

>> MEETING WILL BEGIN AT 10:00.  
>> -- I DID GET MY COCHLEAR LAST FRIDAY.  
>> I AM OKAY.  
>> EVERYTHING IS LIKE TIN CAN SOUNDING BUT I HAVE MY OTTER.  
MY OTTER TRANSLATION, TOO.  
THE CAPTIONS ARE ON THE BOTTOM, TOO.  
>> CAPTIONS ARE STARTED.  
>> FACIAL PALSY I HAD AN -- IT WAS EXTREMELY PAINFUL.  
WORSE THAN MY FIRST ONE.  
AND I AM 15 WEEKS OUT TODAY FROM THIS -- THIS FACIAL NERVE.  
THIS IS ALL -- IN CASE YOU GUYS DIDN'T HEAR LIKE THE MEETING IN FEBRUARY.  
ALL OF MY PROBLEMS WITH HEARING WAS ALL BECAUSE OF -- NASAL CANCER.  
SO, I JUST GOT REALLY BAD NEUROPATHY FROM THE RADIATION TREATMENT BECAUSE  
I GOT RADIATED FROM HERE TO MID CHEST.  
RIGHT AT THE TOP OF THE STERNUM.  
I HAD RADIATION.  
MAJORITY WAS ON THIS SIDE.  
SO I HAD FOUR DIFFERENT NERVE PALSYS, ONE BEING A -- THAT HAPPENED SEVEN  
YEARS AGO.  
THREE YEARS AGO AND MY HEARING HAPPENED FIVE YEARS AGO.  
SO NOW I HAVE -- VESTIBULAR COCHLEAR PALSY ALSO BECAUSE I'M REALLY DIZZY  
NOW.  
NOW GOING THROUGH WHICH NERVE TRANSFER SURGERY IS THE BEST.  
BECAUSE ESPECIALLY YESTERDAY AFTER MY EMG AT 15 WEEKS IS NO DIFFERENT  
THAN THE EMG AT FIVE AND A HALF WEEKS.  
>> WHAT IS EMG MEAN?  
>> IT'S "ELEKTRA" CALL MUSCLE -- THEY -- THEY STICKY ELECTRODES ON YOUR  
FACE AND GIVE YOU ZAP TO, SEE IF THERE'S ANY ACTIVITY THERE.  
THAT IS TO TEST THE NERVE.  
THEN WHAT THEY DO STICK A NEEDLE HERE, HERE, THIS IS THE WORST.  
THEY STUCK A NEEDLE HERE.  
TO SEE IF YOUR MUSCLES WILL CONTRACT.  
WHAT THEY'RE TRYING TO DO IS STIMULATE THIS SIDE OF THE MUSCLE TO  
SIMULATE WHAT THIS SIDE DOES FOR MY SMILE THIS WAY.  
THIS ONE WON'T.  
JUST THE MUSCLE.  
WHEN I HAD BOTH OF MY SURGERIES, MAY 9TH.  
MY SURGERY FOR MY COCHLEAR JULY 14TH.  
THE FACIAL NERVE INSIDE REACTS AMAZING, LIKE VERY ROBUST.  
BUT FOR SOME REASON IT'S NOT ENOUGH ELECTRIC TEE TO GET TO THE --  
ELECTRICITY TO GET TO THE MUSCLE.  
I HAD TWO SURGEONS HERE -- THEY'RE BOTH USC.  
ONE WAS USC AND LEFT HE'S SOMEWHERE ELSE IN L.A.  
SECOND SURGEON GONE IS AT CHLA WHERE WE WORK WHO DOES MOSTLY PEDIATRIC  
PATIENTS.  
BUT DOES ADULTS.  
NOW WE'RE GOING TUESDAY WE HAVE A THIRD OPINION FROM THE TOP PERSON IN  
FACIAL NERVE TRANSFERS IN BOSTON.  
WE HAVE THAT ON TUESDAY TO SEE WHICH APPROACH WOULD BE BEST.  
BECAUSE WE HAVE TWO DIFFERENT SURGEONS WITH TWO DIFFERENT APPROACHES.  
ALL OF THIS, IT'S JUST MY ENT ONCOLOGIST AT USC.  
HE SAYS THAT -- EVEN MY EAR SURGEON SAID THAT THIS IS ALL RADIATION  
ENDUESED -- INDUCED I HAVE SENSITIVE NERVE TO THE RADIATION BECAUSE I WAS  
SO YOUNG I WAS ONLY 36, WHEN I WAS DIAGNOSED WITH THIS.

THAT THEY SAY -- THEY SLAMMED ME WITH THE MOST, HARDEST TREATMENT BECAUSE I WAS YOUNG, HEALTHY.  
AND TO GET THE CURE BECAUSE I ONLY HAD 60% CURATE.  
SO I'M CURED.  
I HAVE ALL THESE OTHER ISSUES.  
IT'S NOT -- I'M ADJUSTING.  
IT'S HARD.  
IT WAS JUST AS HARD TO TAKE THESE DIAGNOSES AS IT WAS TO TAKE MY CANCER DICE NOSES TEN YEARS AGO.  
BUT I'M DEFINITELY NOT AS EMOTIONAL AS I WAS IN FEBRUARY WHEN I TALK ABOUT IT.  
BECAUSE I THINK THAT I JUST PUT THINGS IN PERSPECTIVE.  
I KNOW THAT HE'S TAKING ME THROUGH ALL OF THIS THAT, YOU KNOW, WORRYING ABOUT IT AND STRESSING ABOUT IT DOESN'T MAKE IT ANY BETTER.  
I HAVE TO LOOK FOR THE MOST POSITIVE.  
JOINING THAT GROUP HERE HAS BEEN AMAZING.  
IT'S ACTUALLY HELPED ME THROUGH A LOT OF IT.  
KNOWING THAT THERE'S NOT -- THAT I'M NOT ALONE.  
IN THIS WHOLE JOURNEY AND THAT I HAVE PEOPLE THAT I CAN RELY ON AND GREAT INFORMATION LIKE THE INFORMATION LAST MONTH.  
AND THAT I FEEL LIKE THIS MONTH WILL BE GOOD, TOO, KNOWING THAT I'M A USC PATIENT EVEN THOUGH I'VE NEVER SEEN ANYBODY AT THE CLINIC AND I'M THERE ALL THE TIME.  
>> YOU'RE NOT ALONE, JACKIE.  
OUR SPEAKER WHO IS WITH US NOW IS RESEARCHER AT USC.  
OUR SPEAKER TODAY IS GOING TO DONE RESEARCH IN MANY AREAS WILL BE TALKING ABOUT MUSIC APPRECIATION.  
BUT IS A COCHLEAR IMPLANT RECIPIENT HIMSELF.  
AND SO I'M SURE YOU'LL LEARN SOME NEW THINGS.  
I AM JUST AMAZED AT YOUR STRENGTH AND YOUR TENACITY.  
YOU REALLY LOOK WONDERFUL.  
EVEN ON ZOOM AND MOST PEOPLE DON'T LOOK SO GOOD ON ZOOM TO BEGIN WITH I'M VERY GLAD THAT YOU'RE ABLE TO JOIN US.  
WE REALLY ARE HERE IN ADDITION TO GAINING KNOWLEDGE TO SUPPORT EACH OTHER THROUGH A MYRIAD OF STRESSORS AND DIFFICULTIES AND THE PANDEMIC HAS OBVIOUSLY MAGNIFIED THAT SO MANY TIMES, ESPECIALLY IN YOUR CASE WHERE YOU'RE HAVING TO HAVE SURGERY AND BE IN DOCTOR'S OFFICES AND DEAL WITH THESE INSTANCES OF NOT EVEN BEING ABLE TO UNDERSTAND PEOPLE.  
IT'S REALLY DIFFICULT TIME.  
ONE DAY AT A TIME.  
>> I JUST THINK IT'S -- IT'S JUST SO HELPFUL TO HAVE LIKE YOU GUYS ALL HERE, I HAVE DIFFERENT SUGGESTIONS AND TO ME WITH THE LAST MEETING THAT WE WERE AT, TRYING TO GET THE IPAD -- LAST MEETING WE WERE AT WHEN THE MAN SPOKE ABOUT WORKING IN THE CLOTHING INDUSTRY HOW YOU HAD TO ADVOCATE FOR YOURSELF.  
WHEN I WAS GOING BACK TO WORK WHEN MY HEARING DID COME BACK FOR THAT SHORT TIME OF THREE WEEKS IN MARCH.  
LIKE IT REALLY EMPOWERED ME TO -- BECAUSE I WAS AVERAGE A HARD TIME AT WORK TRYING TO GET THINGS THAT I NEEDED.  
AND IT JUST REALLY EMPOWERED ME KNOWING THAT I NEEDED TO ADVOCATE FOR MYSELF.  
AND ALSO KEPT TELLING ME, REMEMBER THE MEETING YOU HAVE TO ADVOCATE FOR YOURSELF YOU JUST CAN'T SIT BACK AND SAY, OKAY, LIKE YOU'RE NOT GOING TO DO IT.

YOU HAVE TO PUSH.  
AND I DON'T THINK I WOULD HAVE DONE THAT IF IT WASN'T FOR THAT MEETING IN  
FEBRUARY TO HELP ME GET THERE TO DO ALL OF THAT STUFF.  
>> I'M SO GLAD TO HEAR THAT, THAT'S WONDERFUL.  
YOUR STORY IS INSPIRING TO OTHERS.  
THAT'S WHAT WE'RE HERE TO HELP EACH OTHER AND HOPEFULLY FEED OFF OF EACH  
OTHER AND TO GIVE US THE CONFIDENCE TO GET THROUGH LIFE AND DO -- TO  
FUNCTION, BE OUR BEST SELVES.  
IT'S REALLY HARD.  
IT'S 10:06 OR ALMOST 10:07 I THINK WE SHOULD PROBABLY GET STARTED.  
OUR GROUP RIGHT NOW IS SMALL.  
I THINK PEOPLE WILL BE COMING ON.  
THERE STILL IS A NUMBER OF PEOPLE THAT ARE NOT SUPER COMFORTABLE WITH  
ZOOM OR HAVE SOME -- HAVE SOME TECHNICAL ISSUES LOGGING ON.  
BUT I WANT TO -- WE CAN GET STARTED HOPEFULLY WE'LL HAVE SOME OTHERS  
TRICKLE IN.  
GOOD MORNING, I'M SHARON, I'M THE CURRENT PRESIDENT OF HLA A LOS ANGELES.  
VERY, VERY GLAD TO HAVE EVERYBODY HERE AS WE'RE JUST SAYING THIS IS JUST  
AN EXCEPTIONALLY DIFFICULT TIME ON SO MANY LEVELS.  
AND FOR THOSE TRYING TO HEAR, TRYING TO COMMUNICATE, TRYING TO UNDERSTAND  
THROUGH MASKS AND SOCIAL DISTANCING AT THE SAME TIME.  
IT'S LIKE A DOUBLE WHAMMY ON TOP OF OUR HEARING LOSS.  
IT'S A TRIPLE WHAMMY TRYING TO NAVIGATE THIS NEW WORLD.  
SINCE IT'S PROBABLY NOT GOING TO BE CHANGING ANY TIME SOON, I THINK IT'S  
MORE IMPORTANT THAN EVER FOR US TO TRY TO CONGREGATE EVERY MONTH AND TRY  
TO SHARE BEST PRACTICES AND RESOURCES AND HEAR FROM EXPERTS AS TO HOW TO  
MAKE OUR LIVES MORE MEANINGFUL AND EASIER TO GET THROUGH THE DAY-TO-DAY.  
WE HAVE OUR SPEAKER TODAY.  
RAY.  
I'M GOING TO HAVE SANDY BLAKE WHO IS OUR STEERING COMMITTEE, SINGER,  
MUSICIAN, MUSIC TEACHER EXTRAORDINARE INTRODUCE OUR SPEAKER, WE WILL  
LAUNCH INTO THE PRESENTATION AND HAVE A Q&A AFTER AND THEN WE CAN DISCUSS  
SOME OTHER THINGS.  
CHAPTER BUSINESS AFTER THAT.  
I WANT TO FIRST BEFORE WE START TO SEE IF THERE ARE ANY NEW PEOPLE ON  
THIS CALL RIGHT NOW AND IF YOU ARE NEW, IF YOU WOULD LIKE TO UNMUTE  
YOURSELF, IF YOU ARE CURRENTLY MUTE, JUST INTRODUCE YOURSELF.  
WE'D LOVE TO WELCOME YOU.  
I RECOGNIZE MOST OF THE NAMES AND FACES.  
I SEE ONE IPHONE I DON'T KNOW IF THAT IS A NEWCOMER.  
ALL RIGHT F. THERE'S NOBODY NEW THAT WANTS TO SPEAK RIGHT NOW WE'LL ASK  
AGAIN AFTER THE PRESENTATION IS OVER.  
AND SANDYY DON'T YOU TAKE IT OVER.  
>> THANK YOU, SHARON.  
IT IS MY PLEASURE TO INTRODUCE RAYMOND, PHD WHO IS ASSOCIATE PROFESSOR OF  
OTOLARYNGOLOGY AT THE TECH SCHOOL OF MEDICINE AT THE UNIVERSITY OF  
CALIFORNIA.  
HE RECEIVED HIS BACHELOR OF SCIENCE IN PHYSICS FROM THE UNIVERSITY OF KEN  
DEN IN 199 -- OF KENTUCKY IN 1997 AND DOCTOR OF PHILOSOPHY IN HEALTH  
SCIENCES AND TECHNOLOGY FROM HARVARD UNIVERSITY AND THE MASSACHUSETTS  
INSTITUTE OF TECHNOLOGY IN 2005.  
AFTER COMPLETING HIS DOCTORAL STUDIES, RAY WAS PRODUCT DEVELOPMENT FOR A  
CORPORATION TO IMPROVE SIGNAL PROCESSING FOR COCHLEAR IMPLANTS AND  
HEARING AIDS.

AND TO PROVIDE AUDITORY TRAINING SOFTWARE FOR PEOPLE WITH HEARING LOSS.  
DR. RAY JOINED SOUTHERN CALIFORNIA AS ASSOCIATE PROFESSOR OTOLARYNGOLOGY  
IN JANUARY OF 2014.

RAY IS A COCHLEAR IMPLANT USER AND IS PASSIONATE ABOUT THE INTERPLAY OF  
AUDITORY EXPERIENCE, AUDITORY PERCEPTION AND MEDICAL BIONICS TO IMPROVE  
THE LIVES OF PEOPLE WITH HEARING LOSS.

WE'RE SO HAPPY TO HAVE YOU HERE.

TAKE IT AWAY.

>> GOOD MORNING, I WANT TO JUST SUGGEST ONE THING.

IF EVERYONE CAN MUTE YOURSELF IF YOU'RE NOT ALREADY MUTED SO IT WILL  
ELIMINATE THE BACKGROUND NOISE AND WE CAN JUST FOCUS ON RAY THEN DURING  
THE Q&A OBVIOUSLY YOU CAN UNMUTE YOURSELF.

>> THANK YOU.

I'LL TELL YOU A LITTLE BIT ABOUT MY IMPLANT HISTORY.

SO I'VE HAD A COCHLEAR IMPLANT FOR MORE THAN 30 YEARS NOW.

I LOST MY HEARING WHEN I WAS 13.

AND AT THAT TIME THEY WERE JUST DOING PEDIATRIC TRIALS OF THE COCHLEAR  
IMPLANTS IN AMERICA.

SO IT WAS ABOUT 30 YEARS AGO OR SO THAT I GOT MY IMPLANT.

SO I'VE HAD IT A LONG TIME.

I GOT INTO COLLEGE AND PHYSICS I REALIZED THAT I COULD PUT MY LOVE OF  
PHYSICS TOWARDS MY OWN BETTERMENT HOPEFULLY TO THE BETTERMENT OF OTHERS  
BY STUDYING COCHLEAR IMPLANTS.

SO THAT'S WHAT I'VE BEEN DOING EVER SINCE.

SO I DO RESEARCH NOW AT USC IN OTOLARYNGOLOGY AS SANDY MENTIONED.

I STUDY MUSIC APPRECIATION.

I'M FOCUSED ON TRYING TO IMPROVE MUSICAL SPEECH PERCEPTION.

I HAVE A PRESENTATION PREPARED I'M GOING TO SHARE MY SCREEN.

CAN I GET PERMISSION TO SHARE MY SCREEN FROM THE HOST?

OFTEN A RIGHT CLICK NEXT TO THE SHARE SCREEN.

YEAH, I CAN DO IT NOW.

I'M GOING TO TAKE YOU THROUGH A LITTLE PRESENTATION THAT KIND OF COMBINES  
SOME OF THE HISTORY OF COCHLEAR IMPLANTS THAT I FIND TO BE INTERESTING.  
HAVE SOME METAPHORS FOR HOW HEARING LOSS, SOME VISUAL METAPHORS HEARING  
LOSS DISRUPTS MUSIC APPRECIATION.

THEN I'M GOING TO TELL YOU A LITTLE BIT ABOUT SOME OF MY RESEARCH, SOME  
OF MY ACTIVE PROJECTS.

SO THIS IS WHAT I'M FOCUSED ON.

I'M FOCUSED ON COCHLEAR IMPLANTS, HERE IS A BABY WITH AN IMPLANT.

EVERYBODY HERE I BELIEVE IS FAMILIAR WITH A COCHLEAR IMPLANT.

YOU KNOW WHAT IT IS ON THE OUTSIDE.

I'M GOING TO TELL YOU A LITTLE BIT ABOUT WHAT IT IS ON THE INSIDE.

OF COURSE THERE'S A SPEECH PROCESSOR THAT HAS A MICROPHONE, THE  
MICROPHONE CAN PICK UP THE SOUND.

AND THEN, SEE IF I CAN GET -- A POINTER.

A MICROPHONE HERE THAT PICKS UP THE SOUND AND THEN IT'S THE JOB OF OUR  
SOUND PROCESSOR TO CONVERT THE SOUND INTO AN ELECTRICAL STIMULATION  
PATTERN.

THAT ELECTRICAL STIMULATION PATTERN WILL COME UP HERE WITH THE  
TRANSMITTER, IT'S GOING TO SEND THE INFORMATION ACROSS THE SKIN AND SKULL  
WITH A RECEIVER.

IT COMES DOWN TO THE STIMULATOR GOING THROUGH THE MIDDLE EAR THEN INTO  
THE COCHLEA FROM YOU HAVE THE ELECTRODE ARRAY IMPLANTED.

NUMBER OF ELECTRODE CONTACT VARIES FROM 12-22 DEPENDING ON THE MODEL AND MANUFACTURER.

EVEN SOME PEOPLE STILL WHO HAVE A SINGLE ELECTRODE THAT STIMULATES THE NERVE.

HERE IS THE AUDITORY NERVE THAT'S WHAT WE'RE STIMULATING.

THE AUDITORY NERVE HAS ABOUT 30,000 NERVE FIBERS IN IT.

AND SO YOU ARE TRYING TO STIMULATE THE 30,000 FIBERS WITH AS MANY AS 22 ELECTRODES SO YOU CAN SEE HOW THAT IS QUITE A CHALLENGE BECAUSE YOU'RE TRYING TO CREATE THE COMPLEXITY OF SOUND WITH JUST A FEW NUMBER OF ELECTRODES.

THERE'S A LOT OF NERVE FIBERS HERE THAT WE'RE TRYING TO TO STIMULATE.

I LIKE TO GIVE A HISTORY.

BECAUSE IT'S KIND OF -- SOME OF THE EARLY DAYS OF ELECTRICAL STIMULATION KIND OF FUNNY.

THERE IS ACTUALLY ALESSANDRO WHO FIRST ELECTRICALLY STIMULATED THE INNER EAR.

HE WAS THE FIRST PERSON TO MAKE A BATTERY.

I GUESS AS FIRST PERSON TO MAKE A BATTERY HE THOUGHT IT -- HE DID THAT IN 1799 SO HE THOUGHT IT WOULD BE A GOOD IDEA TO TAKE THE BODY, 50 VOLT AND HE INSERTED A METAL ROD INTO BOTH OF HIS EARS.

SO WHEN HE DID THAT HE ELECTRICALLY STIMULATED THE AUDITORY NERVE.

SO HE HEARD SOMETHING JUST BEFORE PASSING OUT.

IT WAS AN EXPERIMENT THAT HE ONLY TRIED ONCE.

BUT TECHNICALLY HE WAS THE FIRST PERSON TO EVER STIMULATE HIS AUDITORY NERVE.

THEN THERE WAS A FELLOW NAMED DUCHENNE HE DID THE SAME THICK BUT WITH ALTERNATING CURRENT, HE WAS QUITE FAMOUS HE STUDIED THE FACIAL MUSCLES. THAT IS WHAT IS SHOWN HERE.

WHAT HE ACTUALLY IS DOING HE STIMULATING THE FACE, CONTRACTING THE MUSCLES, BY DOING THAT HE WAS ABLE TO DO A REALLY CAREFUL STUDY OF FACIAL MUSCULATURE BECAUSE THAT HAVE HE'S ALSO REFERRED TO AS THE FATHER OF ELECTROPHYSIOLOGY.

BUT HE ALSO STIMULATED HIS HEARING USING ALTERNATING CURRENTS.

SO HE WAS ONE OF THE EARLY PEOPLE TO HAVE DONE THAT.

BUT IT DIDN'T REALLY GET SERIOUS UNTIL SCIENTISTS AT HARVARD THEY STARTED STUDYING THE AUDITORY NERVE IN CATS.

WHAT THEY SHOWED, SCIENTISTS AT HARVARD WERE W,VER AND BRAY THEY SHOWED THAT THE AUDITORY NERVE RESPONDS TO SOUND IN A WAY VERY MUCH REPRESENTATIVE OF HARVARD LOOKS LIKE AT THE INPUT.

BASICALLY WHAT THEY DID WAS BY UNDERSTANDING HOW THE AUDITORY NERVE RESPONDS TO SOUND, SOMETHING TO FIGURE OUT HOW DO WE STIMULATE IT ELECTRICALLY SO THAT PEOPLE CAN HEAR AGAIN.

THEN A FRENCH SURGEON WHO WAS THE FIRST TO REALLY GIVE SOMEBODY A COCHLEAR IMPLANT.

ANDRE, HE WAS ELECTROPHYSIOLOGIST HE BUILT THE IMPLANT THEN CHARLES WAS OTOLARYNGOLOGIST HE WAS A SURGEON WHO DID THE FIRST COCHLEAR IMPLANT. THEY DID THAT WAY BACK IN 1957.

SO IN 1957 THEY WERE ABLE TO GIVE SOMEBODY A COCHLEAR IMPLANT AND THAT PERSON COULD HEAR AGAIN BRIEFLY.

BUT ONLY LASTED FOR A WEEK THEY HAD TO TAKE IT OUT BECAUSE OF COMPLICATIONS.

REALLY SET THE STAGE.

THAT LED TO THE WORK THAT WAS DONE BY BILL HOUSE IN SOUTHERN CALIFORNIA  
MANY OF YOU GO TO THE HOUSE EAR INSTITUTE, IT'S ON FIRST STREET IN LOS  
ANGELES.

AND HE REALLY RAN WITH THE BALL HE TOOK IT TO A NEW LEVEL.

>> I GOT IT.

>> WAS THERE A QUESTION?

NO?

DR. HOUSE, HE SURGICALLY IMPLANTED A SINGLE ELECTRODE COCHLEAR IMPLANT IN  
1961.

THEN THROUGHOUT THE '60S HE CONTINUED TO DEVELOP BETTER MODELS OF THE  
IMPLANT AND SOME OF THEM LASTED FOR YEARS.

THAT IS IMPORTANT BECAUSE AS ANYBODY WITH A COCHLEAR IMPLANT KNOWS, THE  
MORE YOU LISTEN WITH THE IMPLANT THE BETTER YOU HEAR WITH THE IMPLANT.  
AND SO BE ABLE TO IMPLANT PEOPLE FOR YEARS HE WAS ABLE TO STUDY HOW THEY  
GOT BETTER OVER TIME.

SO FANTASTIC WORK FROM HIM.

AND THEN GRAEME CLARK IN AUSTRALIA THEY BUILT EVEN BETTER IMPLANT.

AND BETTER -- THEY DID THIS ABOUT THE END OF THE '70S.

ONE, IT HAD MULTIPLE ELECTRODES.

SO BY USING MULTIPLE ELECTRODES THEY COULD STIMULATE THE AUDITORY NERVE  
IN DIFFERENT PLACES.

THAT'S IMPORTANT BECAUSE THE AUDITORY NERVE, IT'S USED TO CONVEYING  
DIFFERENT SOUND FREQUENCIES TO DIFFERENT AUDITORY NERVE POSITIONS.

HAVING MULTIPLE ELECTRODES ALLOWS TO YOU PLAY THE AUDITORY NERVE LIKE  
PLAYING A PIANO SO YOU CAN STIMULATE DIFFERENT REGIONS.

THE OTHER THING THAT THEY DID WAS THEY DEVELOPED WAY OF TRANSMITTING THE  
INFORMATION ACROSS THE HEAD.

SO ANYBODY WITH A COCHLEAR IMPLANT TODAY OR 99.9% WITH IMPLANT TODAY,  
WIRELESS TRANSMISSION THERE'S A DOYLE ON THE OUTSIDE AND SENDS A SIGNAL  
ON THE INSIDE.

AND YOU HAVE SKIN AND SKULL IN BETWEEN.

THAT'S FANTASTIC.

BEFORE THEY SOLVED WIRELESS TRANSMISSION PEOPLE HAD A PLUG.

SO THERE WAS A TRANSCUTANEOUS PLUG THAT YOU ACTUALLY HAD TO PLUG IN THE  
WIRES ON THE SIDE OF THE HEAD.

THAT HAD A PRETTY HIGH RISK OF INFECTION.

SO THAT WAS PROBLEMATIC.

SO WHEN AUSTRALIA SOLVED THE MULTIPLE ELECTRODE ISSUE SOLVED THE WIRELESS  
TRANSMISSION ISSUE, THEY REALLY RAN.

THEY DEVELOPED -- THEY STARTED COCHLEAR CORPORATION AND BECAME VERY  
SUCCESSFUL.

THAT LED TO COCHLEAR CORPORATION.

THAT BRINGS US TO TODAY.

ALL THESE HOT SPOTS IN THE HISTORY.

IN AMERICA, THERE'S A LOT OF WORK IN PALO ALTO AND THE SAN FRANCISCO AREA  
THAT LED TO ADVANCED BIONICS WHICH IS NOW IN THE LOS ANGELES AREA.

THE HOUSE EAR INSTITUTE IN LOS ANGELES DID A LOT OF EARLY GREAT WORK.

HOUSE EAR INSTITUTE OR HOUSE CLINIC IS STILL THERE.

THEN OF COURSE AUSTRALIA GROUP OVER HERE THAT LED TO COCHLEAR CORPORATION  
A LOT OF EARLY WORK IN FRANCE AND EUROPE LED TO MED-EL AND GROUP THERE  
WERE OVER TIME.

THERE WAS A VERY IMPORTANT WORK, SPONSORED BY NIH, THIS SHOWED HOW  
EFFECTIVE THEY WERE.

EVERYBODY -- ALL THE SCIENTISTS -- HALF THE SCIENTISTS SAID THAT IS COCHLEAR IMPLANT IS NOT GOING TO WORK.  
THEN, WELL, IT MIGHT WORK.  
MORE THEY TRIED THE MORE IT WORKED THERE WAS AN IMPORTANT REPORT IN 1977 THAT SAYS CLEARLY THEY WORK.  
SO REALLY INCREASED THE POSSIBILITY OF USING COCHLEAR IMPLANTS.  
THEN FAST FORWARD TO TODAY, THERE'S ABOUT HALF A MILLION PEOPLE NOW WITH COCHLEAR IMPLANTS WORLDWIDE.  
IT'S HARD TO KEEP TRACK OF THE NUMBER.  
BUT CERTAINLY NEAR HALF A MILLION PEOPLE TODAY.  
SPEECH COMPREHENSION IS TYPICALLY QUITE GOOD IN QUIET SITUATIONS.  
AS MANY OF US KNOW MUSIC PERCEPTION AND SPEECH COMPREHENSION IN NOISE CAN BE CHALLENGING.  
SO THAT IS WHAT I FOCUS ON.  
I FOCUS ON THOSE TWO ASPECTS I TRY TO INCREASE SPEECH PERCEPTION IN NOISE AND I TRY TO IMPROVE MUSIC APPRECIATION.  
I'M JUST RETURNING NOW HERE TO MORE OF A CLOSE UP TO THE COCHLEAR IMPLANT.  
AGAIN, THERE'S MULTIPLE CONTACTS HERE.  
MULTIPLE ELECTRODES.  
THOSE DIFFERENT ELECTRODES CAN DIRECTLY STIMULATE THE AUDITORY NERVE HERE AND RECREATE THE SENSE OF SOUND.  
THE ORGANS OVER HERE ARE THE VESTIBULAR CANALS THOSE HELP WITH THE SENSE OF BALANCE.  
THE REASON WHY -- FACT THAT THE BALANCE ORGAN AND HEARING ORGAN ARE RIGHT NEXT TO EACH OTHER IS OFTEN WHY HEARING AND BALANCE DISORDERS GO HAND IN HAND.  
NOW I WANT TO GIVE YOU A QUICK VISUAL METAPHOR FOR WHY MUSIC IS SOMEWHAT MORE DIFFICULT THAN SPEECH IN QUIET.  
FOR PEOPLE WITH HEARING LOSS.  
ONE REASON IS THAT SPEECH IS HIGHLY REDUNDANT.  
SPEECH IS SO REDUNDANT WHEN YOU READ SPEECH EVEN IF YOU MIX UP THE LETTERS YOU CAN STILL READ IT.  
SO WHAT THIS SAYS RIGHT HERE, IT SAYS THE PHENOMENAL POWER OF THE HUMAN MIND.  
ACCORDING TO RESEARCH AT CAMBRIDGE UNIVERSITY IT DOESN'T MATTER IN WHAT ORDER THE LETTERS IN A WORD ARE, THE ONLY IMPORTANT THING IS THAT THE FIRST AND LAST LETTER BE AT THE RIGHT PLACE.  
THE REST CAN BE A TOTAL MESS AND YOU CAN STILL READ IT WITHOUT PROBLEM.  
THIS IS BECAUSE THE HUMAN MIND DOES NOT READ EVERY LETTER ITSELF BUT THE WORD AS A WHOLE.  
WHAT THIS IS SAYING IS THAT, EVEN IF THERE IS HEARING LOSS, OR IF YOU HAVE A COCHLEAR IMPLANT THAT EVEN IF SOMEHOW SOME OF THE SOUNDS ARE SCRAMBLED OR DIMINISHED, SPEECH COMPREHENSION CAN BE QUITE EASILY UNDERSTOOD.  
THIS IS ANOTHER EXAMPLE.  
JUST A PIXELATED IMAGE AND SO EVEN WITH THE LOSS OF INFORMATION MANY OF YOU MIGHT RECOGNIZE WHAT THIS IMAGE IS.  
IT'S A COMMON IMAGE THAT MANY OF US SEE ON A DAILY BASIS OR AT LEAST HAVE AT DIFFERENT POINTS IN OUR LIVES.  
EVEN THOUGH IT'S REDUCED QUALITY, YOU STILL RECOGNIZE IT.  
THE ANALOGY IS EVEN IF YOU HAVE HEARING LOSS OR IF THE COCHLEAR IMPLANT IS GIVING YOU LESS INFORMATION SOMEHOW YOU CAN STILL RECOGNIZE SOMETHING YOU'RE FAMILIAR WITH, LIKE SPEECH.

THIS WAS ABRAHAM LINCOLN.  
YOU COULD RECOGNIZE IT WAS ABRAHAM LINCOLN EVEN WHEN THERE IS A REDUCED INFORMATION.  
BECAUSE ABRAHAM LINCOLN THIS IS AN IMAGE THAT YOU SEE MANY TIMES.  
A LOT OF REDUNDANCY.  
IT'S ICONIC.  
WITH MUSIC, MUSIC IS NOT ABOUT SOMETHING YOU'RE FAMILIAR WITH, SOMETIMES IT IS.  
BUT SOMETIMES MUSIC ABOUT SURPRISE.  
MUSIC IS ABOUT BUILDING UP EXPECTATION THEN CHANGING IT TO GIVE YOU SOMETHING NEW.  
SO MUSIC IS ART.  
AND THIS IS A WORK OF ART THAT HAS BEEN PIXILATED.  
IT'S MUCH MORE DIFFICULT TO FIGURE OUT WHAT THIS IMAGE IS WHEN IT'S REDUCED QUALITY.  
EVEN WHEN THERE'S A LOT OF INFORMATION HERE AND YOU HAVE MORE RESOLUTION, YOU STILL MIGHT NOT RECOGNIZE WHAT IT IS.  
SO YOU REALLY NEED A LOT MORE RESOLUTION BEFORE YOU SEE WHAT THE CLEAR IMAGE IS.  
MUSIC IS LIKE THAT.  
THIS IS A VISUAL METAPHOR FOR TRYING TO CONVEY THAT FOR MUSIC APPRECIATION YOU REALLY NEED HIGHER RESOLUTION.  
A LOT OF THE NUANCES ARE NOT GOING TO COME THROUGH.  
WITH A COCHLEAR IMPLANT WHEN I LISTEN TO MUSIC IS OFTEN DIFFICULT FOR ME TO HEAR THE DIFFERENT INSTRUMENTS BECAUSE SOME OF THE SUBTLITIES ARE BEING LOST BECAUSE OF THE LACK OF RESOLUTION WITH AN IMPLANT.  
THIS IS JUST ANOTHER CLOSE UP AGAIN SHOWING HOW THE ELECTRODE ARRAY REALLY IS IN THE COCHLEA.  
THE COCHLEA IS VERY MUCH LIKE A PIANO.  
IN THAT WHEN SOUND COMES IN, THE LOW FREQUENCY SOUNDS THEY WORK THEIR WAY, ALL THE WAY UP TO THE TOP OR APEX OF THE COCHLEA.  
IN HIGH FREQUENCY SOUND THEY EXCITE THE BASE.  
IN THE COCHLEAR IMPLANT TAKES ADVANTAGE OF THAT, THE COCHLEAR IMPLANT IS LIKE A PIANO, WITH THE LOW NOTES ARE DISTRIBUTED UP HERE.  
AND THE HIGH NOTES ARE DISTRIBUTED DOWN HERE AT THE BASE.  
AND SO THE COCHLEAR IMPLANT USES WHICH ELECTRODE FIRES AS ONE OF THE WAYS THAT CONVEY MUSICAL PITCH.  
WITH THE LOWER NOTES BEING DELIVERED TO THE MORE ABLE ELECTRODES AND HIGHER NOTES BEING DELIVERED TO THE MORE BASAL ELECTRODE.  
ON TOP OF THAT, THERE'S ALSO A TIME CODE, LIKE HOW FAST THE ELECTRODE FIRES.  
AND THE COCHLEAR IMPLANT, THE STATE-OF-THE-ART DOESN'T USE THE TIME CODE VERY WELL.  
AND MY RESEARCH I FOCUS ON THE TIME CODE A GOOD BIT SO I'M GOING TO TELL YOU A LITTLE BIT ABOUT THAT.  
MY RESEARCH AT USC, I STUDY MUSIC APPRECIATION WITH COCHLEAR IMPLANTS.  
AND THAT'S A VERY BROAD TOPIC.  
SO MUSIC APPRECIATION OF COURSE DEPENDS ON YOU, IS WHETHER OR NOT YOU APPRECIATE USE I CAN.  
IT BRINGS INTO PLAY PSYCHOLOGY, YOUR APPROACH TO MUSIC APPRECIATION AND THE BEST RECOMMENDATION THERE IS -- YOU HAVE TO TRY EVERYTHING.  
YOU HAVE TO TRY MUSIC THAT YOU ARE UNFAMILIAR WITH, YOU HAVE TO TRY LISTENING TO YOUR FAVORITE MUSIC, YOU HAVE TO TRY PLAYING MUSIC.  
YOU HAVE TO BE BRAVE.



IT BRINGS INTO PLAY SOCIOLOGY, YOU WANT TO MEET WITH PEOPLE LIKE YOU'RE DOING NOW AND SHARE YOUR STORIES AND SHARE ENCOURAGEMENT TO DIVE BACK INTO MUSIC.

ON THAT NOTE I WANT TO SAY, WE HAVE MY LAB HAS A WEEKLY MUSIC HOUR. WHICH SANDY AND HEATHER TAKE PART OF.

AND IT'S A VERY NICE TIME, WE OFTEN HAVE A MUSICIAN COME AND THEY PLAY FOR US AND WE ASK THEM QUESTIONS.

SHOOT ME AN E-MAIL IF YOU WANT TO JOIN US FOR THAT ANY TIME.

SO MUSIC APPRECIATION DEPENDS ON YOU, THE PSYCHOLOGY AND SOCIOLOGY HAVE SOME ASPECTS THAT I STUDY.

I ALSO STUDY MUSIC APPRECIATION DEPENDS ON HEARING.

I'M VERY MUCH AN ENGINEER.

I THINK A LOT OF OTHER SIGNAL PROCESSING THAT GOES ON AND COCHLEAR IMPLANT PROCESSOR.

BECAUSE I BELIEVE STRONGLY BELIEVE THAT WE CAN IMPROVE THE SIGNAL PROCESSING THAT GOES ON ON THE PROCESSOR.

THE AUDITORY SYSTEM AND HEALTHY HEARING HAS BEEN EVOLVING FOR MILLIONS OF YEARS, HUNDREDS OF MILLIONS OF YEARS.

AND OVER THE PAST SEVERAL DECADES OF COCHLEAR IMPLANT SCIENCE WE HAVE NOT -- WE HAVE NOT CAPTURED ALL OF THE NUANCES OF HEALTHY HEARING.

SO EVERYTHING THAT WE'RE LISTENING TO NOW, OUR SOUND PROCESSOR I SEE IT AS A FIRST ATTEMPT, AS A FIRST DRAFT.

THERE'S A LOT OF INFORMATION THAT IS MISSING IN OUR COCHLEAR IMPLANT THAT WE CAN IMPROVE.

SO I FOCUS A LOT ON THAT.

I'M JUST GOING TO GIVE YOU A QUICK EXAMPLE OF WHAT YOUR PROCESSOR CURRENTLY DOES.

I'M GOING TO TRY TO HIGHLIGHT WHY I THINK SOME OF THE INFORMATION THAT IS MISSING THAT WE CAN PUT BACK INTO IT.

BASICALLY WHAT THIS FIGURE IS SHOWING IS THAT WHEN SOUND COMES INTO THE PROCESSOR, THE FIRST THING IT DOES IS IT GO THROUGH A FILTER BANK.

THAT'S BASICALLY A PIANO.

IT'S TRYING TO PUT LOW FREQUENCY TO ONE ELECTRODE AND HIGH FREQUENCIES TO ANOTHER ELECTRODE.

IT'S DOING THAT IN A VERY RAPID FASHION.

THEN IT TAKES SORT OF A SLOW ENVELOPE OF WHAT IS BEING PROCESSED.

THIS IS -- THIS ENVELOPE PROCESSING HERE I THINK IS ONE OF THE WORST ASPECTS OF COCHLEAR IMPLANT PROCESSING USED TODAY BECAUSE IT DISCARDS SOME OF THE RAPID TIMING INFORMATION THAT COULD CONVEY MUSIC BETTER.

AND COULD CONVEY SPEECH AND NOISE BETTER.

SO EVERY PART OF YOUR BRAIN HAS SORT OF A SPECIALTY.

THERE'S SOMETHING THAT EVOLVED TO BE BETTER AT.

AND THE THING THAT THE AUDITORY NERVE IS THE BEST AT IS TIME.

IT IS THE FASTEST NERVE IN THE BODY.

IT IS MUCH FASTER THAN THE VISUAL NERVE, THE OPTIC NERVE.

FOR ANYBODY WHO HAD AN OLD PASSED TV AT SOME POINT IN THEIR LIFE, THOSE TVS WOULD REFRESH THE SCREEN 60 TIMES A SECOND.

YOU COULDN'T NOTICE -- YOU COULDN'T SEE THAT IT WAS REFRESHING 60 TIMES PER SECOND.

SOMEBODY COULD PUT IN A SUBLIMINAL MESSAGE AND REPLACE ONE FRAME EVERY 60 SECONDS AND YOU COULDN'T SEE IT.

BECAUSE THE OPTIC NERVE CANNOT KEEP UP WITH 60 TIMES PER SECOND OR 60 HERTZ.

THE AUDITORY NERVE CAN KEEP UP WITH AT LEAST 3,000 HERTZ OR 3,000 TIMES PER SECOND.

THE AUDITORY NERVE IS THE FASTERS NERVE IN THE BODY, IT'S WHAT IT DOES REALLY WELL.

SO I THINK DISCARDING SOME OF THE TIMING INFORMATION IS A BAD IDEA.

THIS IS WHAT AN OUTPUT LOOKS LIKE FOR A WORD CHOICE.

IF I SAY THE WORD "CHOICE" TO YOU RIGHT NOW, THEN WHAT HAPPENS IS -- WHAT I'M SHOWING HERE THIS IS AT THE BOTTOM HERE THIS IS JUST A PRESSURE WAVE FORM.

YOU HAVE LIKE A CH, THIS IS THE VOWEL, OI, THEN UP HERE WHAT HAPPENS IS THAT THE CH SOUND THAT IS HIGH FREQUENTLY.

CH, GOT A LOT OF HIGH FREQUENTLYS.

IT EXCITES ELECTRODE THAT WOULD BE IMPLANTED MORE BASALLY OR AT THE BOTTOM OF THE COCHLEA.

THEN THIS IS THE VOWEL.

IF YOU LOOK CLOSELY AT THE VOWEL, YOU SEE LIKE -- YOU SEE A MODULATION THAT IS GOING UP AND DOWN.

THAT IS ACTUALLY CALLED, WHEN YOU SAY A VOWEL, YOUR VOCAL THEY OPEN AND CLOSE.

SO WHEN I SAY OI, MY VOCAL, THEY OPEN AND CLOSE ABOUT A HUNDRED TIMES PER SECOND THAT'S YOUR VOICE PITCH.

THIS INFORMATION HERE HAS VOICE PITCH, THERE'S SOME RAPID TIMING INFORMATION THAT IS IN THERE.

THEN AT THE END OF THE WORD YOU HAVE A S SOUND.

WHICH IS AGAIN A HIGH FREQUENCY SOUND SO IT'S GOING TO EXCITE SOME OF THE BASAL ELECTRODES.

THIS IS WHAT IT LOOKS LIKE AT THE OUTPUT OF THE FILTER BANK.

THEN THAT INFORMATION, WE'RE GOING TO TAKE THE ENVELOPE WE DISCARD ALL THE FASTER MODULATIONS HERE.

YOU CAN STILL SEE THE VOICE PITCH.

BUT SOME OF THE FASTER, WHAT WE REFER TO AS TEMPORAL FINE STRUCTURE OF FINE TIMING INFORMATION, IT'S BEEN CAST ASIDE.

THEN THAT IS GOING TO BE USED TO MODULATE LITTLE PULSE, IS THAT WILL COME OUT OF YOUR ELECTRODES.

WHEN YOU DO THAT, NOW THE FUNDAMENTAL FREQUENCY OF VOICING, THE VOICE PITCH STARTING TO GET BLURRY.

STARTING TO GET DEGRADED AND DIMINISHED.

THE FINE TIMING INFORMATION HAS GONE OUT OF IT.

AND SO ONE OF MY CHIEF FOCUSES IN MY LAB IS TRYING TO BUILD A BETTER IMPLANT.

TRYING TO CONVINCING THE MANUFACTURERS THAT THE TIMING INFORMATION HAS A LOT OF STRENGTH TO IT.

SO, STATE-OF-THE-ART COCHLEAR IMPLANTS THEY DISCARD A LOT OF THE TIMING INFORMATION.

THEY DON'T DISCARD ALL OF IT.

THERE'S SOME TIMING -- THEY DISCARD A LOT OF IT.

SO THE TEMPORAL FINE STRUCTURE OF SOUND IT MIGHT BE IMPORTANT FOR MUSIC PERCEPTION AND ALSO SPEECH COMPREHENSION IN NOISY SITUATIONS IS A LOT OF SCIENTIFIC STUDIES ON THAT.

SO I STUDY HOW WELL COCHLEAR IMPLANT USERS CAN USE THIS INFORMATION.

IF IT'S PROVIDED IN A CLEAR AND CONSISTENT MANNER.

SO ONE QUESTION I HAVE IS, HOW WELK COCHLEAR IMPLANT USERS HEAR MUSICAL PITCH BASED ON STIMULATION TIMING.

HOW WELL THEY CAN DO IT BASED ON STIMULATION TIMING.

SO THERE'S WAYS THAT I APPROACH THIS I WORK WITH ADULT COCHLEAR IMPLANT USERS, BECAUSE AS SANDY WILL ATTEST SOME OF THE HEARING STUDIES THAT WE DO, THEIR LONG, BORING AND TEDIOUS. THE REASON WHY IS BECAUSE WE'RE TRYING TO GET DOWN TO THE BASIC BUILDING BLOCKS OF HEARING. THE BASIC, HOW WELL CAN YOU HEAR PITCH, WHAT IS YOUR RESOLUTION. TO DO THAT, FOR THOSE KIND OF STUDIES I PREFER WORKING WITH ADULTS BECAUSE THEY HAVE THE FOCUS AND THE ATTENTION TO DO LONG PITCH TRAINING EXERCISES. THEN WE DO PITCH RANKING. YOU HEAR TWO SOUNDS YOU HAVE TO SAY WHICH ONE IS HIGHER IN PITCH. THEN WE PROGRESSIVELY BRING THE SOUNDS CLOSER TOGETHER TO SEE WHAT THE NOTABLE DIFFERENCES. OR DISCRIMINATION THRESHOLD. WE DON'T WANT LOUDNESS TO BE THE COULD YOU YOU'RE LISTENING FOR WE WANT IT TO BE PITCH. SO THAT'S THE BASIC TASK THAT WE'RE DOING. WE'RE DOING THIS USING STIMULATION TIMING, BY PASSING THE PROCESSOR AND DOING TIMING. WHAT I'M SHOWING HERE IS A GRAPH, ON THE GRAPH YOU HAVE POOR PITCH PERCEPTION UP HERE NEAR THE TOP. SO IF THERE'S DISCRIMINATION THRESHOLD OR NOTICEABLE DIFFERENCE 100% THAT IS ON ACTIVATION. THAT MEANS SOMEBODY CAN ONLY HEAR THE DIFFERENCE IF THERE IS ONE OCTAVE DIFFERENCE. THEN DOWN HERE AT 1%, THAT IS REALLY GOOD. BECAUSE A HALF STEP ON A PIANO IS ABOUT 6%. ANYBODY WHO CAN HEAR 1% DIFFERENCE IS HEARING A MICRO CHANNEL, IT'S VERY GOOD. SO EVERYBODY BEFORE ME WHO STUDIES COCHLEAR IMPLANTS HAVE SAID THAT COCHLEAR IMPLANT USERS CAN USE STIMULATION TIMING ABOVE ABOUT 300 HERTZ, I THINK I HAVE A PIANO DOWN HERE. HERE IS MIDDLE C. MIDDLE C ABOUT 300 HERTZ HERE. YOU CAN SEE IN THIS GRAPH, THERE WAS THIS GRAPH IS SHOWING IS HOW MOST COCHLEAR IMPLANT USERS DO ON THIS TASK. AND MOST OF THEM CAN'T DO IT VERY WELL ONCE THE FREQUENCY YOU'RE TRYING TO PROVIDE GOES UP. THIS IS PRODUCED IN A SET OF DOGMA AMONGST COCHLEAR IMPLANT SCIENTISTS WHERE THEY BELIEVE THAT COCHLEAR IMPLANT USERS CANNOT HEAR PITCH ABOVE 300 HERTZ SO THEY SAY, WELL WHY SHOULD WE BOTHER TRYING TO ENCODE IT IN THE CI SOUND PROCESSOR. I ARGUE THAT THEY HAVE IT BACKWARDS. AND I SAY, WELL THEY'RE NOT GOING TO BE ABLE TO HEAR IT UNTIL YOU ENCODE IT. THEN ONCE YOU ENCODE IT THEY WILL LEARN HOW TO HEAR IT. IN MY STUDIES I TRAIN PEOPLE TO LISTEN TO THAT PITCH CUE SO IF THEY GET BETTER. SO THIS IS AS A REFERENCE POINT, THIS IS HOW NORMAL HEARING LISTENERS DO WHEN THEY'RE LISTENING TO PITCH. NOW NORMAL HEARING LISTENERS WE CAN'T -- THIS -- BETWEEN A TIMING CUE AND A PLACE CUE BUT COCHLEAR IMPLANT USERS WE CAN. SO WHEN I FIRST START WORKING WITH COCHLEAR IMPLANT USERS I'M LISTENING TO TIMING PITCH.

THAT IS HOW WELL THEY DO.  
SO IT'S -- ON BETTER SIDE OF WHAT OTHER PEOPLE HAVE FOUND.  
BUT THEN WHEN THEY GET EXPERIENCE LISTENING TO TIMING PITCH THEY DO MUCH BETTER.  
SO WITH THIS 30 HOURS OF TRAINING THEY GET MUCH BETTER.  
SO THIS IS PROOF POSITIVE IN MY MIND THAT IF WE PUT THIS INFORMATION BACK IN TO THE CI SOUND PROCESSOR YOU WILL BE ABLE TO USE IT AND BE ABLE TO HEAR IT.  
I WANT TO BE CLEAR HERE.  
THE STUDY THAT I DO IN THE LAB, WE'RE BYPASSING THE CLINICAL SOUND PROCESSOR THAT IS NOT INFORMATION THAT I OR ANY OF THE COMPANIES HAVE PUT BACK INTO THE PROCESSOR YET.  
MATHEMATICALLY IT'S QUITE CHALLENGING TO PUT THIS INFORMATION BACK IN THAT.  
BUT I'M WORKING ON IT AND SO ARE SOME OF THE RESEARCH GROUPS AT THE MANUFACTURERS TO PUT THIS INFORMATION BACK.  
I'M VERY HOPEFUL THAT ONCE IT GETS THERE IS GOING TO IMPROVE MUSICAL PITCH PERCEPTION FOR ANYBODY WHO USES THE COCHLEAR IMPLANT.  
THIS IS JUST SHOWING SORT OF THE LEARNING CURVE, LIKE HOW MUCH BETTER PEOPLE GET OVER TIME WITH THE TRAINING.  
YOU CAN SEE THAT THE TRAINING CONTINUES ON.  
THERE'S ONLY SO MUCH IN-LAB TRAINING.  
I'M TAKING ADVANTAGE OF THE FACT THAT WE'RE IN A PANDEMIC NOW I'M DOING PITCH TRAINING ON A DAILY BASIS BECAUSE I HAVE ALL MY RESEARCH HARDWARE AT HOME.  
I SPEND A LOT OF TIME DOING THIS AT HOME.  
AND I'M GOING TO FIND OUT JUST HOW GOOD IT GETS.  
IT'S LOOKING PRETTY GOOD, I'LL SAY THAT.  
I'LL SAY THAT -- OTHER SCIENTISTS IN THE FIELD BELIEVE THAT THERE'S A 300 HERTZ LIMIT OR MIDDLE C.  
I'M ABLE TO HEAR MUSICAL PITCH UP TO AT LEAST 2,000 HERTZ.  
THAT'S NIGHT AND DAY.  
THERE'S A LOT OF INFORMATION THAT CAN BE BROUGHT BACK INTO THE PROCESSOR.  
THE CONCLUSION FOR THAT IS THAT, STATE-OF-THE-ART COCHLEAR IMPLANT DEVICES THEY DO NOT USE FAST TIMING INFORMATION.  
THEY DISCARD IT.  
I THINK THAT A MISTAKE.  
STIMULATION TIMING CAN BE MORE EFFECTIVELY USED TO CONVEY MUSICAL PITCH.  
MY RESEARCH SHOWS THAT COCHLEAR IMPLANT USERS CAN USE STIMULATION TIMING FOR PITCH PERCEPTION WITH PRACTICE.  
IF THEY'RE GIVEN EXPERIENCE.  
SO THAT'S ONE SNAPSHOT FROM THE WORK IN MY LAB.  
IN GENERAL MY LAB IS TRYING TO DEVELOP NEW SOUND PROCESSING STRATEGIES TO BETTER USE THIS INFORMATION.  
SORRY.  
I THOUGHT I HAD ACKNOWLEDGMENT SLIDE.  
IT SEEMS TO BE MISSING.  
LET ME SEE IF I CAN GET TO IT.  
I WANTED TO MENTION WHO MY LAB MATES ARE.  
SUSAN BISSMEYER AND ANDRE, THEY ARE PHD STUDENTS IN MY LAB.  
THEY ARE WORKING ON A LOT OF THE PROJECTS SO I'M THANKFUL TO THEM.  
THEN JURI IS A PHD STUDENT FROM CINEMATIC ART.  
SHE HELPS OUT ON A LOT OF DIFFERENT ACTIVITIES INCLUDING THE MUSIC HOUR THAT WE HAVE.

THEN WILL IS MD CANDIDATE.  
HE HAS FANTASTIC WORK.  
I WANTED TO HAVE MY E-MAIL DOWN HERE AGAIN.  
IF ANYBODY WANTS TO CONTACT ME.  
I ENCOURAGE YOU TO DO SO.  
GO TO THE MUSIC HOUR AND OTHER RESEARCH ASPECTS THAT WE DO.  
BECAUSE OF THE PANDEMIC RIGHT NOW EVERYTHING WE'RE DOING IS REMOTE.  
IT'S ONLINE HEARING TEST AND VIRTUAL MUSIC HOUR THAT WE HAVE.  
AND WE DO SURVEYS AND STUFF LIKE THAT.  
THEN I'LL FINISH IT UP WITH ABOUT THE LITTLE FOX.  
I REALLY LIKE IT BECAUSE OF THE BIG EARS.  
SO WITH THAT, IF THERE'S ANY QUESTIONS I'M HAPPY TO TALK ABOUT ANY ASPECT  
OF MY WORK.  
>> SHARON, THANK YOU, THAT WAS A VERY INTERESTING PRESENTATION.  
WHY DON'T WE OPEN IT UP FOR QUESTIONS, IT'S A LOT OF INFORMATION.  
LOT OF GREAT INFORMATION.  
>> CAN WE UNSHARE THE SCREEN.  
THAT WOULD BE GREAT, THANKS.  
>> I HAD A QUESTION.  
HI, RAY, THIS IS TIM BROWNING NICE TO SEE YOU AGAIN.  
CAN YOU DESCRIBE MORE OF THIS MUSIC APPRECIATION HOUR YOU HAVE, WHAT DOES  
THAT REALLY INVOLVE?  
MY SITUATION IS I WAS BORN WITH MODERATE TO SEVERE HEARING LOSS SO I'VE  
NEVER REALLY HAD THE CHANCE TO APPRECIATE MUSIC.  
IN A I WOULD THAT MAYBE PEOPLE WHO COULD AT ONE POINT I WAS CURIOUS WHAT  
THAT INVOLVED.  
>> WE STARTED WAY BACK IN -- ACTUALLY STARTED IN DECEMBER WE HAD KIND OF  
A CHRISTMAS PARTY MEETING AND THEN IN FEBRUARY WE HAD AN IN-PERSON  
MEETING AT TECH USC THEN THE PANDEMIC CAME TO TOWN.  
THEN ONCE THE PANDEMIC ROLLED IN WE DECIDED TO START HAVING ZOOM  
MEETINGS.  
SO WHAT WE DO IS WE MEET EVERY THURSDAY AT 2:00 PACIFIC TIME AND USUALLY  
WHAT WE DO IS WE INVITE A MUSICIAN.  
THE MUSICIAN MAY OR MAY NOT HAVE HEARING LOSS.  
I WOULD SAY MAYBE TWO-THIRDS WE GET THEM FROM THE USC SCHOOL OF MUSIC.  
THEY PLAY THEIR INSTRUMENTS THEN WE ASK THEM QUESTIONS ABOUT THEIR  
INSTRUMENT.  
THEN WE TALK ABOUT WHAT SOUNDS GOOD TO US.  
HOW WELL WE CAN HEAR DIFFERENCES IN DIFFERENT INSTRUMENTS AND DIFFERENCES  
IN MUSICAL PITCH OR DIFFERENCES IN TIMBRE.  
PEOPLE HAVE QUESTIONS ON SIGNAL PROCESSING SO SOMEBODY MIGHT ASK WHAT IS  
THE BEST SETTING FOR LISTENING TO MUSIC ON THE COCHLEAR IMPLANT.  
I'LL TRY TO ANSWER THAT ALTHOUGH IT'S NOT A STRAIGHT FORWARD QUESTION.  
SO WE DO THAT.  
SOMETIMES WE HAVE MORE WORKSHOP WHERE ONE OF THE STUDENTS FROM THE SCHOOL  
OF MUSIC WILL TRY TO GET US TO DO SOMETHING LIKE ONE OF THE PEOPLE TRY TO  
GET ME TO SING, I WOULDN'T DO IT.  
BUT SANDY WOULD SING FOR US.  
STUFF LIKE THAT.  
BUT YOU CAN DEFINITELY COME.  
YOU'LL FIND OUT IT'S VERY INFORMAL.  
IT'S VERY MUCH LIKE THIS MEETING EXCEPT THE SPEAKER IS ALWAYS FOCUSED ON  
MUSIC.  
>> I DON'T HAVE A COCHLEAR IMPLANT.

I NOTICE THAT FOR ME AND MUSIC, I CAN'T UNDERSTAND LYRICS, I NEVER HAVE BEEN ABLE TO HEAR THE LYRICS.  
THE MUSIC I'LL GRAVITATE TOWARD IS MUSIC THAT REMINDS ME OF SOME SORT OF EXPERIENCE.  
THAT'S WHY I HAVE TENDENCY TO LISTEN TO THE SAME MUSIC OVER AND OVER AND ENJOY IT.  
BUT I NEVER TRULY UNDERSTOOD THE HEARING LOSS IMPACT THAT I HAVE WITH MUSIC, BECAUSE I CAN'T UNDERSTAND THE LYRICS.  
I CAN READ THEM.  
BUT I JUST -- VERY FRUSTRATING.  
I'VE ALWAYS BEEN KIND OF CURIOUS ABOUT THAT.  
>> I CAN KIND OF SPEAK GENERALLY TO THAT.  
MOST PEOPLE WITH HEARING LOSS WITHOUT A COCHLEAR IMPLANT MOST PEOPLE HAVE HIGH FREQUENCY HEARING LOSS.  
DO YOU HAVE HIGH FREQUENCY HEARING LOSS?  
SO WITH HIGH FREQUENCY HEARING LOSS OFTEN YOU HAVE TROUBLE UNDERSTANDING THE LYRICS, YOU HAVE -- YOU MIGHT HAVE DIFFICULTY UNDERSTANDING SPEECH BECAUSE OF THE CONSONANTS GIVE YOU TROUBLE.  
BUT MUSIC PERCEPTION IS PROBABLY BETTER THAN MINE, BETTER THAN THE AVERAGE COCHLEAR IMPLANT.  
YOU'RE ABILITY TO HEAR DIFFERENCES BETWEEN NOTES.  
SO YOU MIGHT BE FOLLOWING THE MELODY LINE PRETTY WELL OF THE FAMILIAR MUSIC THAT YOU'RE USED TO.  
SO THERE IS DIFFERENT ASPECTS OF MUSIC APPRECIATION BUT IN YOUR POSITION BEING FRUSTRATED WITH THE INABILITY TO FOLLOW THE LYRICS IS THE HARD PART BUT YOU PROBABLY CAN ALLOW YOURSELF TO ENJOY AND GET LOST IN THE MELODY LINE.  
>> I THINK THAT DEFINITELY WHAT IT IS FOR ME.  
I'LL HEAR SOUND THAT RESONATE WITH ME SO I LIKE THE MUSIC EVEN IF I DON'T KNOW WHAT THE HECK THEY'RE TALKING ABOUT.  
I TRY TO ENJOY THE BEST I CAN.  
>> I HAVE THE SAME SITUATION I OFTEN HAVE TROUBLE FOLLOWING THE LYRICS UNLESS I HAVE THE LYRICS IN FRONT OF ME AND I'M LISTENING TO IT.  
RECENTLY I HEARD A SONG CALLED "ONE HEADLIGHT" BY THE WALLFLOWERS.  
REALLY DANCEABLE.  
THEN I SAID I GOT TO LEARN THE LYRICS SO I LOOKED UP THE LYRICS, HE'S TALKING ABOUT -- HIS BEST FRIEND THIS WOMAN WHO DIED HOW BAD THE WORLD IS I'M LIKE, OH, MAN, I SHOULDN'T HAVE LOOKED UP THE LYRICS.  
>> I UNDERSTAND IT'S ALWAYS A -- NOT ALWAYS A GOOD THING.  
>> HEATHER, DID YOU HAVE A QUESTION?  
>> I ACTUALLY WANTED TO SEE IF I COULD SWITCH WITH TIM.  
BECAUSE I'M A FORMER MUSICIAN AND I LOVE MUSIC, THE HARMONICS THAT ARE IN MUSIC ARE SOMETHING THAT I REALIZE AT ONE POINT PROFOUNDLY AFFECTED ME.  
LIKE BEING ENVELOPED IN THAT SOUND.  
NOW THAT I HAVE A COCHLEAR IMPLANT I NEVER WAS ABLE TO HEAR THE LYRICS EVEN IN HIGH SCHOOL, BUT I WOULD HEAR THE MUSIC VERY WELL.  
NOW WITH MY CI I FEEL LIKE I CAN REALLY HEAR A LOT OF LYRICS A LOT MORE THAN I EVER USED TO BE ABLE TO.  
BUT I'M MISSING ALL OF THAT MID SOUND.  
ALL OF THE HARMONICS OF THAT, OF THE INSTRUMENTS AND OF THE VOICE SO EVERYTHING SOUNDS VERY TINNY AND I CAN'T STAND IT.  
I WOULD GIVE UP BEING ABLE TO HEAR THE LYRICS.  
THE BEAUTIFUL COMPLEX SOUND OF THE MUSIC.  
WANT TO SWITCH, TIM?

>> I'M GOOD.

>> HEATHER I'M HOPEFUL, BECAUSE I KNOW WHAT THE SIGNAL PROCESSING IS DOING AND I'M HOPEFUL THAT WE CAN MAKE A DIFFERENCE.

I'M HOPEFUL THAT WE CAN DEVELOP A BETTER SOUND PROCESSING STRATEGY JUST FOR MUSIC, TOO.

WHERE YOU CAN ACTUALLY MAKE SOME OF THAT SACRIFICE.

BECAUSE -- MAKE THAT SACRIFICE WITH THE SWITCH.

YOU COULD SWITCH INTO A DIFFERENT PROGRAM AND THAT PROGRAM WOULD GIVE YOU -- LIKE ONE OF THE THINGS THAT THE IMPLANT HAS TO DO IS IT HAS TO MAP ACOUSTIC FREQUENCY TO ELECTRODE PLACE.

SO IT HAS A FREQUENCY TO ELECTRODE MAP.

I THINK THAT WE CAN MAKE IT SO THAT YOU GET A MUCH HIGHER DENSITY FOR THE LOW FREQUENCY HARMONICS AND HAPPEN THAT -- MAP THAT TO A BROADER RANGE OF ELECTRODES.

I THINK WE CAN IMPROVE HOW TIME IS USED UNDERSTAND IMPLANT.

I'M HOPEFUL THAT THAT IS GOING TO GIVE A LOT MORE RICHNESS TO HARMONIC SOUNDS FOR US TO HERE.

I'M ALSO DISCOURAGED BY HOW DIFFICULT IT IS TO MAKE A CHANGE WITH THE IMPLANT MANUFACTURER.

>> RIGHT.

I KEEP SAYING THAT, I KEEP GOING BACK TO MY MAPPING, I KEEP TRYING TO CREATE A PROGRAM JUST WITH MY AUDIOLOGIST THAT IS BETTER FOR MUSIC.

SHE DOESN'T HAVE ANY IDEA I KEEP TRYING TO ARTICULATE THESE THINGS.

ONLY THING THAT WORKS IS LIKE JUST TAKING ALL OF THE COMPRESSION OFF JUST MAKING IT WIDE OPEN SO AT LEAST I'M HEARING THE SOUND BUT IT'S

OVERWHELMING, I CAN'T STAY IN THAT PROGRAM FOR VERY LONG.

I WOULD SO APPRECIATE JUST TO BE ABLE TO CLICK OVER AT LEAST HEAR IT BETTER EVEN IF IT WAS LIKE 20% OR 10% BETTER.

I DON'T KNOW WHAT SANDY THINKS ABOUT THAT.

SANDY IS A FORMER MUSICIAN AS WELL.

JUST LIKE EVEN A SMALL AMOUNT OF IMPROVEMENT I THINK WOULD BE HIGHLY VALUABLE FOR ME.

>> I'M WITH YOU ON THAT, HEATHER.

IT IS NOT SOMETHING I REALLY EVER REALIZED HOW MUCH I WOULD MISS, BUT OF COURSE MY HEARING LOSS WAS SO SUDDEN, IT WAS OVERNIGHT AND TRAUMATIC ENOUGH AS IT WAS.

SO I AM EXCITED FOR ANY IMPROVEMENT THAT CAN HAPPEN IN THE MUSIC REALM, DEFINITELY.

WHAT I HAVE BEEN WORKING ON MYSELF IS I'M WORKING WITH MY VOICE AND PIANO ON INTERVALS.

AND I DO THAT -- I DO THAT IN ORDER TO REINFORCE MY SENSE OF PITCH WHICH IS NOT GREAT RIGHT NOW.

BUT I FEEL LIKE BY DRILLING ONE THREE FIVE THREE ONE, AROUND MIDDLE C.

AND SINGING AT THE SAME TIME SO THE PIANO AND SINGING, AND IT'S JUST LIKE BACK TO BASICS.

REALLY IS WHAT I'M DOING.

IT'S NOT TERRIBLY EXCITING.

IT'S NOT EVEN AS EXCITING AS THE TESTING IN RAY'S LAB.

BUT I FIGURED THAT IT'S KIND OF REHABILITATING.

I ALSO HAVE A PROGRAM ON MY IPAD JUST CALLED PIANO.

SO IT'S AN ELECTRONIC SOUND I CAN PLAY THE SAME -- IF I'M NOT NEAR MY PIANO I CAN DO IT WITH THE APP OF JUST ONE THREE FIVE THREE ONE.

I'M TELLING YOU IF YOU TRY SINGING ALONG, IF YOU TRY TO MATCH A PITCH WITH AN INSTRUMENT, THERE'S SOMETHING THAT GOES ON IN THE BRAIN AND THE AUDITORY NERVE THAT IS UNIQUE.  
I WOULD LOVE TO GET SOME OF MY -- SOME OF THAT DELICIOUSNESS THAT YOU'RE TALKING ABOUT, HEATHER, THAT WOULD BE GREAT, DEFINITELY.  
>> WE'RE WORKING ON IT.  
JACKIE HAD A QUESTION?  
>> RAY, I WAS WONDERING I JUST GOT A COCHLEAR IMPLANT BEFORE I EVEN GOT MY COCHLEAR I HAD A BAHA.  
HOW DO YOU FEEL ABOUT THE APP, BRING BACK THE BEATS, IS THAT A GOOD APP I'VE BEEN TRYING TO USE THAT.  
I KNOW I'M ONLY IN THE FIRST WEEK.  
BUT I HEARD THAT THERE WAS GOOD THINGS ABOUT THAT APP.  
>> THERE'S SO MANY DIFFERENT APPS THAT MY GENERAL PHILOSOPHY IS TO TRY THEM ALL.  
AND BRING BACK THE BEAT, I'VE LOOKED INTO IT A LITTLE BIT BUT I THINK IT'S MORE DESIGNED FOR A NEW RECIPIENT.  
I HAVE JUST BEEN THROUGH SO MANY DIFFERENT TRAINING EXERCISES MYSELF, SOME THAT I'VE DESIGNED FOR MYSELF, YEAH.  
BRING BACK THE BEAT, I THINK IT'S GOOD BUT I THINK YOU SHOULD JUST EXPLORE AS MANY AS YOU CAN.  
I OFTEN IN MY MIND I TRY TO SEPARATE WHAT I'M TRYING TO DO IN MY LAB FROM REHABILITATION IN GENERAL.  
SO FOR REHABILITATION IN GENERAL I HIGHLY RECOMMEND JUST LISTENING TO MUSIC, BOTH THAT YOU'RE FAMILIAR WITH AND LISTENING TO MUSIC THAT YOU'RE NOT FAMILIAR WITH.  
I REALLY ENJOY LISTENING TO MUSIC WITH LYRICS IN FRONT OF ME.  
THERE'S SOMETHING ABOUT BEING ABLE TO HOOK ON TO THE LYRICS THAT ALLOWS YOU TO HAVE THE SINGER'S VOICE POP OUT.  
ONCE THE SINGER'S VOICE POPS OUT THEN YOU CAN PUT ATTENTION TO THE LEAD MELODY.  
ONCE YOU CAN HEAR THE LEAD MELODY AND THE SIPPINGER YOU MIGHT ALSO BE ABLE TO PULL OUT THE BASS LINE BEING SEPARATE.  
I HIGHLY RECOMMEND FOR JUST REHABILITATION, LISTENING TO MUSIC.  
OFTEN WHEN I ASK PEOPLE TO DO REHABILITATION IN MY LAB I HAVE THEM DO REALLY BORING PITCH TEST AND TIMBRE TEST.  
WHY AM I DOING THAT WHEN I THINK THAT LISTENING TO MUSIC IS BETTER.  
AND IT'S BECAUSE IN MY LAB I'M ALSO TRYING TO DO SOMETHING DIAGNOSTIC.  
I'M TRYING TO FIGURE OUT WHAT THE LIMIT OF YOUR PITCH PERCEPTION ARE, BECAUSE IF I KNOW THE LIMITS OF YOUR PITCH PERCEPTION THAT WILL HELP ME DESIGN A BETTER SOUND PROCESSOR.  
I ALWAYS FEEL LIKE THINGS THAT BRING BACK THE BEAT OR ANGEL SOUND DEVELOPED BY ONE OF MY COLLABORATORS, OR ANYTHING THAT I DESIGN THAT ALL THOSE -- THEY'RE KIND OF RESEARCHY AND CLUNKY.  
WE'RE DOING THAT BECAUSE WE'RE TRYING TO GET AT HOW WELL YOU CAN HEAR. SOMETHING DIAGNOSTIC ABOUT IT.  
THEN FOR REHABILITATION I JUST RECOMMEND LISTENING TO MUSIC AND WATCHING MUSICALS.  
READING LYRICS AS YOU GO.  
FOR SPEECH PERCEPTION, AUDIO BOOKS.  
I USED TO LISTEN TO AUDIO BOOKS WITH THE BOOK IN FRONTED OF ME, REAL LOUSE YOU TO RETRAIN YOUR BRAIN IN A VERY ACCURATE AND SYSTEMATIC MANNER. HEALTHIER.  
>> I'M SORRY I'M HOGGING THIS.



EXCITED OF YOU POSSIBLY COMING UP WITH SIGNAL PROCESSING SOLUTIONS OR LIKE PROGRAMS ON A HEARING AID.  
HOW DO WE AS ORGANIZATION, AS HLAALOS ANGELES, AND EVEN MORE IMPORTANTLY I'M ON THE BOARD OF TRUSTEES FOR HLAAL CALIFORNIA.  
HOW DO WE GET OUR PEOPLE -- WOULD IT BE SOMETHING FOR US TO GET COCHLEAR IMPLANT USERS WHO ARE INTERESTED IN ASKING THE COCHLEAR IMPLANT COMPANIES, LIKE IF WE WROTE LETTERS AND SAID, HEY, THIS IS REALLY DRIVING ME CRAZY, CAN YOU PLEASE PUT THE FOCUS ON THIS.  
IT DOESN'T SEEM LIKE -- IS FROM A WAY TO HELP -- FOR US TO USE OUR -- OUR GROUP TO HELP AFFECT SOME CHANGE THAT MIGHT HELP US ALL.  
>> I HOPE SO.  
I THINK IT'S GOING TO TAKE MULTIPLE THINGS.  
I THINK ONE IS, WE VOICE THAT MUSIC APPRECIATION IS A PROBLEM AND SPEECH COMPREHENSION IN NOW SHE SITUATIONS IS A PROBLEM.  
I THINK THEY KNOW THAT NOW.  
BUT I THINK TELLING THEM REPEATEDLY THAT THAT'S WHAT THEY SHOULD BE FOCUSING ON IS A PROBLEM.  
I THINK THE OTHER ASPECTS OF THE PROBLEM WHICH KIND OF IS AN INTERPLAY BETWEEN BEING A USER AND BEING A SCIENTIST IS THAT A LOT OF THE ENGINEERS AT THESE COMPANIES THEY HAVE KIND OF GIVEN UP.  
I HAVE NEVER HAD SOMETHING SO DISHEARTENING THAN TO TALK WITH AN ENGINEER AT COCHLEAR AND HAVE THEM SAY, I DON'T THINK WE CAN MAKE IT BETTER. YOU'VE GOT THE WRONG JOB THEN.  
BECAUSE I AM PRETTY SURE THAT WE CAN MAKE IT BETTER.  
IF YOU ONLY HAVE 12 OR 16 OR 22 ELECTRODES THAT THAT'S THE PRIMARY BOTTLENECK.  
I DON'T THINK IT IS.  
I THINK THAT WE CAN USE STIMULATION TIMING MUCH MORE EFFECTIVELY.  
SO HEATHER I GUESS WHAT I'M SAYING IS THAT, ONE OF THE PROBLEMS IS THAT THE ENGINEERS AND CEOS THEY KNOW THAT MUSIC APPRECIATION IS A PROBLEM. BUT THEY DON'T SEE THE SOLUTION.  
SEE THE SOLUTION.  
THEY'RE FIND OF FIXATED ON MARKETING.  
THEY COME OUT WITH THE NEXT PROCESSOR.  
BUT THE NEXT PROCESSOR DOESN'T DIFFER FROM THE OTHER ONE OTHER THAN THE COLOR OR IT HAS SOME KIND OF DIFFERENT CONNECTIVITY.  
THEY'RE MORE FOCUSED ON MARKETING.  
THEY'RE MORE FOCUSED IN THE LONG GAME IN TRYING TO BUILD A BERT ELECTRODE.  
BUT FOR THE PEOPLE WHO HAVE -- HAVE A COCHLEAR IMPLANT THEY DON'T QUITE SEE HOW TO MAKE THE SOUND PROCESSING BETTER.  
SO I THINK A LOT OF THAT COMES TO ME I HAVE TO PROVE IT TO THEM.  
LOOK, IF YOU GET THIS INFORMATION BACK INTO THE DEVICE THEN MUSIC APPRECIATION WILL BE BETTER.  
I GUESS WRITING LETTERS WOULD BE VERY HELPFUL.  
BUT I DO BELIEVE THEY KNOW THAT MUSIC APPRECIATION IS A PROBLEM. THEY JUST DON'T SEE WHAT THE SOLUTION IS.  
SHARON, DID YOU HAVE A QUESTION?  
>> YES.  
I HAVE A FEW QUESTIONS.  
THANK YOU SO MUCH FOR YOUR PRESENTATION.  
I JUST WANT TO SAY MY VERY FIRST MEETING AT HLAAL-L.A. WAS TWO AND HALF YEARS AGO.

AND YOU WERE THE SPEAKER, I'VE BEEN COMING BACK ALMOST EVERY MONTH SINCE SO THANK YOU, I REMEMBER LEARNING A LOT.  
ONE OF MY FIRST QUESTIONS IS GENERAL RELATES TO THE ELECTRODES.  
I'M CYCLING FIVE YEARS WITH MY IMPLANT.  
SO WHAT I HAD BEEN TOLD WAS, I HAVE A 22 ELECTRODE PANEL.  
AND THOSE ELECTRODES WERE ESSENTIALLY TAKING THE PLACE OF THE 50,000 OR SO SENSORY CELLS HAD THEY BEEN WORKING, BUT HAD ALL BEEN DESTROYED.  
I WAS ESSENTIALLY DEAF IN MY RIGHT EAR WHERE I HAD THE IMPLANT.  
IF THAT IS ACCURATE, WHY ARE THE MANUFACTURERS NOT JUST MAKING BIEDERMAN ARRAY PANELS FOR SPEECH AND MUSIC AND JUST IN EVERY SENSE OF THE WORD TO MAKE OUR HEARING EXPERIENCE MORE NATURAL, THAT'S MY FIRST QUESTION.  
>> THAT'S VERY GOOD QUESTION.  
I'LL BEGIN BY SAYING, YOU DO HAVE 22 -- IF YOU HAVE A COCHLEAR DEVICE YOU HAVE 22 ELECTRODES.  
AND -- THAT DOESN'T MEAN THAT YOU ONLY HAVE 22 SORT OF FREQUENCIES THAT YOU CAN PRODUCE.  
BECAUSE YOU CAN CONTROL THE ELECTRIC CHARGE THAT IT DELIVERED BY TURNING ON ELECTRODES IN COMBINATION.  
SO IF YOU TURN ON ELECTRODE ONE YOU HEAR A CERTAIN PITCH.  
IF YOU TURN ON ELECTRODE TWO YOU HEAR A DIFFERENT PITCH.  
BUT AS YOU TURN ON ELECTRODE ONE AND TWO BOTH TOGETHER THEN YOU ARE HEAR INTERMEDIATE PITCH.  
SO EVEN WITH ONLY -- EVEN IF YOU ONLY HAD TWO ELECTRODES, YOU WOULD BE ABLE TO USE THE RATIO OF CHARGE BETWEEN THOSE TWO ELECTRODES TO PRODUCE INTERMEDIATE PITCHES.  
MY CAUTION THERE IS DON'T THINK THAT 22 JUST MEANS THAT YOU HAVE A PIANO WITH 2 KEYS, IT'S ACTUALLY MORE COMPLEX THAN THAT.  
I THINK IT'S MORE LIKE YOU HAVE A NORMAL PIANO BUT YOU ARE PLAYING IT WITH MITTENS ON SO YOU CAN LIKE IN BETWEEN NOTES BY HITTING DIFFERENT PLACES.  
THE OTHER ASPECT THEY ARE TRYING TO BUILD MORE ELECTRODES IN THE ARRAY.  
ONE OF THE CHALLENGES THERE IS THE SURGICAL APPROACH, BECAUSE YOU CAN'T JUST PUT MORE ELECTRODES ON THE ARRAY BECAUSE IF IT'S FAR AWAY FROM THE AUDITORY NERVE THE CURRENT IS GOING TO SPREAD OUT ANYWAY.  
EVEN IF YOU HAD 100 ELECTRODES THEY'RE KNOTTED GOING TO BE TRULY INDEPENDENT.  
SO THERE'S A TWO CHALLENGES, ONE IS PUTTING MORE ELECTRODES ON THE ARRAY AND, TWO, GETTING IT CLOSER TO THE NERVE.  
SOME PEOPLE ARE EXPLORING A SURGICAL APPROACH WHERE THEY PENETRATE RIGHT INTO THE AUDITORY NERVE.  
THAT SEEMS LIKE AT LEAST A DECADE OFF.  
PEOPLE ARE EXPLORING THAT.  
BUT IT HAS COMPLICATION YOU HAVE TO GET CLOSER TO THE AUDITORY NERVE.  
>> THANK YOU.  
I ALSO WANT TO KNOW I'M A HYBRID USER, I HAVE A HEARING AID IN MY OTHER EAR.  
AND I STILL FIND THAT I'M NOT SYNING BOTH IN SPEECH AND MUSIC.  
I HAVE A GREAT MEMORY THOUGH OF FIVE YEARS AGO I WAS ACTIVATED, I HAD SURGERY IN JULY, ACTIVATED IN AUGUST I REMEMBER GOING TO THE HOLLYWOOD BOWL.  
I REMEMBER FOR VERY FIRST TIME HEARING THE SOUND OF A VIOLIN IN MY IMPLANTED EAR AND IT WAS JUST INCREDIBLE.  
BUT LOT OF OTHER INSTRUMENTS STILL ARE VERY GARBLED.

I THINK I ENDED UP JUST RELYING ON MY HEARING AID ON EAR WHERE I HAVE SOME NATURAL HEARING AND I HAVE IT IMPROVED WITH THE USE OF A HEARING AID.

I HE AM ASSUMING YOUR SUGGESTION DOING SOME REHABILITATION TO TAKE OUT THE HEARING AID OR PUT IT IN EARPLUG THEN FOCUS ON IMPLANTED EAR.

I THINK MY BRAIN JUST GRAVITATES IN HUGHES I CAN TO THE HEARING AID AND IMPLANT FOR SOME OTHER THINGS BUT I'M STILL NOT USING -- I DON'T THINK I'M USING BOTH.

IT DOESN'T FEEL LIKE I AM.

>> TO AN EXTENT I RECOMMEND REHABILITATION WITH -- JUST WITH THE IMPLANT. JUST WITH THE HEARING AID.

THEN IN COMBINATION I THINK THAT YOU SHOULD DO ALL DIFFERENT -- ALL THREE SO I THINK YOU SHOULD DO ALL THREE.

BUT THERE'S ALSO SOMETHING THAT'S COMPLICATED ABOUT COCHLEAR IMPLANTS AND HEARING AIDS AND HOW THEY WORK TOGETHER.

AS ANY COCHLEAR IMPLANT USER KNOWS, THE BRAIN IS PLASTIC SO AFTER YOU TURN ON THE COCHLEAR IMPLANT YOU GET USED TO THAT NEW WAY OF HEARING. YOUR WHOLE SENSE OF PITCH CHANGES.

YOUR SPEECH REALLY MATURES OVER THE 6-12 MONTHS AFTER YOU GET THE IMPLANT AND YOUR BRAIN GETS USED TO IT.

IT SEEMS THAT THE BINAURAL FUSION OF A LEFT AND RIGHT EAR, WHETHER IT'S TWO IMPLANTS OR IMPLANT AND HEARING AID OR WHAT HAVE YOU IT SEEMS A LITTLE BIT MORE RESISTANT TO ACCOMMODATING THAT.

MORE RESISTANT TO THAT KIND OF FACILITATION.

SO I THINK A BIG CHALLENGE IS FOR PEOPLE LIKE ME AND OTHER COCHLEAR IMPLANT SCIENTISTS FOR TRYING TO OPTIMALLY PROGRAM YOUR IMPLANT TO WORK WITH YOUR HEARING AID.

WHAT I'M SAYING IS I'M NOT SURE THAT -- THERE MIGHT BE SOME ASPECT OF THE COORDINATION BETWEEN YOUR LEFT AND RIGHT EAR THAT WOULD BE FACILITATED BY BETTER PROGRAMMING OF THE TWO.

THAT'S JUST BECAUSE LIKE, I BET IF I PLAYED JUST A PURE TONE TO YOUR LEFT EAR AND SAME PURE TONE TO YOUR RIGHT EAR, ANY NORMAL HEARING LISTENER IT'S THE SAME PURE TONE.

I BET YOU WOULD PROBABLY SAY THAT THE LEFT EAR SOUNDED HIGHER OR LOWER THAN THE RIGHT EAR.

THERE'S A LACK OF LINING UP OF THE SOUND OF THE ENVIRONMENT TO WHAT YOU'RE HEARING.

I THINK THAT YOUR BRAIN IS RESISTING THAT A LITTLE BIT.

I THINK IT WOULD BE BETTER IF WE CAN PROGRAM THE IMPLANT SO THAT IT AGREED WITH THE HEARING AID.

>> THAT'S A GREAT ANSWER.

I THINK RESISTANT IS THE PERFECT WORD.

JUST FEELS LIKE THERE'S SOME RESISTANCE FOR THEM GOING IN SYNC.

WHEN I STOP TO FOCUS ON WHICH IS DOMINANT, WHICH EAR IS DOMINANT WITH EAR I KNOW IT'S THE LEFT BECAUSE IT'S HOW I -- I GREW UP WITH NORMAL HEARING, HOW I USED TO HEAR IT.

NOW AS YOU WERE SPEAKING I NOTICE THAT MY HEARING AID WAS DOMINATING HOW I HEARD YOU, RESISTANT TO GREAT.

THANK YOU.

THAT'S REALLY HELPFUL.

ANY OTHER QUESTIONS, FOLKS?

>> CAN YOU HEAR ME, SHARON?

THIS IS DIANE.

OKAY.

I WAS HAVING SOME TROUBLE.  
I JUST HAVE ANTIDOTE THAT ALL THIS CONVERSATION REMINDED ME OF IS.  
MY FORMER AUDIOLOGIST AND I WOULD TALK A LOT WHILE SHE WAS DOING THE  
MAPPING SO I COULD GET A FEEL OF HOW I WAS HEARING.  
WE HAD A RUNNING GAG BECAUSE SHE HAD A PATIENT WHO WOULD COME IN WITH HIS  
IPAD AND ONLY THING HE WAS CONCERNED ABOUT WAS HEARING THE DRUM LINE ON  
THE MUSIC THAT HE LIKED.  
HE DIDN'T CARE ABOUT SPEECH.  
HE DIDN'T CARE ABOUT SUBTLE SOUND ALL HE WANTED TO HEAR WAS THAT DRUM  
POUNDING IN HIS HEAD.  
SO THAT BECAME A RUNNING GAG.  
I JUST THOUGHT OF IT BECAUSE WE WERE TALKING ABOUT MUSIC.  
THAT'S JUST MY STORY.

>> OKAY.

THANK YOU.

RAY, THANK YOU SO MUCH.

IT'S JUST A PLEASURE TO HAVE YOU I'M EXCITED TO KNOW THAT THIS TECHNOLOGY  
IS JUST GETTING BETTER AND PEOPLE LIKE YOU DEVOTING YOUR LIVES TO HELPING  
ALL OF US HEAR BETTER IS VERY ENCOURAGING.

BECAUSE LIKE FOR ALL OF US LIKE WHAT HEATHER WAS SAYING, IF IT WAS 10%  
BETTER IT WOULD BE HUGE.

I'M FINDING THAT INCREMENTAL BENEFITS FOR ME BOTH ON MY HEARING AID AND  
MY IMPLANT ARE JUST HUGE AND MY ABILITY TO WORK, LIVE IN THE MAINSTREAM  
HEARING WORLD.

I JUST THANK YOU FOR YOUR WORK.

LOOK FORWARD TO HAVING YOU BACK WITH SOME BREAK THROUGH.

HEATHER.

>> I JUST WANT TO ENCOURAGE YOU -- YOU WILL ALL TO GET INVOLVED WITH THE  
MUSIC APPRECIATION THINGS ON THURSDAY.

I HAVE MISSED A LOT OF THEM, I'M SORRY.

SANDY HAS BEEN REALLY VERY CONSISTENT AND GOING, THEY'RE ABSOLUTELY  
WONDERFUL.

THE THING THAT -- BESIDES LEARNING WHAT RAY AND HIS COLLEAGUES ARE DOING,  
WHICH IS SO FASCINATING, HAVING THEIR EXPERTISE TO HELP YOU OUT.

ONE OF THE THINGS THAT I'M GETTING A LOT OUT OF IS THE OTHER PEOPLE IN  
THE GROUP THEY WILL SAY, HEY, LISTEN TO THIS PERSON.

LIKE I CAN'T REMEMBER WHO IT WAS, MAYBE IT WAS YOU, RAYMOND, WHO WAS  
SAYING, YEAH, YOU KNOW ONE OF THE THINGS WE FOUND REALLY INTERFACES WELL  
WITH THE COCHLEAR IMPLANT IS JOHNNY CASH.

I'M LIKE, JOHNNY CASH, I WOULD NEVER LISTEN TO JOHNNY CASH.

THEN I STARTED LISTENING, WOW, I DON'T KNOW WHAT IT IS ABOUT THE TIMBER  
OF HIS VOICE OR WHERE HE SINGS, BUT I WAS LISTENING, I CAN REALLY LARRY  
THIS IT WAS WONDERFUL.

THOSE LITTLE TIDBITS FROM THE OTHER PEOPLE IN THE GROUP ARE SO HELPFUL.  
IT IS FUN.

IF YOU GUYS ARE INTERESTED IN HOW YOU HEAR MUSIC, NOT EVEN WITH THE  
COCHLEAR IMPLANT JUST WITH HEARING AIDS, PLEASE TUNE IN ON THURSDAYS.

I'D LOVE TO SEE YOU GUYS THERE.

AND IT'S FUN.

>> MUSICAL TRAINING REQUIRED?

I WOULD LIKE TO DO THAT BUT I'M NOT MUSICAL.

DOES IT MATTER?

>> NO, NO, NO, NOT AT ALL.

>> I WAS -- I WOULD SAY USUALLY ABOUT 20 PEOPLE COME.

WITH ABOUT 12-14 CI USERS THE REST STUDENTS FROM MY LAB.  
AND I WOULD SAY ABOUT HALF OF THE CI USERS ARE MUSICALLY EXPERIENCED OR  
MUSICALLY TRAINED.  
THEN HALF ARE NOT.  
IT'S MUCH MORE OF A MIX.  
IF YOU SEND ME AN E-MAIL I CAN ADD YOU TO THE ANNOUNCEMENT LIST.  
SO BASICALLY ONE OF THE MUSIC STUDENTS HAVE COUPLE ANNOUNCEMENTS A WEEK.  
A SUBTLE REMINDER ON THURSDAY MORNING THEN SHE SENDS OUT RECAP ON EITHER  
FRIDAY OR SATURDAY ABOUT WHAT IS GOING ON.  
SHARON, I CAN MAKE SURE THAT YOU GET THAT FOR SURE.  
YOU CAN SEND IT TO EVERYBODY ELSE OR ANYBODY SEND ME THEIR E-MAIL WE CAN  
ADD IT TO THE LIST.  
YOU'LL GET ANNOUNCEMENTS.  
FOR THIS WEEK I THINK IT'S A JAZZ PLAYER.  
HE'S GOING TO PLAY.  
ONE OF MY STUDENTS HAS BEEN COORDINATING EVERYTHING.  
I TREAT IT LIKE I'M NO LONGER THE HEAD SCIENTISTS OR ANYTHING I JUST SHOW  
UP I'M JUST ANOTHER CI USER.  
I ALSO DON'T KNOW WHAT TO EXPECT.  
>> IS IT DONE OVER ZOOM?  
>> THIS IS ZOOM, YEAH.  
>> THANK YOU.  
I PUT RAY'S E-MAIL ADDRESS IN THE CHAT BOX.  
IN CASE YOU DIDN'T GET OFF THE PRESENTATION.  
>> I JUST WANTED TO SECOND HEATHER'S RECOMMENDATION THAT YOU TRY IT OUT.  
IT'S A VERY SUPPORTIVE, VERY SUPPORTIVE ATMOSPHERE.  
AND IT'S INTERESTING, TOO, BECAUSE ALL OF OUR SITUATIONS ARE DIFFERENT.  
WE ALL STRUGGLE WITH SLIGHTLY DIFFERENT THINGS AND THE WAY THIS ALL CAME  
ABOUT CAN BE UNIQUE.  
BUT THE MAIN THING IS THAT WE'RE THIRSTY FOR ART.  
WE'RE THIRSTY FOR MUSIC.  
AND ONE OF THE THINGS THAT RAY EXPOSED US TO IS A MUSICIAN, COMPOSER  
NAMED STEVEN MALINOWSKI WHO USES GRAPHICS, HE USES VIDEOS WHERE HE HAS --  
HE'S GOT THE SCORE AND HE USES ALL THESE COLORS AND MOVEMENT TO REFLECT  
THE MUSIC.  
IT'S DELIGHTFUL.  
IT'S REALLY GREAT.  
HE'S GOT EARLIER ONES THAT ARE MORE SIMPLE THEN HE'S GOT GO FUGUES, HE'S  
GOT CONCERTO.  
THAT IS ONE THING THAT CAME OUT OF THIS PARTICULAR SESSION THAT I THINK  
EVERYBODY COULD USE.  
>> SOUNDS WONDERFUL.  
I'M IN.  
>> OKAY.  
>> EVERY THURSDAY.  
OKAY.  
WHAT TIME?  
>> I'LL GET THE ANNOUNCEMENT LIST, TOO, BECAUSE I'M A CI USER IN LOS  
ANGELES, SO I WANT TO BE KEPT ON THIS LIST.  
I LIKE TO POP IN WHEN I CAN.  
IT'S VERY GOOD TIME FOR ME, MY WIFE GOES TO PLAY TENNIS I CAN JUST GIVE  
MY DAUGHTER A LITTLE BIT OF SATURDAY MORNING CARTOONS FOR AN HOUR.  
>> I THANK YOU SO MUCH FOR JOINING US, I THINK WE ALL LEARNED A LOT.

AND I'M GLAD THAT THE RESEARCH KEEPS MOVING FORWARD, LIKE HEATHER WAS SAYING WE ALL NEED TO FIND WAYS TO ADVOCATE SO THAT IT CONTINUES TO MOVE AT A GOOD PACE.

AND WE'LL JUST BE ABLE TO MAKE, EVEN IF IT'S BABY STEPS JUST KEEP GOING FORWARD.

THANK YOU FOR JOINING US AGAIN.

AND PLEASE STAY ON FOR THE REST OF THE MEETING.

HAS ANYBODY COME ON SINCE THE BEGINNING THAT IS A NEWCOMER THAT WOULD LIKE TO RAISE THEIR HAND AND SAY HI.

WE'VE HAD MORE PEOPLE WELL, YOU GUYS, WE WANT TO TALK ABOUT NEXT MONTH. WE'RE THINKING OF GOING BACK TO A RAP SESSION BECAUSE WE HAD WONDERFUL PRESENTERS THIS MONTH AND LAST MONTH.

AND WE THOUGHT THAT SEPTEMBER, OUR NEXT MEETING WILL BE ON THE 26TH.

AND WE WERE THINKING OF HAVING A RAP SESSION.

LETTING EVERYBODY JUST KIND OF SHARE THEIR EXPERIENCES.

I KNOW THAT WE'RE ALL STRUGGLING AND TRYING TO MAKE THE BEST OF THE SITUATION.

BUT IT'S HARD AND IT'S STRESSFUL AND IT ADDS TO THE ISOLATION BECAUSE WE CAN'T HEAR.

SO WE THOUGHT WE'D FIND OF INVITE EVERYBODY TO COME JOIN, SHARE WHAT YOU'D LIKE TO SHARE.

ANY TIPS, SUGGESTIONS, THINGS THAT ARE WORKING THAT ARE MAKING LIFE BETTER, THINGS THAT ARE BETTER THAN BEFORE AS A RESULT OF USING ZOOM FOR ME I'M HEARING BETTER BECAUSE I'M ABLE TO USE MY MINI MIC CONNECT IT TO MY COMPUTER.

OTHER THAN OUR FORMER MEETINGS IN PERSON WHERE WE HAD A TELECOIL, THIS IS FOR ME THE NEXT BEST SITUATION.

MY NON-HEARING RELATED MEETINGS ARE ACTUALLY TO SOME DEGREE EASIER THAN BEING IN CONFERENCE ROOMS OR ROOMS WITH PEOPLE IN A CIRCLE AND ME STRUGGLING.

SAVE THE DATE, 26TH OF SEPTEMBER, AT 10:00 A.M.

WE HOPE YOU'LL JOIN US.

AND SHARE SOME OF YOUR STORIES AND STRUGGLES AND TRIALS, TRIBULATIONS AND HOPEFULLY WE CAN GIVE EACH OTHER SOME SUPPORT AND SOME POINTERS FOR HOW TO CONTINUE GOING FORWARD.

I'D LIKE TO THANK DEANNA ONCE AGAIN FOR BEING WITH US AND DOING AN EXCELLENT JOB ON THE CAPTIONING.

I KNOW I SPEAK FASTER THAN I WOULD LIKE TO AND MANY OF US DO AS WELL.

YOU'VE DONE A REALLY GOOD JOB AT CATCHING OUR WORDS IN A VERY ACCURATE FASHION.

SO THANK YOU FOR BEING WITH US AGAIN.

ANYBODY HAS ANY FINAL WORDS PLEASE GO AHEAD AND SAY THEM.

IF NOT WE WILL RECONVENE, I THINK IT WILL BE FIVE WEEKS BECAUSE THERE IS ONE MORE SATURDAY IN AUGUST.

IT WOULD BE FIVE WEEKS FROM TODAY.

>> I MISS YOU ALL IN PERSON.

BUT THIS IS THE NEXT BEST THING, THANK YOU FOR CONTINUING THE MEETINGS.

>> IT IS THE NEXT BEST THING.

I REALLY HOPE WE CAN REBUILD AND CONTINUE TO GROW BECAUSE I THINK WE COULD ALL USE THE EDUCATION AND THE SUPPORT.

I THANK YOU --

>> SHARON?

ONE LAST THING.

I THINK WE'RE GOING TO HAVE A SURVEY PREPARED PROBABLY IN THE COMING WEEKS WE'RE GOING TO SEND OUT TO PEOPLE.  
SURVEY IS GOING TO GET YOUR FEEDBACK ABOUT OUR CHAPTER MEETINGS AND TOPICS AND WHAT YOU WOULD LIKE TO HEAR MORE ABOUT.  
AND IDEAS YOU HAVE IN TERMS OF, SHOULD WE HAVE MORE SOCIAL, SMALLER GROUP SUPPORT MEETINGS.  
SHOULD WE -- WHAT SHOULD WE DO DURING THE PANDEMIC TO BETTER MEET YOUR NEEDS.  
I THINK WE'RE GOING TO PREPARE A SURVEY TO SEND TO YOU GUYS.  
WE'LL DO IT BY E-MAIL.  
JUST LOVE TO HEAR YOUR FEEDBACK.  
WE'RE TRYING TO -- THIS IS VERY CHALLENGING SITUATION TRYING TO GET PEOPLE COMFORT WITH ZOOM TO ATTEND.  
ALL CHAPTERS ARE GOING THROUGH THIS.  
WE JUST WANT TO LEARN MORE ABOUT WHAT PEOPLE ARE EXPECTING, WHAT THEY HOPE TO DO AND LEARN.  
JUST SEE IF WE CAN TAILOR TO THEIR NEEDS AND SUPPORT.  
I THINK WE'LL GET SOMETHING PREPARED VERY SOON TO SEND OUT TO EVERYONE.  
I THINK WE MAY DISCUSS THAT DURING THE NEXT MEETING AS WELL.  
PART OF OUR RAP SESSION TO DISCUSS HOW WE'LL MOVE TOWARD THE FUTURE.  
JUST BE ON THE LOOK OUT FOR THAT.  
>> THANK YOU, TIM.  
THERE'S ALWAYS SOMETHING I FORGET THANK YOU FOR FILLING IN VERY IMPORTANT POINT.  
RAY, IF YOU HAVE ANY PATIENTS OR ANY PEOPLE YOU WORK WITH THAT YOU THINK WOULD BENEFIT FROM OUR GROUP PLEASE BY ALL MEANS HAVE THEM CONTACT US SO WE COULD ADD THEM TO OUR DATABASE AND THEY WILL GET MEETING ANNOUNCEMENTS.  
ALSO HAVE A FACEBOOK PAGE THAT'S BEEN SOMEWHAT ACTIVE WITH PEOPLE POSTING STORIES AND INTERESTING INFORMATION ABOUT UPDATES IN HEARING TECHNOLOGY AND CLEAR MASKS AND THINGS THAT ARE REALLY PERTINENT TO US.  
LOOK OUT FOR THE SURVEY.  
AND WE REALLY WANT TO KNOW WHAT YOU GUYS WANT AND WHAT WORKS AND WHAT DOESN'T WORK.  
SO WE CAN AVOID THAT.  
GIVE ONE LAST SHOUT OUT TO HEATHER FOR HER WONDERFUL SOCIAL EVENT, IS THAT SHE SPEARHEADED COUPLE OF WEEKS AGO FOR A HAPPY HOUR I ATTENDED.  
IT WAS A SMALL GROUP, IT WAS A LOT OF FUN TO JUST BE ABLE TO GET TO KNOW ONE ANOTHER IN THAT SORT OF CONTEXT.  
AND I JUST FOUND IT REALLY SOCIAL AND WONDERFUL.  
I HOPE THAT WE COULD DO MORE OF THESE SMALL GROUP GATHERINGS THAT ARE OUTSIDE THESE TYPES OF MEETINGS TO JUST BE ABLE TO CONNECT AND SHARE OUR STORIES AND HAVE FUN.  
WE NEED TO HAVE AS MUCH FUN AS WE CAN.  
THANKS HEATHER FOR THAT.  
>> GLAD YOU HAD FUN.  
I HAD A BLAST IT WAS CRAZY.  
EVERYONE WAS IN A GREAT MOOD.  
WE JUST REALLY SHARED A LOT AND IT JUST FELT -- LIKE YOU DIANE, I REALLY DO MISS THE PERSONAL PART OF THIS CHAPTER.  
AND I WAS TRYING TO GET IT BACK.  
WE HAVE THESE BIG MEETINGS, IT'S SORT OF HARDER.  
WE ALL HAD A COCKTAIL.  
AND WE WERE TALKING ABOUT HOW MANAGING THE --

>> CHEERS.  
>> ANYWAY, IF YOU GUYS ARE INTERESTED IN DOING MORE OF THOSE I WOULD LOVE TO DO MORE OF THOSE.  
IT WAS GREAT.  
>> AND TIM WANTED TO A --  
>> HE DID.  
HE HAD THE BEST STORY OF ALL.  
ANYWAY, THANK YOU FOR SUPPORTING ME IN THAT SHARON, HOPING WE CAN DO SOME MORE OF THOSE FUN THINGS.  
>> ABSOLUTELY.  
IT'S GOING TO BE A WHILE.  
I DON'T KNOW, WE WERE VERY CLOSE TO MOVING IN TO A NEW PERMANENT LOCATION THANKS TO JACKIE AND CHRIS WHO WERE ON THIS CALL.  
WHO -- AT CHILDREN'S HOSPITAL, BOTH EMPLOYED AT CHILDREN'S HOSPITAL.  
AND WE WERE ABLE TO SECURE JUST AN ABSOLUTELY BEAUTIFUL CONFERENCE ROOM AT CHILDREN'S HOSPITAL FOR THE ENTIRE YEAR OF 2020 MAPPED OUT.  
PERFECT FACILITY NEAR THE TRAIN STATION, CENTRAL TO OUR POPULATION THAT GOES FROM PASADENA ALL THE WAY WEST VALLEY AND SOUTH TO LONG BEACH.  
WE WERE A WEEK AND A HALF AWAY FROM OUR FIRST MEETING BEFORE THE EXPLOSIONS, JUST TRYING TO MAKE THE BEST OF IT IT.  
I THINK THAT WITH EVERYTHING'S CONTRIBUTIONS LET'S JUST KEEP PLOWING AHEAD COMING UP WITH IDEAS AND STAYING CONNECTED.  
BE HEALTHY AND SAFE AND STAY COOL IN YOUR HOPEFULLY AIR CONDITIONED OR FANNED HOMES WITH FANS.  
WE'LL SEE YOU GUYS ON THE 26 -- FOURTH SATURDAY OF SEPTEMBER.  
26TH.  
OKAY.  
ALL RIGHT.  
TAKE CARE EVERYBODY.  
THANK YOU.  
>> TAKE CARE EVERYONE.  
THANK YOU AGAIN, RAY.