

UNSEEN COLLAPSE

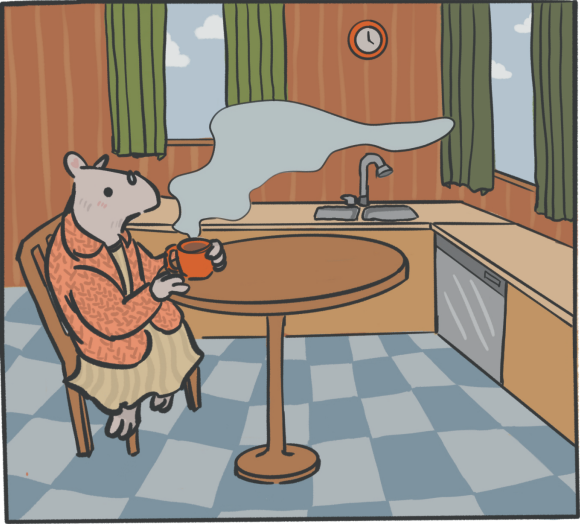
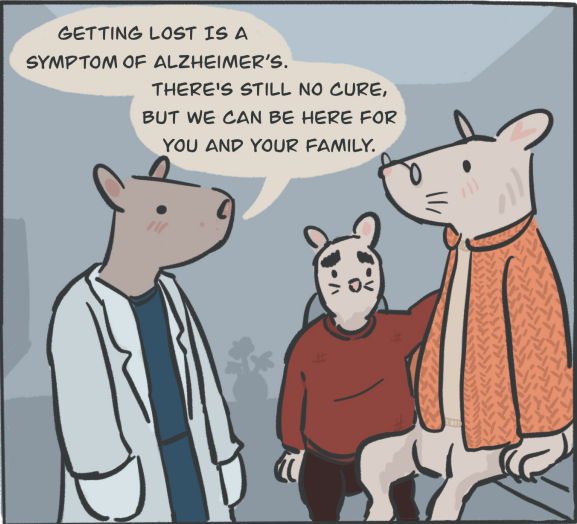
THE GRADUAL DISINTEGRATION OF NEURAL
NETWORKS IN ALZHEIMER'S



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WITH THANKS TO
THE UNIVERSITY OF
OREGON COMICS
AND SCIENCE
INITIATIVE



AS PEOPLE AGE, IT'S NORMAL TO LOSE VISUAL AND AUDITORY ACUITY AND BECOME MORE FORGETFUL.



WITH ALZHEIMER'S, MEMORY ISSUES KEEP GETTING WORSE, AND EVENTUALLY BECOME DANGEROUS.



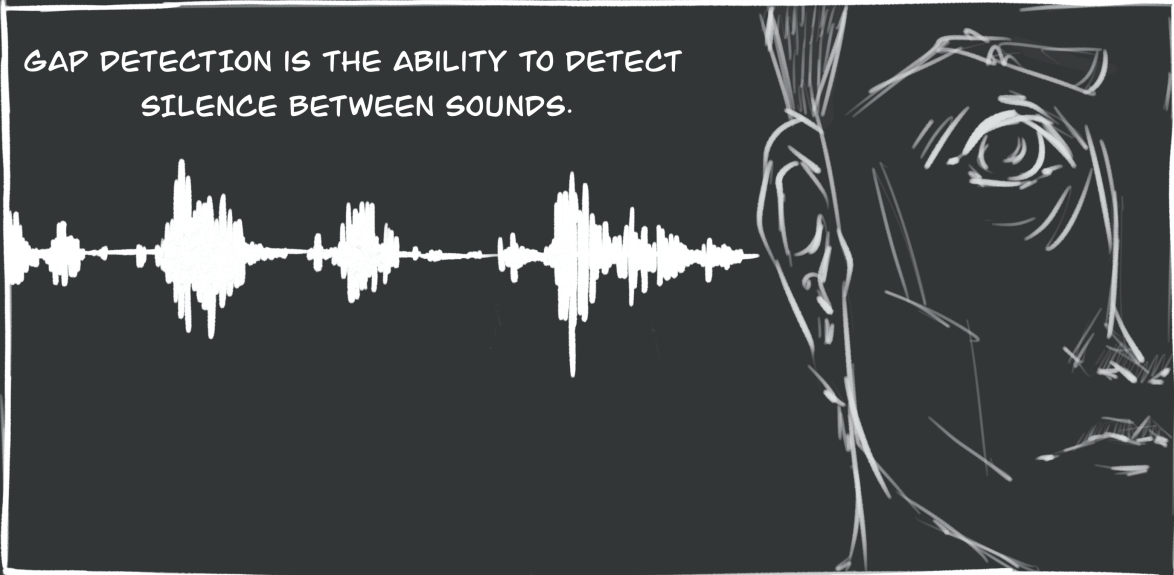
THE DISEASE ACTUALLY STARTS DECADES BEFORE YOU NOTICE SYMPTOMS.



BY THE TIME SYMPTOMS APPEAR, DAMAGE TO THE BRAIN IS ALREADY IRREVERSIBLE.

BUT WHAT IF WE COULD DETECT ALZHEIMER'S EARLIER - WITH SIMPLE AND NON-INVASIVE TESTS - BEFORE IT'S TOO LATE?

GAP DETECTION IS THE ABILITY TO DETECT
SILENCE BETWEEN SOUNDS.



IN ALZHEIMER'S PATIENTS, GAP
DETECTION IS IMPAIRED MUCH
EARLIER THAN MEMORY.

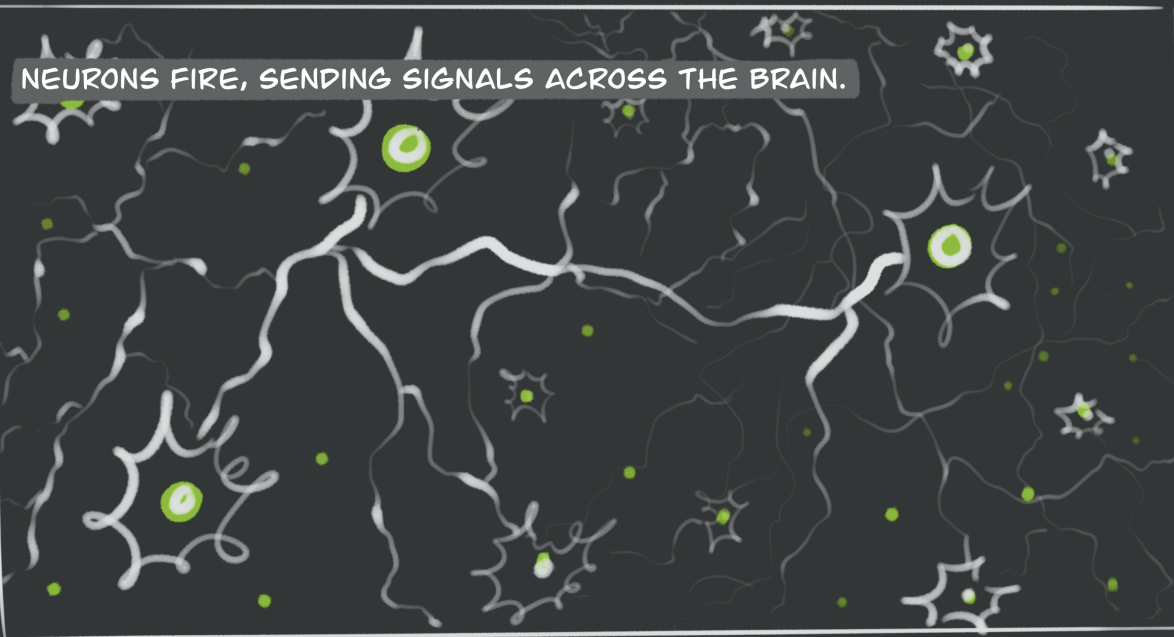


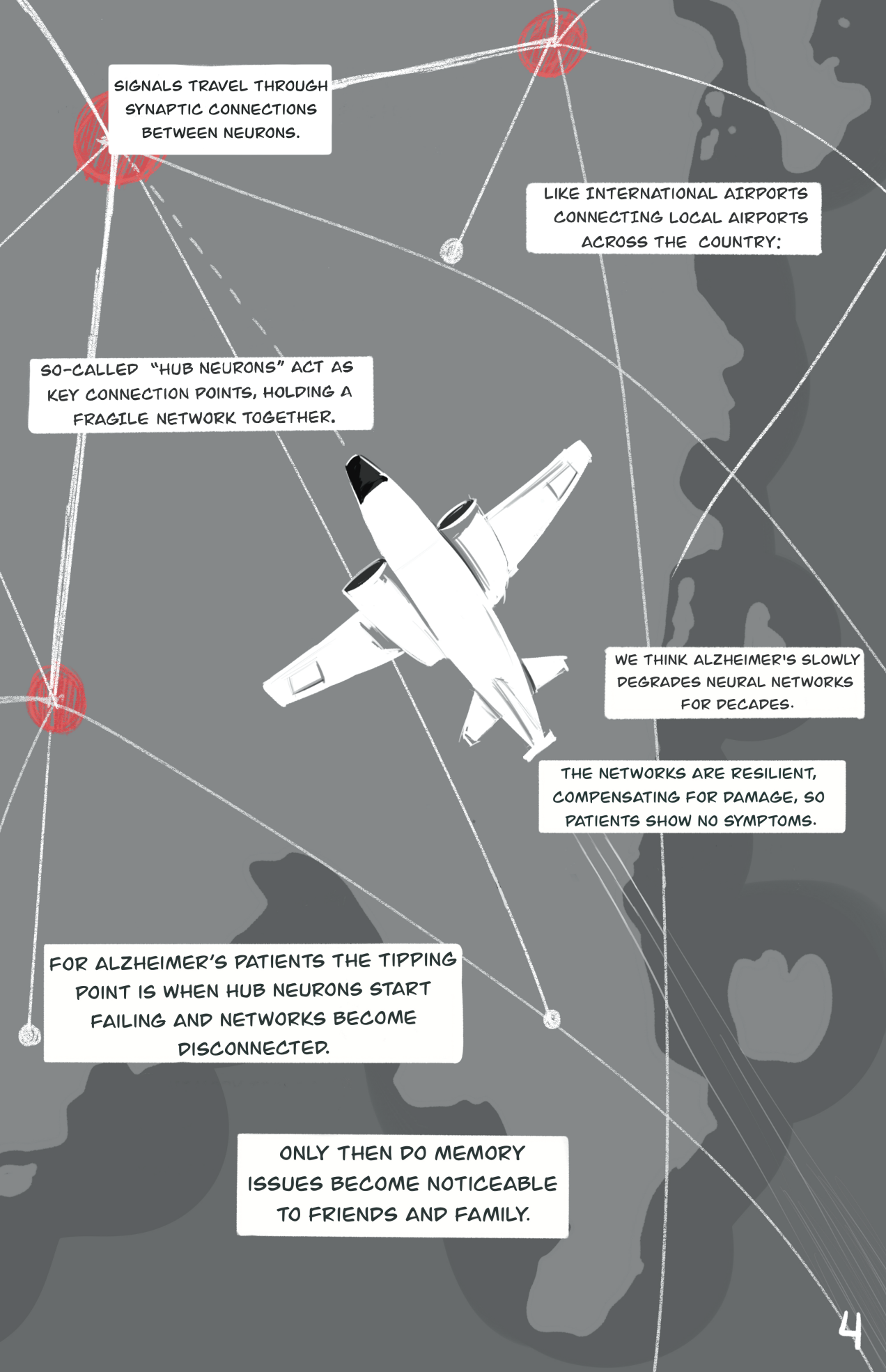
BUT WE STILL DON'T KNOW WHY.



OUR BRAINS USE COMPLEX NEURAL
NETWORKS TO INTERPRET SOUND.

NEURONS FIRE, SENDING SIGNALS ACROSS THE BRAIN.





SIGNALS TRAVEL THROUGH
SYNAPTIC CONNECTIONS
BETWEEN NEURONS.

LIKE INTERNATIONAL AIRPORTS
CONNECTING LOCAL AIRPORTS
ACROSS THE COUNTRY:

SO-CALLED "HUB NEURONS" ACT AS
KEY CONNECTION POINTS, HOLDING A
FRAGILE NETWORK TOGETHER.

WE THINK ALZHEIMER'S SLOWLY
DEGRADES NEURAL NETWORKS
FOR DECADES.

THE NETWORKS ARE RESILIENT,
COMPENSATING FOR DAMAGE, SO
PATIENTS SHOW NO SYMPTOMS.

FOR ALZHEIMER'S PATIENTS THE TIPPING
POINT IS WHEN HUB NEURONS START
FAILING AND NETWORKS BECOME
DISCONNECTED.

ONLY THEN DO MEMORY
ISSUES BECOME NOTICEABLE
TO FRIENDS AND FAMILY.

THIS IS TIED TO THE IDEA OF
"GRADUAL DEGRADATION"

THE THEORY THAT BRAIN FUNCTION DEGRADES
SLOWLY AND CONSISTENTLY OVER TIME.

RESEARCHERS BELIEVE GRADUAL DEGRADATION
OCCURS UNTIL HUB NEURONS FAIL.



WHEN YOUR FLIGHT
IS CANCELED

AND YOU LOSE ACCESS TO THE
FUNCTION ASSOCIATED WITH THAT
HUB NEURON.

DISEASE
ONSET

GRADUAL
DEGRADATION

GRADUAL DEGRADATION CAN LAST
YEARS OR DECADES.

UNTIL HUB NEURON FAILURE SETS OFF A
CASCADE, RESULTING IN NOTICEABLE
SYMPTOMS.

GAP DETECTION MOST LIKELY STARTS TO
DETERIORATE DURING GRADUAL DEGRADATION.

HUB NEURON
FAILURE

NOTICEABLE
SYMPTOMS

DIAGNOSIS



DISEASE
ONSET

GRADUAL
DEGRADATION

HUB NEURON
FAILURE

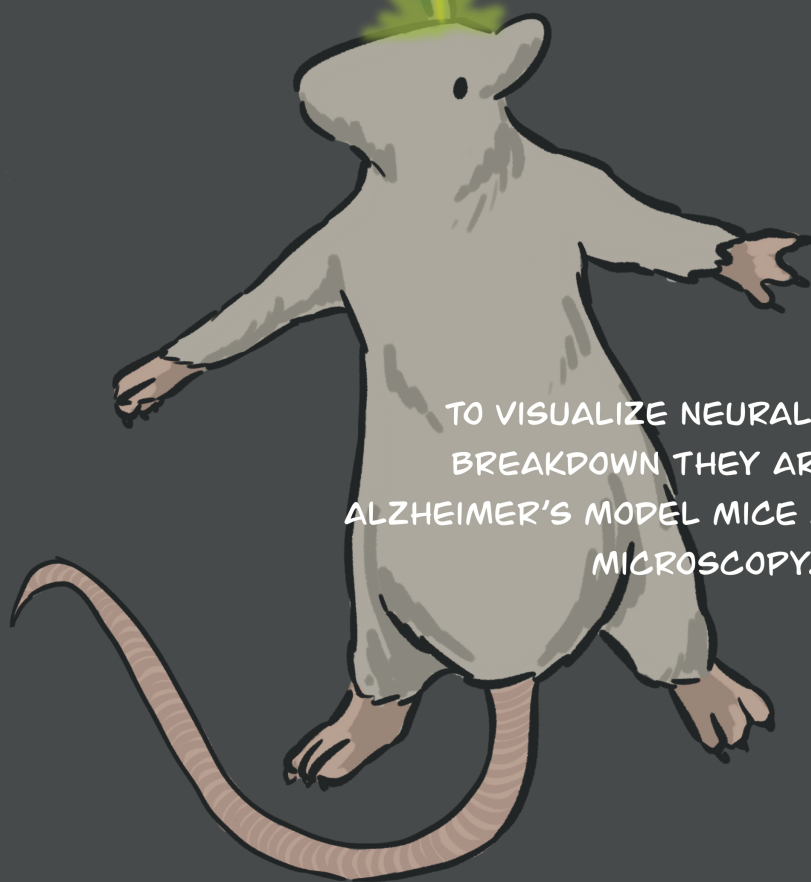
NOTICEABLE
SYMPTOMS

DIAGNOSIS

THE GOAL OF THE
WEHR LAB AT THE
UNIVERSITY OF
OREGON IS TO
MOVE DIAGNOSIS
EARLIER.

THEY ARE WORKING TO VISUALIZE
AND ESTABLISH A LINK BETWEEN
HUB NEURON FAILURE AND GAP
DETECTION.

TO VISUALIZE NEURAL NETWORK
BREAKDOWN THEY ARE USING
ALZHEIMER'S MODEL MICE AND 2-PHOTON
MICROSCOPY.

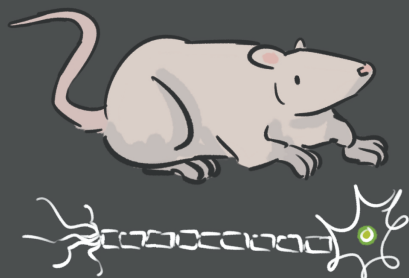


THE MODEL MICE (CALLED 5XFAD)
HAVE BEEN GENETICALLY
ENGINEERED AND BRED TO DEVELOP
SEVERE AMYLOID PLAQUES

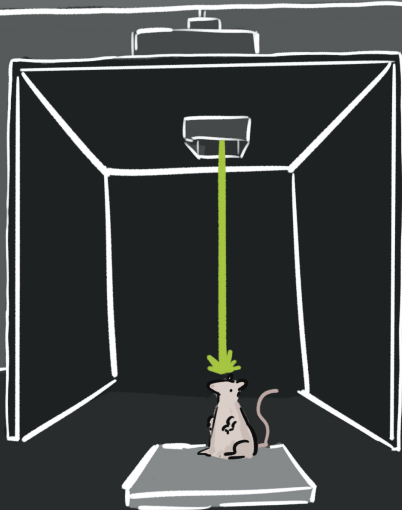
A PHYSIOLOGICAL MIRROR OF
ALZHEIMER'S IN HUMANS.



THE WEHR LAB HYPOTHEZIZES
THAT GAP DETECTION DEGRADES
BEFORE HUB NEURONS FAIL.



IF THIS IS TRUE, GAP
DETECTION WOULD BE A
CONCRETE BIOMARKER
OF ALZHEIMER'S
DISEASE PROGRESSION.



PHYSICIANS COULD USE SIMPLE,
NON-INVASIVE GAP DETECTION
TESTS TO HELP DIAGNOSE
ALZHEIMER'S.



**THOUSANDS OF SCIENTISTS ARE WORKING
TOGETHER TO CURE ALZHEIMER'S**



**GAP DETECTION IS JUST ONE
SMALL PIECE OF THE PUZZLE.**

