# Spatial Hearing Tests and Adaptation

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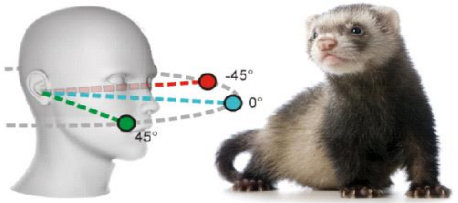
Learning Auditory Brain LAB

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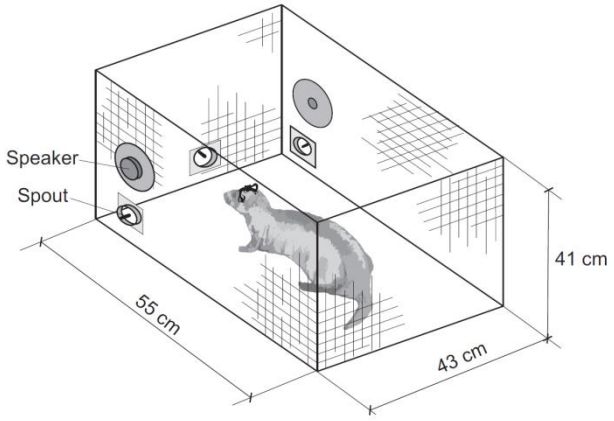
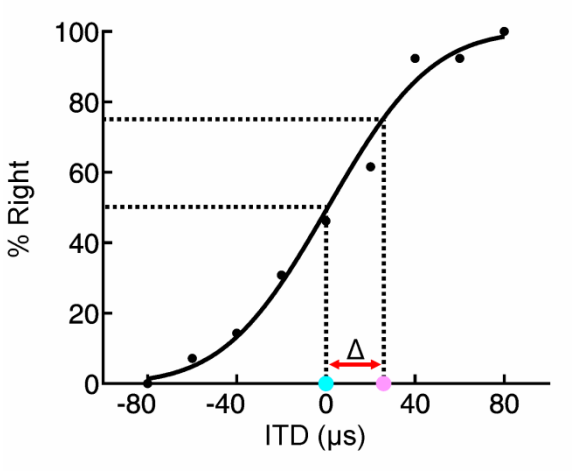
# Measuring sound localization abilities

## Ferret Earphones

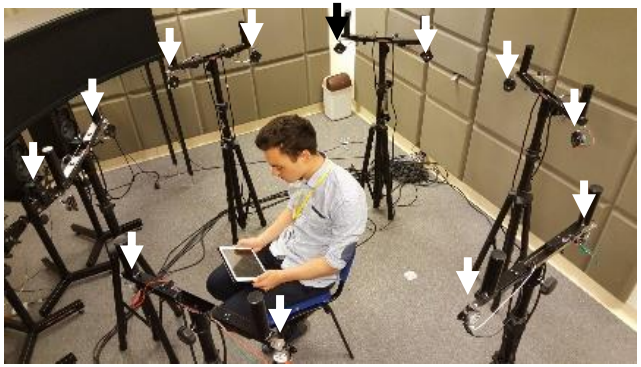
## Testing Chamber




## Psychometric function



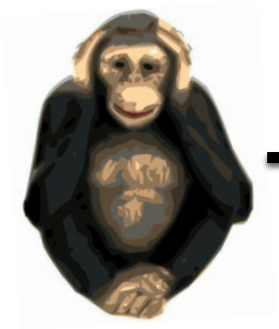

## Loudspeaker Arrays



Sound localization can be assessed using arrays of loudspeakers or headphones (virtual reality).

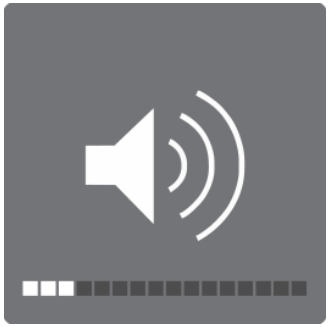
We can measure the % correct or the smallest detectable change in location (the spatial threshold).

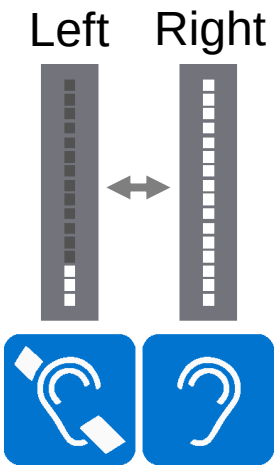
# How does the brain adapt to hearing loss?



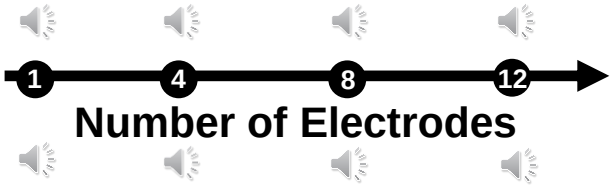
Learn to rely more on intact sensory inputs

Learn to use abnormal sensory inputs






**Cochlear Implant Simulation**



# Tinnitus: the price of adaptation?

- Perception of a phantom sound without a corresponding acoustic stimulus
- Can be tone-like (beeping, whistling) or noise-like (hissing, roaring)
- Can be perceived in one ear, both ears, or in the head
- Prevalence
  - Tinnitus in general: 5-10% of the population
  - Troublesome tinnitus: 1-2% of the population

# Subjective vs. objective tinnitus

## Objective Tinnitus

- Produced by a physical source within the body:
  - Spontaneous otoacoustic emissions
  - Blood vessel anomalies in the vicinity of the cochlea (pulsatile tinnitus)
- Can sometimes also be heard by other people
- ~5% of the tinnitus cases

## Subjective tinnitus

- No physical generator for the acoustic sensation
- Can only be perceived by the patient
- ~95% of the tinnitus cases

# Conclusions

- Many different types of hearing loss
- Can adapt to hearing loss in different ways
- Loss of hearing is often associated with phantom sounds