LET'S ENTER THE WORLD OF THE HUMAN BRAIN IN ACTION.

A FUNCTIONAL MRI MACHINE MEASURES CHANGES IN BLOOD FLOW IN AREAS OF THE BRAIN THAT ARE ACTIVE WHEN A PERSON PERFORMS A TASK.

WHILE WE CAN'T TELL EXACTLY WHAT A PARTICIPANT THINKS AND FEELS DURING A SCAN, WE CAN SEE THE AREAS RESPONSIBLE FOR SPECIFIC FUNCTIONS.

WITH THE HELP OF DR. JOY HIRSCH, HEAD OF THE fMRI LAB AT COLUMBIA UNIVERSITY, WE RECENTLY SCANNED SOME INTERESTING PEOPLE. LET'S TAKE A LOOK AT THEIR BRAINS IN ACTION.
ZAHA BUSTAMI IS A NATIVE ARABIC SPEAKER AND AN INTERPRETER AT THE UNITED NATIONS.

WE SCANNED ZAHA’S BRAIN AS SHE WATCHED VIDEOS OF U.N. SPEECHES AND TRANSLATED THEM FROM ARABIC TO ENGLISH.

ZAHA’S BRAIN IS DOING A VERY COMPLICATED LANGUAGE TASK—SIMULTANEOUS TRANSLATION—AND WE CAN SEE A LOT OF BRAIN AREAS WORKING AT ONCE. THERE IS ACTIVITY IN VARIOUS LEVELS OF ZAHA’S LANGUAGE SYSTEM AND IN SYSTEMS INVOLVED IN DECISION MAKING AND MOTOR PLANNING.

GENERALLY, A BRAIN PERFORMING A LANGUAGE TASK WOULD SHOW ACTIVITY MOSTLY ON THE LEFT SIDE OF THE BRAIN. BUT IN THIS CASE THE ACTIVITY STRETCHED ACROSS BOTH SIDES. THIS SUGGESTS THAT SIMULTANEOUS TRANSLATION IS QUITE COMPLICATED AND MORE PARTS OF THE BRAIN WERE ENLISTED TO HELP OUT.
LANDRY FIELDS PLAYED BASKETBALL AT STANFORD UNIVERSITY. HE NOW PLAYS PROFESSIONALLY FOR THE NEW YORK KNICKS.

WE SCANNED LANDRY’S BRAIN WHILE HE WATCHED CLIPS OF HIS OWN BASKETBALL HIGHLIGHTS.

LANDRY WAS ASKED TO IMAGINE THAT HE WAS BACK ON THE COURT.

VISUAL AREAS ARE VERY ACTIVE IN BOTH SIDES OF THE BRAIN. HIGHER UP IN THE BRAIN, THESE REGIONS CONTROL MOTOR PLANNING AND COORDINATION. WE ALSO SEE THE AREAS THAT INVOLVE LANDRY’S EMOTIONAL DECISION MAKING AND EVALUATION OF HIMSELF.

WE MIGHT SUSPECT THAT LANDRY WAS THINKING THROUGH HIS MOVES AND COACHING HIMSELF WHILE WATCHING HIS PERFORMANCE. HIS BRAIN ACTIVITY POSSIBLY REFLECTS THE EXCITEMENT HE FELT WHEN HE WAS MAKING THESE PLAYS FOR THE FIRST TIME ON THE COURT.
YO-YO MA IS A REKOWNED CLASSICAL MUSICIAN. WE SCANNED YO-YO’S BRAIN AS HE WATCHED VIDEO CLIPS OF HIMSELF PERFORMING MUSIC.

YO-YO WAS ASKED TO MENTALLY RELIVE THE EXPERIENCE IN AS MUCH DETAIL AS POSSIBLE.

THE VISUAL AND AUDITORY PARTS OF YO-YO’S BRAIN SHOW EXPECTED ACTIVITY, BUT HIS LANGUAGE AREAS ARE VERY ACTIVE AS WELL. THESE AREAS SUGGEST A DEEP EMOTIONAL RESPONSE TO THE MUSIC. WE ALSO SEE DISTINCTIVE ACTIVITY WHERE THE BRAIN INTEGRATES PATTERNS OF SENSORY SIGNALS.

YO-YO WAS LISTENING, PERFORMING AND EXPERIENCING HIS MUSIC ALL AT THE SAME TIME. THE WIDESPREAD AMOUNT OF ACTIVITY IN HIS BRAIN SUPPORTS A MASTERFUL BALANCE BETWEEN APPRECIATION OF THE LANGUAGE OF MUSIC, HIS EMOTIONAL EXPERIENCE AND HIS OWN AWARENESS OF PERFORMING.
(José Luis “Cheo” Pardo)

José Luis Pardo writes music and plays guitar for the band Los Amigos Invisibles. José Luis listened to his own music while we scanned his brain.

We asked José Luis to imagine he was playing along.

Although he only heard audio clips, the scans show visual stimulation. We also see an active motor system. All together, this activity could suggest that he probably pictured himself performing or composing while the music was playing.

These areas of José Luis’s brain are known to be associated with error correction and self-reference. That could represent the intimate association that he has with his own music. Perhaps José Luis was analyzing and critiquing his performance.