased. After an additional three weeks of treatment, another baseline was administered. If the child had not answered all of the riddles correctly, treatment continued for another two to three weeks and a final baseline was administered. Treatment was discontinued and a final, withdrawal baseline was administered two to three weeks later.

## Participants

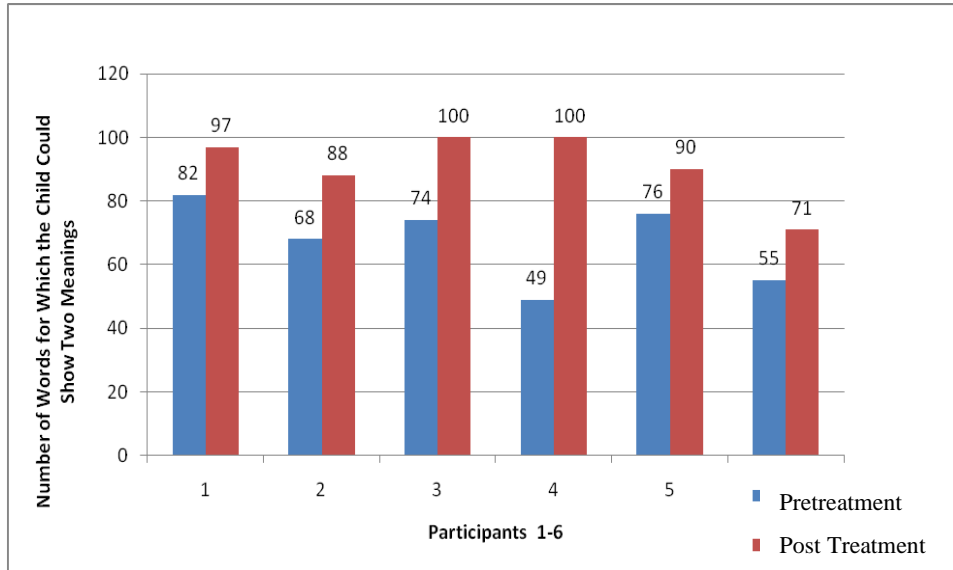
All six children scored at or just below 1.5 SD below the mean on a standardized language test such as the *Clinical Evaluation of Language Functioning -4* (Semel, Wiig, Secord, 2003). They had all passed a hearing and vision screening. Five of the children were diagnosed as having autism and were considered high-functioning and one had been diagnosed as presenting with Asperger syndrome. All six students had individual education plan objectives that included “Increasing vocabulary or semantics” and/or “Increasing understanding/use of multiple meaning words” and/or “Increasing ability to make inferences.” The participants ranged in age from 10 to 13 years. (See Table 1 for a description of the participants.

**Table 1: Description of the Participants**

Participant	Primary Diagnosis	Secondary Diagnosis/Description	Age	Gender
A	Autism	Language Disordered	11 years	Male
B	Autism	Language Disordered	10 years	Male
C	Autism	Pragmatic Difficulties	12 years	Male
D	Asperger syndrome	Behavioral Disorder	12 years	Male
E	Autism	Language Disordered	13 years	Male
F	Autism	Language Disordered	10 years	Male

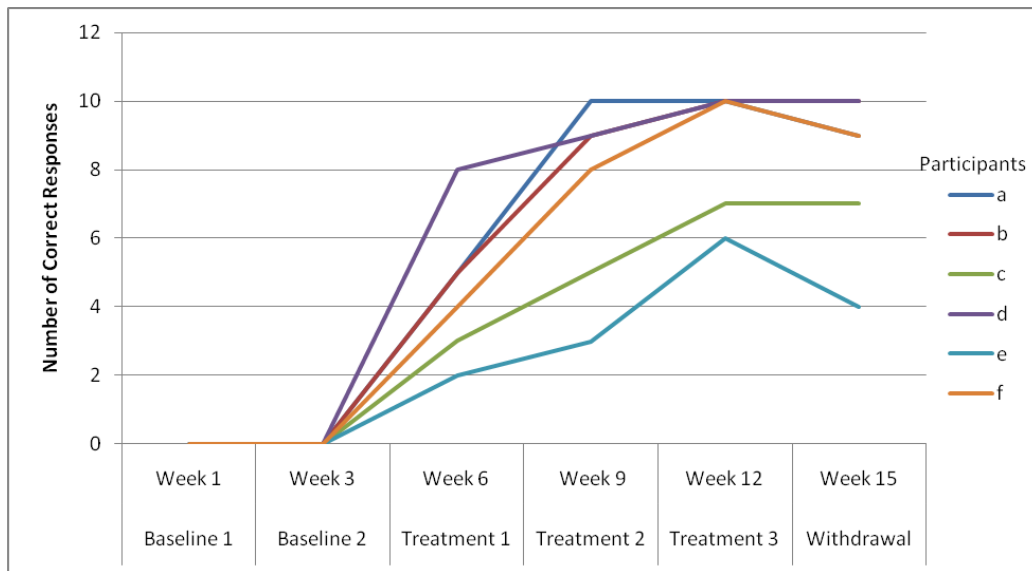
## RESULTS

The first question the study examined was whether participants could increase their comprehension of two meanings of a word when those words were targeted in therapy. All of the children increased the number of words for which they could identify two meanings on the MMP. (See figure 1.) The range of newly acquired two-meaning words for the six participants was 14 to 51 words, with a mean 23.66.

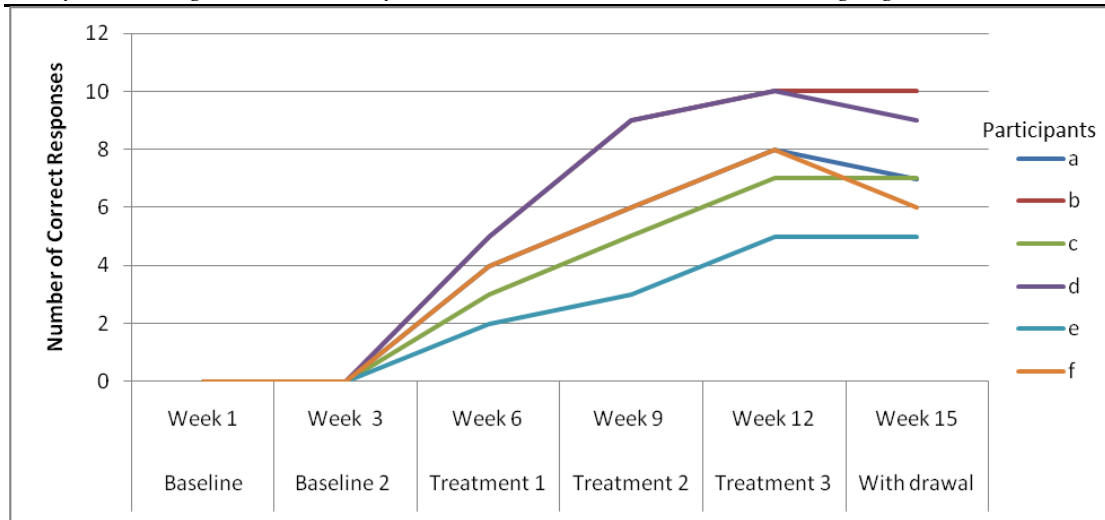


**Figure 1: Number of Words with Two Known Meaning Pre and Post Treatment**

The second question was if the children could increase their selection of correct responses to lexical riddles (CR) after having been trained on those riddles for both W2M and WN2M. Visual inspection of the data, as shown in figure 2 and figure 3, suggests that all children increased their ability to solve treated riddles, to varying degrees. Four of the six children learned all or almost all of the riddles presented in each condition. The data revealed a slight overall decrease following the withdrawal period.

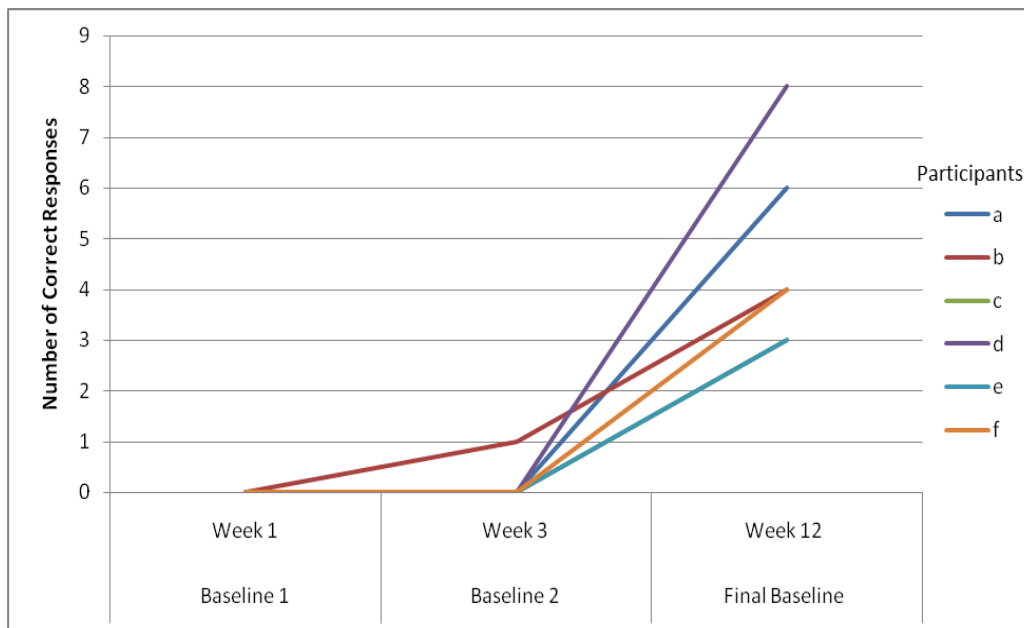


**Figure 2: Number of Correct Responses to 10 Treated Riddles Based on Words for Which the Participant Knew Two Meanings (W2M)**



**Figure 3: Number of Correct Responses To 10 Treated Riddles Based on Words that the Participant Previously did not Know Two Meanings for, i.e., Treated Riddles for WN2M**

The final question the present study sought to answer was if the children would increase their CR on riddles that corresponded to known multiple meanings of words. These non-treated riddles were baselined prior to treatment and again at the end of the treatment on the other sets of riddles. Visual inspection of the data revealed an increase over baseline conditions. Strengths of this study include the fact that visual inspection of the data in all three conditions showed a percentage of non-overlapping data of 100%, confirming that no treatment data points overlapped with baseline data points. This affirms the effectiveness of the treatment.



**Figure 4: Number of Correct Responses (CR) to Untreated Riddles which were based on Words for Which the Participant Understood Two Meanings (W2M)**

## **DISCUSSION**

The present study investigated the effects of teaching lexical humor to high-functioning children with AA. Overall, the children made gains both in their comprehension of multiple meanings and in their ability to solve lexical riddles. While the children's ability to comprehend two meanings for words did increase, it is not clear how much the treatment of the meanings in the context of riddles and the teaching of just meanings (without riddles) contributed to that increase since there was not a series of baselines or other control measures for the multiple meaning pools. While the increases would suggest that the training did help the participants increase their acquisition of multiple meanings, it did not control for outside influences and so improvement cannot be attributed solely to the treatment program. Regardless of the reason, during the course of this treatment the children substantially increased the number of new words for which they knew two meanings. This result was heartening since participants made improvement in areas of language that were on their individual education plans. It also confirms the need for visual explanations and specific teaching of semantics for children with AA as suggested by Quill (1997).

The children with AA in this study did learn to answer treated riddles. They uniformly learned to respond both to riddles based on words for which they previously did know two meanings and to riddles based on words for which they previously did not know two meanings. For children with AA, learning specific riddles based on multiple meaning words were successful. A slight preference for success in riddles based on previously known words was noted, possibly due to the easier retention of words already in the child's repertoire. Four of the six children learned all of the riddles presented for W2M and two of the children learned all of the riddles for the original WN2M.

The most important finding of this study was that correct responses increased on untreated riddles. These untreated riddles were based on words that the children knew two meanings for but had failed to correctly answer the corresponding riddle in the first two baselines. While no treatment was administered on these words or riddles, a final baseline, administered at the conclusion of instruction for the treated riddles, revealed an increase in the correct responses on the untreated riddles. Since no increases occurred in the absence of treatment for the target and untreated groups of riddles, but did occur following treatment of the target groups of riddles, treatment appears to have generalized to the untreated riddles. This suggests that there might be some transfer of the skill the children learned in solving treated riddles to the solving of novel riddles when the child knew two meanings for the corresponding words.

Limitations of this study are that it included only six participants. Further, the participants worked at different speeds and a uniform number of words was not introduced to every child. Finally, a relatively small number of riddles was taught, limiting the ceiling of learning. Future research should determine which riddles are understood by typically developing children, and should investigate whether this study is replicable on larger groups of children with AA or for other populations.

Anecdotally, the child with the behavior disorder showed a remarkable change throughout treatment. Toward the end of the treatment, he began to laugh appropriately to some of the riddles and was overheard asking another student one of the treated riddles. Another participant began to tell the riddles to his instructor when he came into the therapy room. This participant told the instructor that he "liked jokes" and was "a good joke teller." For this participant, the learned riddles served as a social relationship builder. Other comments by the graduate student instructors were that their participants liked working on humor and that it maintained their attention.

The main purpose of this study was to begin to understand if children with AA could be taught a process to understand lexical humor. Though this is a pilot study with a small group of children, the fact that six children, taught by six different instructors, all made substantial progress is promising. The suggestion that the children may have transferred a process for deciphering lexical humor is even more exciting.

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## APPENDIX A

Sample Multiple Meaning Pool Page

(Point to the two pictures that show “tie”)



The Multiple Meaning Pool displays an array of 6 pictures, in which two pictures show the target multiple meaning word.

## APPENDIX B

Sample Items from Humor Baseline Pool

1. **What do prisoners use to call each other?**
  - a. Cell phones.
  - b. They don’t call anyone. They just talk to the prisoner next door.
  - c. Computers.

- d. Nothing.
2. **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.**
3. **What kind of dog keeps the best time?**
- a. A collie.
  - b. A watch dog.**
  - c. Dogs can't tell time.
  - d. A golden retriever.
4. **Why did the cookie go to the hospital?**
- a. Cookies don't go to hospitals.
  - b. Because it had a fever.
  - c. Because it felt bad.
  - d. Because it felt crummy.**
5. **Why did the elephant eat the candle?**
- a. He wanted a light snack.**
  - b. He wanted some wax.
  - c. Elephants only eat hay.
  - d. He was hungry.
6. **What do you call a pony with a sore throat?**
- a. A sick pony.
  - b. Ponies don't get sore throats.
  - c. An unhappy pony.
  - d. A little horse (hoarse).**
7. **Why did the soccer player bring string to the game?**
- a. So he could tie the score.**
  - b. So he could lace up his shoes.
  - c. So he could fly a kite.

You shouldn't bring string to a soccer game.