



MEASURING MINDS: HOW SCIENTISTS STUDY HOW PEOPLE UNDERSTAND OTHERS

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In this article, we explore the science of understanding others' minds. Specifically, we discuss how scientists try to study the processes of understanding the thoughts and feelings of other people (known as mentalizing) and of sharing other people's emotions (known as empathizing). Understanding others is important because it helps people to build strong social connections with their friends, family, and people in their community. However, when people struggle with understanding others it might negatively impact their mental health or cause difficulties in their daily lives. Scientists are working hard to measure how people understand others—in the laboratory

and in the real world. They use questionnaires and tests, observe people, track behaviors with mobile phones, and even image the brain. We will describe these methods and discuss how researching the understanding of others might help improve the lives of young people like you.

WHY STUDY THE SCIENCE OF UNDERSTANDING OTHERS?

Understanding others is important for everyone's overall wellbeing. It helps people to navigate the social world, and to create and maintain relationships with others, such as friends and family. There are two important aspects of understanding others: **mentalizing** and **empathy** [1]. **Mentalizing** is the ability to decipher or figure out the thoughts and feelings of other people. For example, imagine someone's sibling receives a book for their birthday. Their sibling smiles, but there is a slight hesitation in their voice and a quick glance at their phone. The person knows their sibling had mentioned a few times wanting to buy a new phone but could not afford it. Putting together what they observe, what they know about their sibling's desires and the current situation, the person realizes their sibling might be pretending to be happy while actually feeling disappointed. Empathy is the ability to share other people's emotions while recognizing that those feelings are not your own. For example, someone might feel nervous when someone else gives a speech, even if it is not them up there, or get excited for a teammate who scores a winning goal, even if they did not play, or feel a twinge in their own body when they see someone stub their toe, even though they are not the one who got hurt.

Sometimes people struggle with understanding others, and this can create difficulties in their lives. In some cases, for instance, nurses or other professionals who work with people who are unwell, in pain, or experiencing some kind of distress can sometimes experience a reduced connection with others and find it difficult to empathize with others. Also, some people who experience depression might feel what others are feeling but get overwhelmed by it, especially if it relates to their own negative experience. This may make interacting with others stressful and may make it difficult to maintain good social connections. As another example, when you feel very stressed, it may be more difficult to understand how your friend or sibling sees a situation you disagree on. This can escalate and lead to a fight. Finally, some people who have **autism spectrum disorder** might have difficulties working out what others might be thinking or feeling, which can make it hard for them to relate to others.

As you can see, it is important to learn more about how we understand others. Learning more might help scientists and doctors to improve the lives of people who have difficulties understanding others. But

MENTALIZING

The process of understanding the thoughts and feelings of other people.

EMPATHY

The process of sharing other people's emotions.

to do research on these concepts, scientists first need to be able to *measure* them. Scientists try to measure how people understand others in several ways, which we will describe next.

QUESTIONNAIRES

Scientists can use **questionnaires** as a simple way to learn about how people understand others. Questionnaires contain different statements about thoughts, feelings or behaviors, and people rate how much they agree or disagree with the statement (Figure 1A). Sometimes parents or teachers might be asked to rate a child's or student's behaviors as well.

Questionnaires have several important advantages. For example, they are quick for people to fill out, and this method is not expensive. Questionnaires can give scientists a good idea of what people *believe* they are feeling or thinking. However, questionnaires have some drawbacks, too. For instance, people do not always know exactly how they are feeling or what they are thinking. Also, some people might under- or over-estimate how "good" they are at understanding others.

ABILITY TESTS AND OBSERVING BEHAVIOR

Children usually start to understand that others think differently than they do around 4 years of age [2]. One simple task scientists developed allows them to test this ability. They tell children a story. Franky puts a chocolate in the cupboard. His sister moves the chocolate to the drawer. Scientists ask the child where will Franky look? If the child knows that Franky would not know to look in the drawer, they have passed the test. See Figure 1B for another example of a test.

Caring behaviors can come from empathy. Caring behaviors can be studied in young children in the lab. For example, an experimenter can pretend to hurt themselves, and then observe how the child behaves in response (Figure 1C) [5].

As children get older, the skills that help them understand others get better. Scientists can test this by asking children to do harder tasks. For example, scientists can ask children to read stories or watch videos. Then, the children must "read between the lines" to figure out people's emotions or thoughts. Scientists can also ask how people feel and can even measure reactions in the body, such as sweat on the palms or heart rate. This technique can be used to measure empathy, by measuring bodily reactions while people watch others **who are in distress or pain**.

QUESTIONNAIRE

A list of written questions used to understand how people think, feel or act.

Figure 1

(A) An example of a questionnaire measuring self-reported empathy and mentalizing. (B) An example of how mentalizing can be tested in children. (C) Caring behaviors can be examined by the scientist pretending to hurt themselves. (D) Tasks inside MRI machines can be used to investigate how the brain understands others. (E) Mobile phones can be used to ask questions outside the lab ((D, E) adapted from Kanske [1], Hildebrandt et al. [3], Breil et al. [4]).

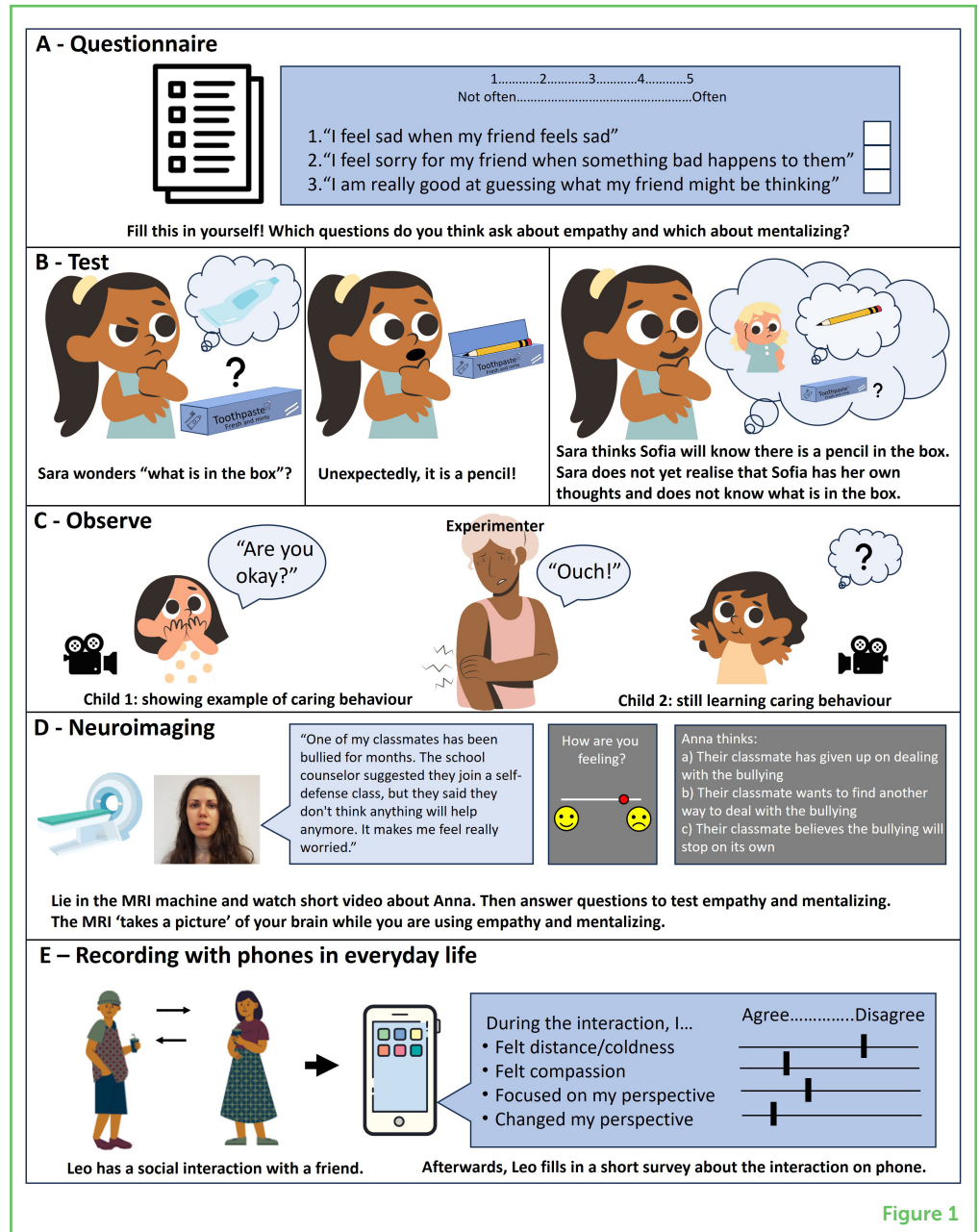


Figure 1

IMAGING THE BRAIN

What if scientists could peer inside a person's head to see what is going on in someone's brain while they are empathizing with others or thinking about the thoughts or feelings of others? A **magnetic resonance imaging (MRI)** machine uses strong magnets to take pictures of the inside of a person's body. Scientists can ask people to read stories, look at images, or watch videos while they are inside the MRI scanner, to investigate which areas of the brain might be more or less active (Figure 1D). Doing so, scientists have found that several parts of the brain, and groups of brain parts acting together, are responsible for empathy vs. mentalizing (Figure 2) [1, 6].

MAGNETIC RESONANCE IMAGING (MRI)

A machine that uses strong magnets to take pictures inside a person's body.

Figure 2

The human brain has special areas for understanding other people's thoughts and feelings. Look at this figure to see which areas within the brain are more active when people are engaging in (A) mentalizing vs. (B) empathy (figure adapted from Schurz et al. [6]).

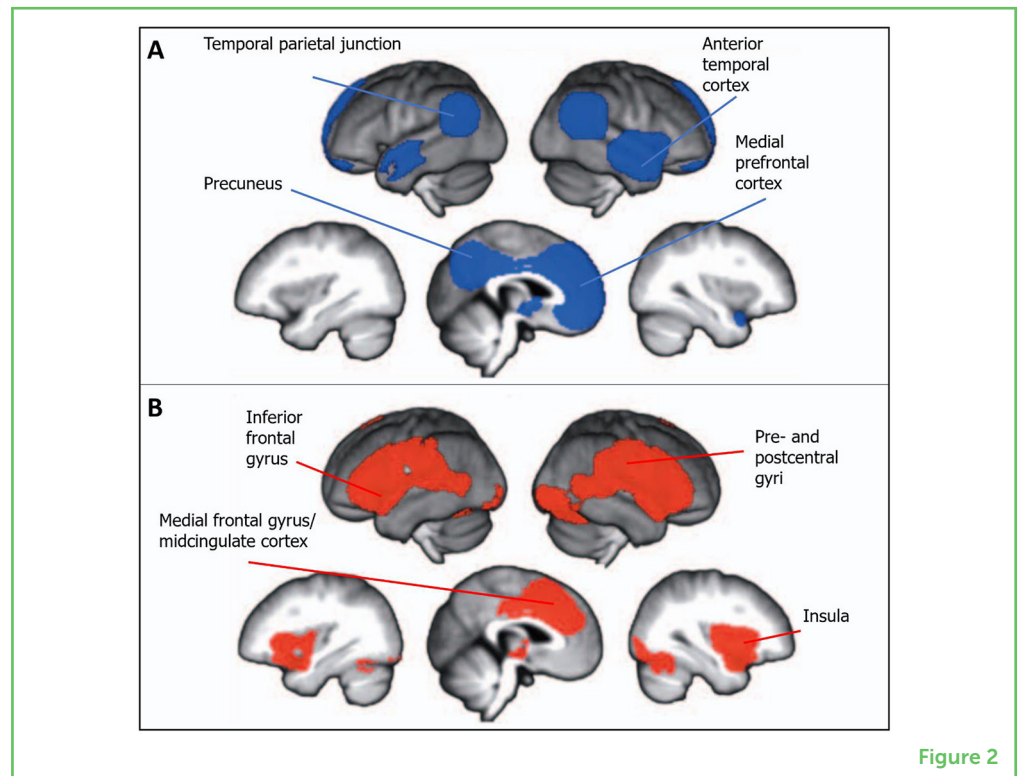


Figure 2

However, not everyone can go inside an MRI scanner. If a person has metal in their body, or if they live far from a scanner facility, it might not be possible. Plus, MRI scanners can be quite expensive, which means not everyone has access to them.

LABORATORY VS. REAL LIFE

The measures described so far are all usually performed in the laboratory. But do people act the same way in the lab as they do in real life? Some scientists have found differences between the experiments done in the lab vs. how people actually understand others in everyday life [7]. For example, in the lab, scientists often ask people to imagine a stranger, or they show people videos about strangers. The scientists assess how people understand the stranger's thoughts or feel the stranger's emotions. However, scientists have found that in people's day-to-day lives, they mostly empathize with people they know, such as friends or family. The second difference is that many of the measures developed for use in a lab revolve around examining how people relate to "negative" emotions, such as sadness or pain. However, in the real world, people often empathize with the positive emotions of their friends and family as well.

Given these issues, it makes sense that scientists should study people in their day-to-day lives. One way to do this is using a piece of technology a lot of people already have... a mobile phone!

USING PHONES TO UNDERSTAND OTHERS IN DAILY LIFE

Scientists can ask people to answer some simple questions throughout the day, using their mobile phones. Why might this be different from getting someone to answer questions in the lab? If something has just happened, people are better at giving a more accurate picture of how they feel, rather than trying to remember their feelings much later (Figure 1E). Scientists can also collect data passively, which means that the participant does not have to answer any questions. For example, scientists can use time spent on social apps, closeness to others via Bluetooth, or random audio recording of conversations. However, this brings up the important issue of privacy: even if scientists ask for permission, do you think people might still feel uncomfortable with their personal data being collected and used? Scientists always follow strict rules to protect privacy, but it is still important to think about.

THE FUTURE!

Scientists are trying to develop new technologies or use existing technologies to study the science of understanding others. One example you may be familiar with is **virtual reality**. This usually involves someone putting on a special headset and walking around or interacting with objects in a virtual space that they can see in 3D. Virtual reality could be a way to combine lab measurements with real-life measurements. Scientists can create a virtual world similar to what people might experience in the real world, which could allow scientists to measure how people understand others in real time.

SUMMARY

Maybe your first thought was that “measurement” sounded boring... but we hope we have changed your mind! Understanding others is important—as humans we are constantly trying to understand each other’s feelings and what people might be thinking. These abilities help us navigate through life.

This article discussed the ways scientists try to measure how people understand others. All the methods have strengths and weaknesses, and scientists usually try to use a range of tools to investigate the questions they are most interested in. As measurement methods become more advanced, scientists will be able to learn more about how people understand others. This might ultimately help people who have difficulties understanding others in everyday life.

VIRTUAL REALITY

A technology that allows people to explore computer-generated 3D environments, often using a headset.

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I am a postdoctoral researcher at the University of Melbourne and the Murdoch Children's Research Institute. I am interested in the neuroscience of how humans try to understand and interact with each other, and how this can impact mental health. I am particularly interested in researching this in children and teenagers. *bray.k@unimelb.edu.au



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I am a professor at the Centre for Youth Mental Health at the University of Melbourne. I have a background in psychology and my research aims to improve our understanding of the neural basis of mental health problems in young people. I am also interested in how the family environment shapes brain development and plays a role in risk and resilience for mental health problems in youth.

