Neuroscientist studies super recognizers' ability to process faces

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Meike Ramon. Credit: SNSF

Neuroscientist Meike Ramon is conducting research with people who have an extraordinary talent for processing faces. The police have shown an interest in her work.

As a child, Meike Ramon never dreamt she would one day become a neuroscientist. She was initially more interested in public relations and did an internship in a PR agency after completing secondary school. When her bosses at the agency advised against studying communications or journalism—skills they said she would learn in professional life anyway—and urged her to study a subject she truly enjoyed, she opted for a course in psychology at the University of Bochum.

It was a career-defining decision. Ramon was able to acquire research experience at an early stage since she began working as an assistant while still studying. A term paper in developmental psychology on the subject of face recognition in infants laid the foundation for her thesis.

"We were told that newborn babies have a very out-of-focus perception of their surroundings but can still recognize their mother's face within 24 hours," the researcher recalls. "The two seemed incompatible to me, so I decided to explore the issue in more detail." Without realizing, Ramon had found the topic that still dominates her research work today: face recognition.

Momentous encounter in New York

Ramon's thesis became "extremely ambitious." She developed several behavioral tests for it and wanted to use electroencephalography (EEG) and magnetic resonance imaging (MRI) to investigate congenital face blindness, or prosopagnosia. In the end, she took her professor's advice and joined forces with a fellow student to reduce the scope of the project somewhat.

"Because I had put so much time and energy into the subject, I was keen to present my results to other researchers." Even before she had graduated, Ramon applied for a conference in New York, traveling over at her own expense. "I suddenly found myself standing in front of an

enormous hotel with a poster under my arm and utterly innocent as to what to expect at a scientific conference."

After her presentation, she held an animated discussion with a researcher who had also presented findings on face blindness. It was only afterwards that Ramon realized she had met Bruno Rossion, an acknowledged expert on face recognition whom she had quoted extensively in her thesis.

They stayed in touch and Ramon did a voluntary research internship at Rossion's laboratory in Belgium. On the strength of this, the professor offered her a place as a Ph.D. student. During her doctoral research, Ramon investigated the question of why we can process—i.e., compare and memorize—information about the faces of people we know faster and better than information about the faces of people we do not know. What neurological processes are at play here?

It was years later than Ramon first began to explore the phenomenon of "super recognizers"—people with a talent for processing information about faces particularly effectively, regardless of whether the faces are familiar.

She gives an example from her current research. A super recognizer is shown a picture of a person she has never seen before. Then the recognizer watches a short video of a large crowd of people, such as a grandstand at a football ground.

"Most people will be completely unable to recognize this one stranger in the crowd." However, the super recognizer does so quickly. Ramon's goal is to identify the specific neurological processes underlying this gift. One of her investigations in pursuit of this involves showing subjects wearing a cap with 64 integrated electrodes a series of visual stimuli in rapid succession on a screen while a portable EEG system records the

electrical signals in their brain.

Valuable for identifying criminals

A few years ago, Ramon was asked by Fribourg cantonal police's criminal investigations department if she could put them in touch with super recognizers as part of their investigations into raids on a bank and a jeweler's shop. She contacted her super recognizers and used the opportunity to validate her research data against real-world experience in police work.

The result was the first study to empirically test super recognizers' skills using data from an actual police investigation. This year, Ramon presented the results to an international law enforcement audience at Europol in The Hague.

Ramon explains how super recognizers are able to provide tangible support for the police: following the terrorist attack on the Christmas market at Berlin's Gedächtniskirche in December 2016, during which 13 people were killed, dozens of officers spent hours studying CCTV footage to try to identify the culprit.

"Super recognizers can do tasks like that much more efficiently," Ramon explains. She has been advising Berlin's police on super recognizers since 2017. Using a test procedure they developed together, they were able to identify the officers with a talent for face recognition from around 18,000 members of the city's force.

The researcher pre-empts the question about whether the job could not be done much more efficiently by facial recognition software and specialist algorithms, having answered it dozens of times in the past. "Algorithms are only any use if they've been trained beforehand using an awful lot of pictures. Super recognizers do it intuitively using just one

picture." This is why she advocates combining super recognizers' talents with the most reliable machine solutions specifically for police work.

In 2019, Ramon used the funding she received from the Swiss National Science Foundation to set up her own research team. Her "Applied Face Cognition Lab" has been affiliated to the University of Lausanne since March 2022. As yet, she does not know what will happen when funding runs out after 2024.

She says there is fierce competition among researchers for professorships—her next logical career step. She could therefore also envisage working for the federal authorities, as a consultant or in industry. In September she briefed the Bern Cantonal Parliament on the potential and risks of human and machine face recognition.

"There's a lot of demand for my research right now," Ramon says. There has been a strong surge in interest in super recognizers from the police and justice system in recent years. So I'm excited to see which doors open up to me going forward."

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