

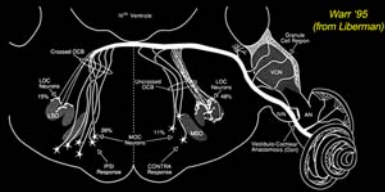
# Behavioral Assessments of the Olivocochlear Efferent Systems

Structure and Function of the Auditory and Vestibular Systems  
Brad May  
February 3, 2009

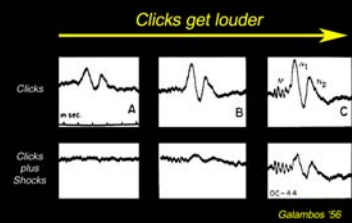
## Overview

- Listening in noise
- Sound protection
- Auditory development

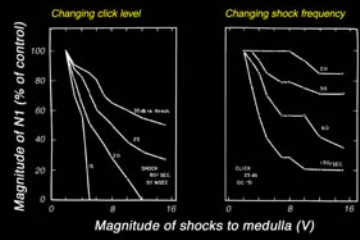
## Olivocochlear Pathways



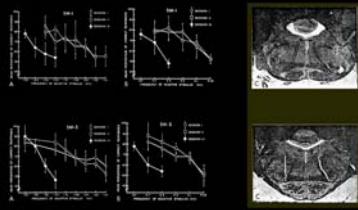
## Early Physiological Studies



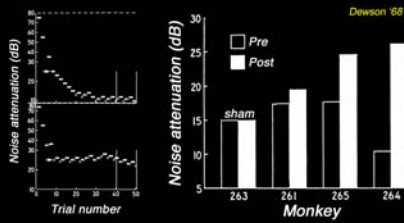
## Early Physiological Studies



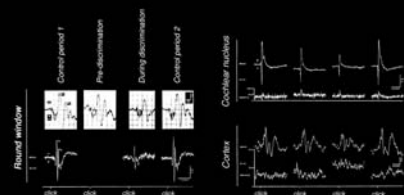
## Early Behavioral Studies



## Early Behavioral Studies

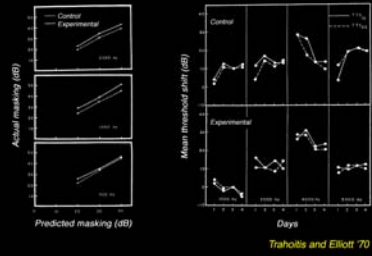


## Early Behavioral Studies

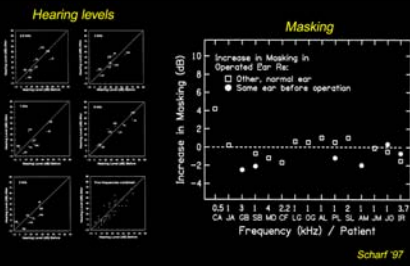


Oatman '71

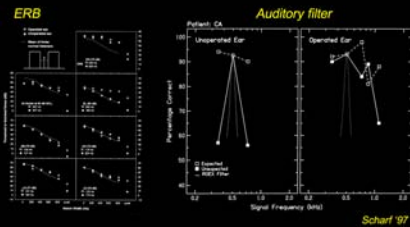
## Early Behavioral Studies



## Human Studies

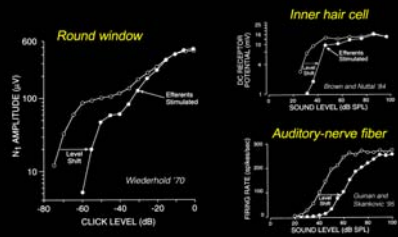


## Human Studies

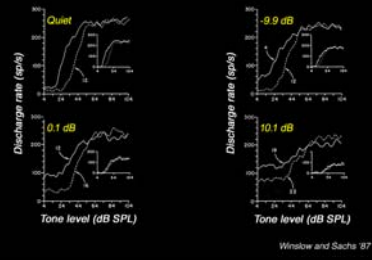


Enhancing behavioral approaches...

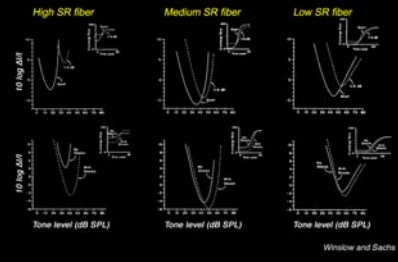
## Single-Unit Physiology



## Single-Unit Physiology

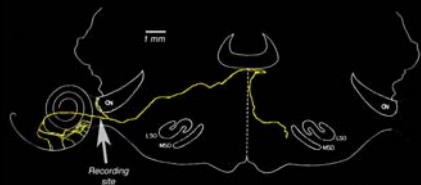


## Single-Unit Physiology

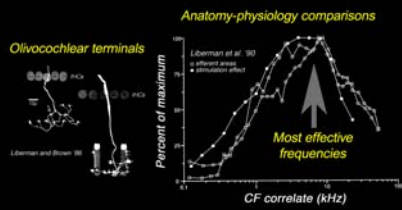


## Anatomical Studies

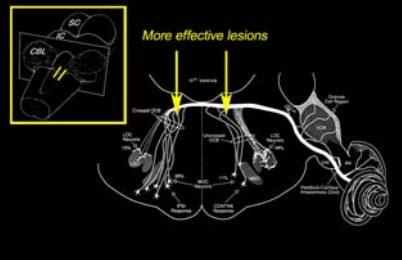
Intracellularly-labeled olivocochlear projection



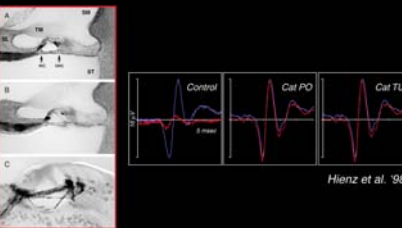
## Anatomical Studies



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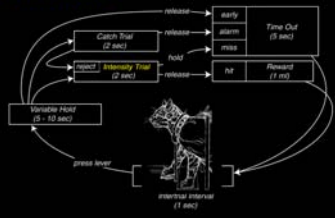


## The 'Ideal' Behavioral Study

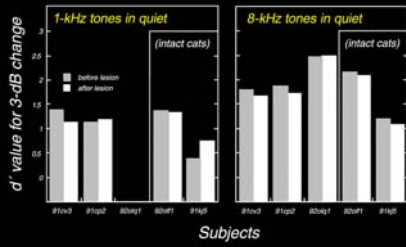
Subject: Cat  
Lesion placement: Bilateral brainstem  
Lesion assessment: Physiological  
Task: Intensity discrimination in noise  
Stimulus: 8 - 10 kHz tones

# The 'Ideal' Behavioral Study

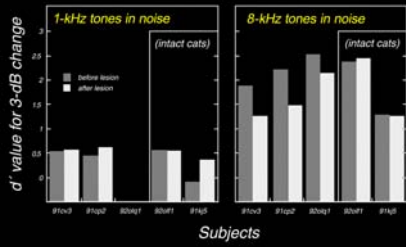
Behavioral Cycle



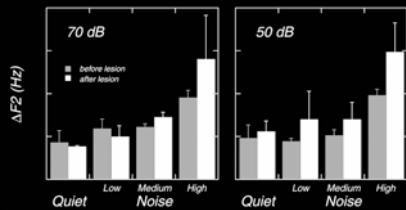
# The 'Ideal' Behavioral Study



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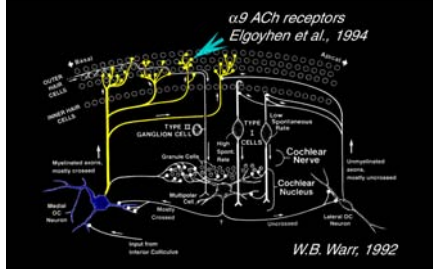
# Failure to Replicate



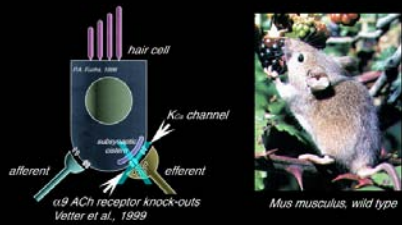
## Failure to Replicate

Dewson '68	Hienz et al. '98
Capps & Ades '68	Stebbins '70
Igarashi et al. '79	May & McQuone '95
Oatman '71	Oatman '88
Scharf et al. '97	Zeng et al. '00
Trahoitis & Elliott '70	Liberman '91

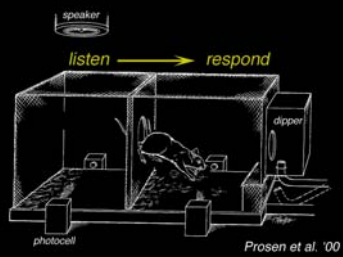
## The 'Ideal' Subject



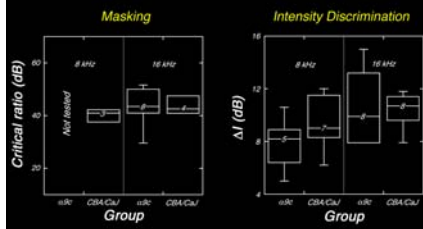
## The 'Ideal' Subject



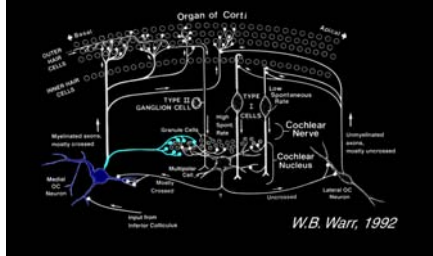
## Behavioral Studies in Mice



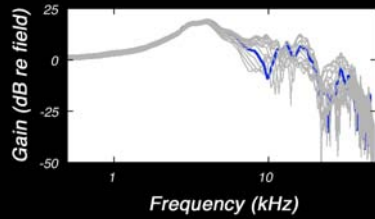
## Failure to Replicate



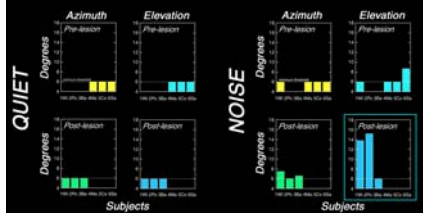
## New Interpretations



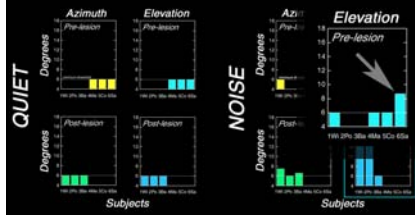
## New Behaviors



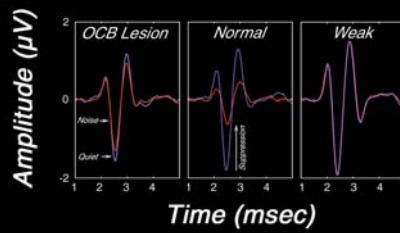
## Resurrecting the OCB Lesion



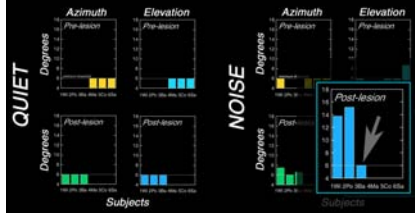
## Inter-Subject Variation



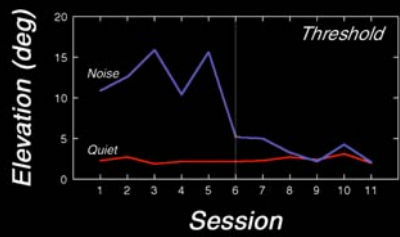
## Inter-Subject Variation



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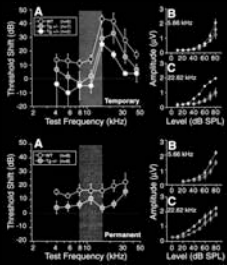
## Training Effects



## So who was right?

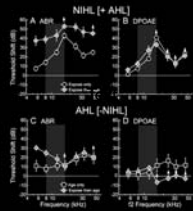
Dewson '68	Hienz et al. '98
Capps & Ades '68	Stebbins '70
Igarashi et al. '79	May & McQuone '95
Oatman '71	Oatman '88
Scharf et al. '97	Zeng et al. '00
Trahoitis & Elliott '70	Liberman '91

## Protective Effects



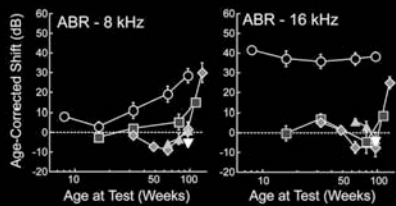
Mason et al. '02

## Auditory Development



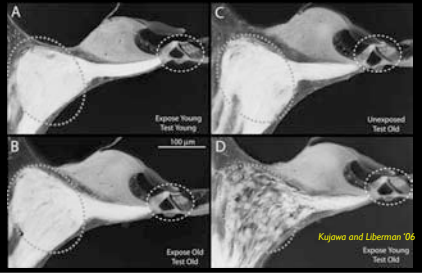
Kujawa and Liberman '06

## Auditory Development

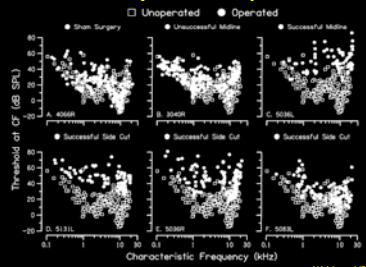


Kujawa and Liberman '06

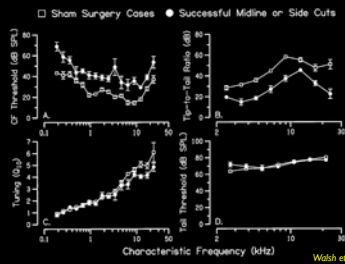
## Auditory Development



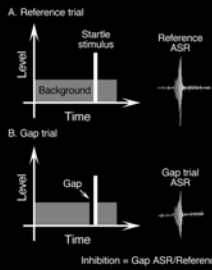
## Auditory Development



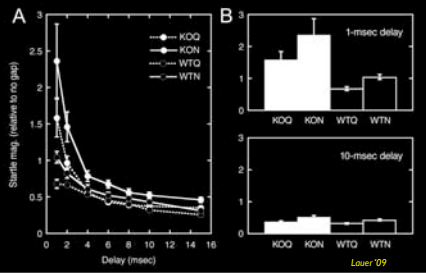
## Auditory Development



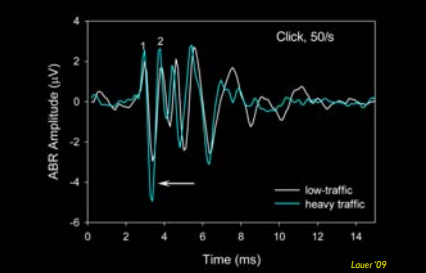
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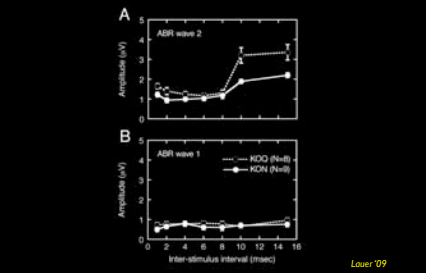
## Auditory Development



## Auditory Development



## Auditory Development



## Grant Submission

- Deadlines
- Proper forms
- Content
- Format
- Review

## Deadline

MARCH 13, 2009

Electronic submission

## Forms

<http://grants.nih.gov>

SF424 forms

## Content

1. Narrative
2. Summary
3. Specific Aims
4. Background
5. Preliminary Results
6. Research Design and Methods
7. Vertebrate Animals
8. Bibliography

## Format

0.5 in (or larger) margins  
11 pt (or larger) font size  
standard fonts (arial, helvetica, times)  
6 lines (or less) per inch

## Format

Narrative = 4 sentences  
Summary = 30 lines or less

Specific Aims = 1 page  
Background = 2 pages

Preliminary Results and  
Research Design = 7 pages

## Review

Significance  
Approach  
Innovation  
Investigators  
Environment  
Overall Evaluation

## Scoring

1.0-1.5 High impact  
1.5-2.0 Impressive ideas  
2.0-2.5 No major flaws  
2.5-3.0 Strengths>weaknesses  
3.0-3.5 Weaknesses>strengths  
3.5-4.0 Numerous problems  
4.0-5.0 Simply not a good plan  
NRFC