AMERICAN PSYCHOLOGICAL ASSOCIATION

The joke's in you

New research on how children develop a sense of humor is giving psychologists a window into social and mental development.

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November 2007, Vol 38, No. 10
Print version: page 18

One afternoon four years ago, Merideth Gattis, PhD, was putting groceries away in the kitchen while her 4-year-old daughter Ella looked on. After transferring eggs to the refrigerator, Gattis tripped slightly on her way to the trash can. The empty egg carton, with its top closed, threatened neither broken eggs nor a messy floor, but Gattis played it up for her daughter's amusement. She wobbled perilously, juggled the carton around, carefully steadied it, and made a comically grand show of relief--all to the giggling audience of Ella.

Gattis, a psychologist at Cardiff University in the United Kingdom, pondered the faux near-tragedy. What made that scenario funny?

Twenty years ago, scientists scoffed at the suggestion that studying humor was scientifically significant, but today psychologists are turning to humor as a tool for looking at development and cognition. In adults, a deficient sense of humor can signal a variety of disorders such as schizophrenia, autism and Asperger syndrome, and offers new insights into the nature of those conditions. In children, a developing sense of humor can serve as a weather vane for emerging cognitive features such as recognizing intentionality and understanding symbolism.

Humor's building blocks

Babies show their first signs of mirth within the first five weeks of life when they begin smiling in response to their parents' cooing and silly facial expressions. Most scientists think these smiles are an emotional response to social interaction, with different types of smiles for different situations. Peek-a-boo might elicit one type of smile, tickling another.

Three months later, laughter emerges, thrilling parents and grandparents and providing auditory evidence that the child is enjoying him- or herself. These behaviors aren't specific to humor, but they're the building blocks for expressing humor. As children get older, they begin to reliably laugh and smile at typically "funny" situations.

Psychologists' prevailing view of what makes a situation funny is known as the incongruity theory. Ithaca College psychologist Barney Beins, PhD, explains it like this: Something is funny when a real-world event doesn't match up with your mental model of what should happen. But the revelry's in the details, says Beins, who's been studying humor for 15 years.

"Humor is a very complicated psychological response; it's multifaceted," Beins says. And separating incongruous events into humorous and non-humorous situations depends on many factors, including mood and what children learn from others. "Children have to learn about humor. As kids start getting a bit older, their humor becomes more sophisticated."

So when Ella laughed at her mom's bumbling antics, she was recognizing the incongruity of someone trying desperately to save an empty egg carton from falling. But Gattis noticed a subtle kink in this theory: How did Ella know her mom was intentionally joking around with the egg carton rather than genuinely mistaken about its contents--or lack thereof?

As luck would have it, just a few days prior to the incident, Cardiff graduate student Elena Hoicka (who earned her PhD in June) approached Gattis about studying humor in children. Gattis credits the conversation with inspiring her to really take notice of her daughter's behavior. The two tried to break the problem down into smaller pieces for studying. Past research has shown that children as young as 14 months old can distinguish between intentional actions and unintentional ones. For instance, one study published in 1995 showed that 14- to 18-month-olds tend to copy intentional actions and correct unintentional mistakes. Gattis and Hoicka wanted to build upon this to see if toddlers could parse actions into either intentional joking or unintentional

blunders.

Doing so requires that they first understand that a joke somehow deviates from the norm--for example, trying to write with a pencil's eraser or drinking from the bottom of a cup. Second, children must understand that someone intended for this deviation to happen, that it wasn't just an error. Finally, they must realize the performer knows that the children think it's a joke. If all of these cognitive pieces are in place, cue the laugh track; the child gets the joke.

To look at the second step of this process, the researchers devised a way to measure whether children knew the performer intended to do the wrong thing. Gattis and Hoicka performed a variety of "incorrect" actions accompanied by either laughter and smiling or "Whoops!" and grimacing. Some were considered unambiguous jokes: Put a boot on your hand--laugh and smile. Others were unambiguous mistakes: Write with the wrong end of a marker--"Whoops!" And others were more ambiguous; sipping from the bottom of a cup could either be a mistake or a joke depending on the researcher's accompanying action. Because the toddlers were too young to simply tell researchers what they thought, Gattis and Hoicka watched to see whether the toddlers would copy or correct the actions.

According to results in press in Cognitive Development the 25- to 36-month-old toddlers aced the test. They copied all the actions marked by laughter and corrected those accompanied by "Whoops!" regardless of whether the actions were ambiguous. The 19- to 24-month-old group got tripped up on the ambiguous actions, but even at that age the children differentiated between intentional jokes and unintentional mistakes. As early as 19-months-old, the results suggest, children seem to distinguish between someone doing something wrong intentionally and doing something wrong accidentally--a big step in cognition. Grasping that others act intentionally is a fundamental part of theory of mind, or recognizing that others possess the same mental presence as oneself.

"Humor sets you up to understand that people can do things wrong and intend them to be wrong," Gattis says. That's an easy entry into duality--the idea that an action can mean more than one thing--a very difficult concept for young children, Gattis notes.

Humor deficits

When the mind doesn't develop normally, people's sense of humor can become derailed. For instance, one study published in *Psychiatry Research* (Vol. 141, No. 2, pages 229-232) showed that people with schizophrenia don't perform as well as healthy participants on joke comprehension tests. Study author Joseph Polimeni, MD, and his research partner Jeffrey Reiss, MD, showed participants a variety of one-panel cartoons with captions beneath them. Some of the captions matched the cartoons, some didn't, and participants tried to identify those that matched.

"In general, people with a good sense of humor do pretty well [on the test]," Polimeni says. "Participants with schizophrenia did worse."

Also, he noted there is "a pretty high magnitude of difference" between the humor-recognizing abilities of people with schizophrenia and with bipolar disorder. As the two disorders are often mistaken for each other, it could provide a tool for more accurate diagnoses, Polimeni says, if further studies bear out the findings.

Polimeni, a psychiatrist at the University of Manitoba in Winnipeg, thinks the deficiency is related to schizophrenic people's frequent inability to connect the dots between associated ideas.

"A lot of humor has to do with associations," Polimeni says. "When you hear a punch line, everything in the joke has to come together. But if one of the associations isn't connecting, it's a lot harder to understand the joke."

A study published online in April of the *European Archives of Psychiatry and Clinical Neuroscience* offers an explanation: People with schizophrenia don't put in the extra cognitive effort required to understand jokes. Instead, they treat them purely as incongruent events, never making the leap to humor.

"It takes some effort to go beyond the surface of the joke to the hidden meaning, so schizophrenics who don't expend the extra effort would show less of a sense of humor," Barney Beins says.

Contrast this with cases of autism spectrum disorder and Asperger syndrome. Scientists agree that people with autism and Asperger have an impaired sense of humor similar to people with schizophrenia, but anecdotes abound of autistic and Asperger children and adults flirting with comedy. In a summary article published in 2004 in the *Journal of Autism and Developmental Disorders* (Vol. 34, No. 5), Viktoria Lyons and Michael Fitzgerald, PhD, examine the literature and arrive at an interesting suggestion: some people with autism and Asperger syndrome do understand humor--but at a mathematical level. Research has well established that many people with autism and Asperger have excellent mathematical reasoning skills, and these skills might cross over into the logical, formulaic patterns of certain types of humor, such as puns, the researchers say. But even at this level, the sense of humor appears to operate more at the intellectual level than at the emotionally expressive level, a bit like painting by numbers. They've figured out how humor "works," but a drama will still feel the same for them as a comedy.

Paul Rozin, a University of Pennsylvania psychologist who coauthored a 2006 article about patterns in humor and music in the

journal *Emotion* (Vol. 6, No. 3, pages 349-355), thinks this equation-like understanding of humor might parallel the way people with autism process music. They can abstract relationships among ideas, he says, but have great difficulty fitting those ideas into a social framework.

"They're just as aware of [humor and music] as the normal person, but they're not as engaged in it," Rozin says. It's an area he'd like to see more work done in, he says, because humor is such a fundamental part of communication. "I think there's something really interesting here."

Figuring out what that something is will help scientists and parents alike understand what's behind laughter or the lack of it. Beins hopes that one day humor might be used as a diagnostic tool for discriminating conditions with otherwise similar symptoms. Further understanding humor in normally developing children will help psychologists look at the cognitive processes that make humor possible in the first place. And parents can take pleasure in the fact that behind their children's giggling facade is a symphony of complex cognition.

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