

# Regular glimpsing windows provide release from energetic masking

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# Question:

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What role does rhythm play in speech perception in noise?

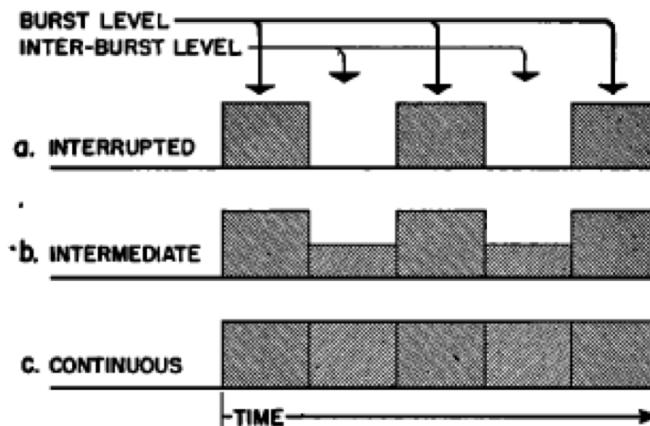
# Previous Energetic Masking Work

- Lots of work on steady-state masker



(Festen & Plomp, 1990)

- Periodic maskers, simple and variable noise power



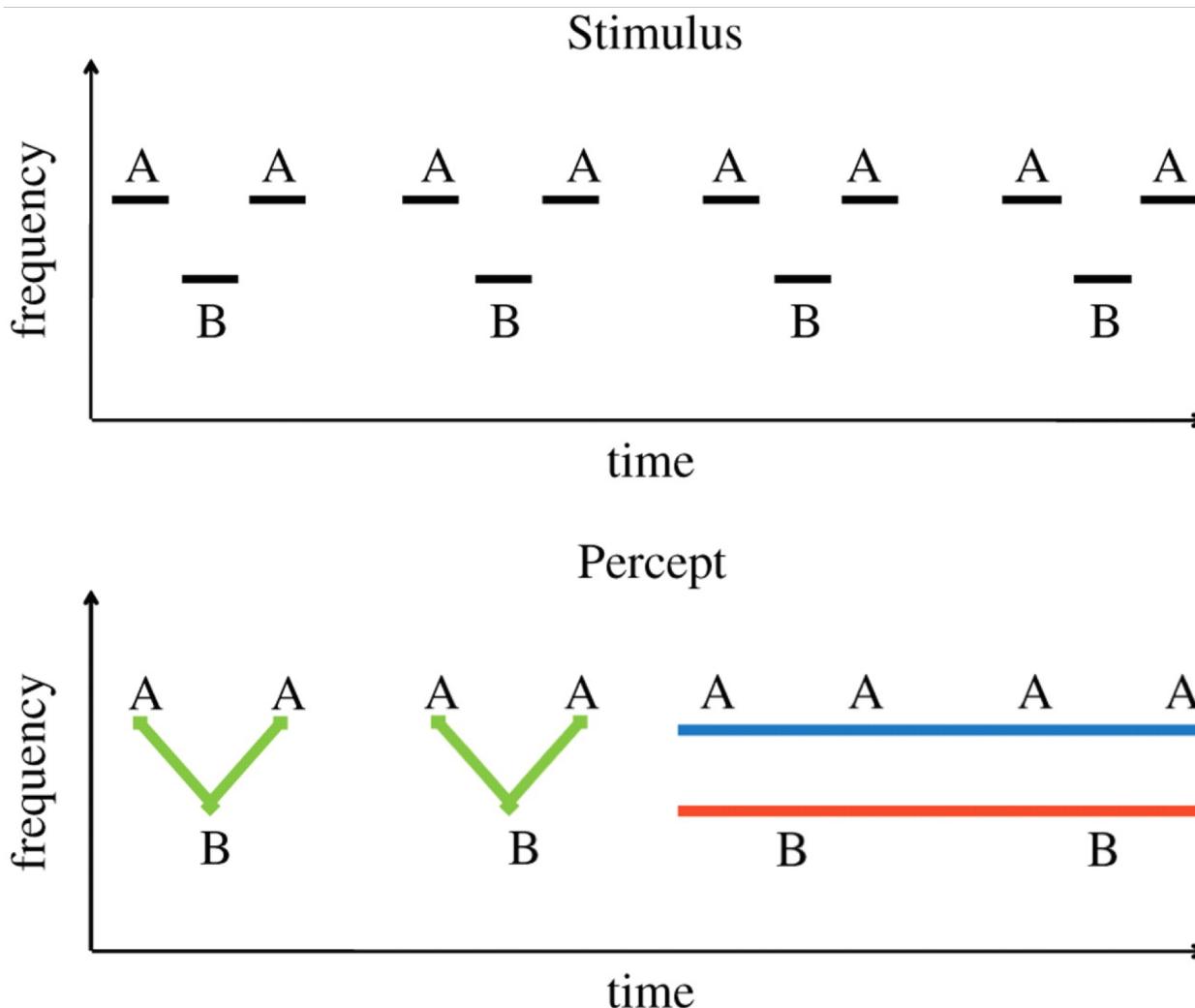
(Pollack, 1955)

- Complex structure, but no repeating rhythm



(Festen & Plomp, 1990)

# Streaming and Rhythm



(Al Bregman's Lab)

# Motivation

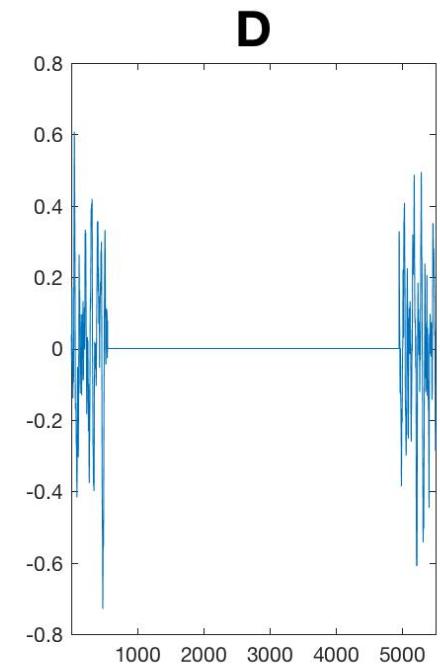
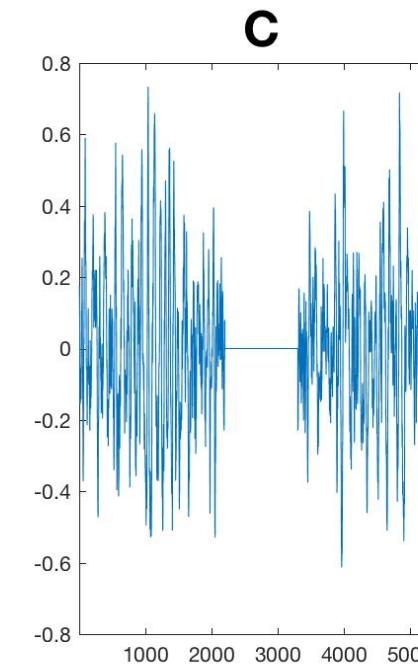
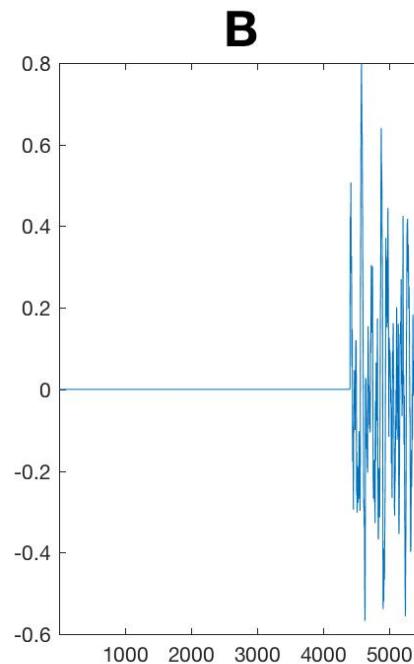
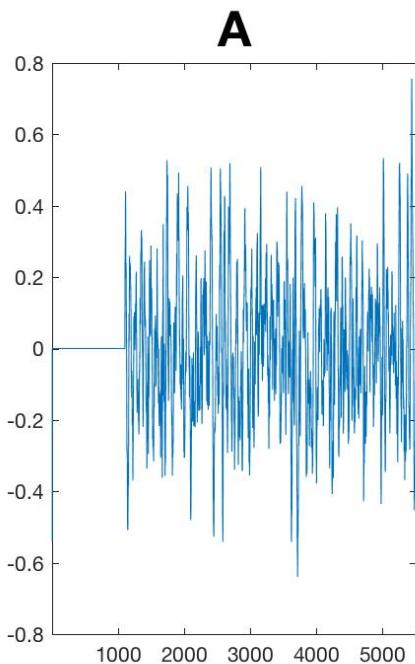
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- Energetic masking causes decreased intelligibility
- Auditory stream segregation separates auditory stimuli
- Can stream segregation-like processes aid in overcoming energetic masking?
- **Hypothesis: increased online rhythmic information will ease speech perception in noise**

*Spoiler: It does*

# Our Energetic Maskers

- Speech shaped noise presented at an SNR of -10dB
- 8 periods of silence placed in the noise every second forming 125ms windows containing noise and silence



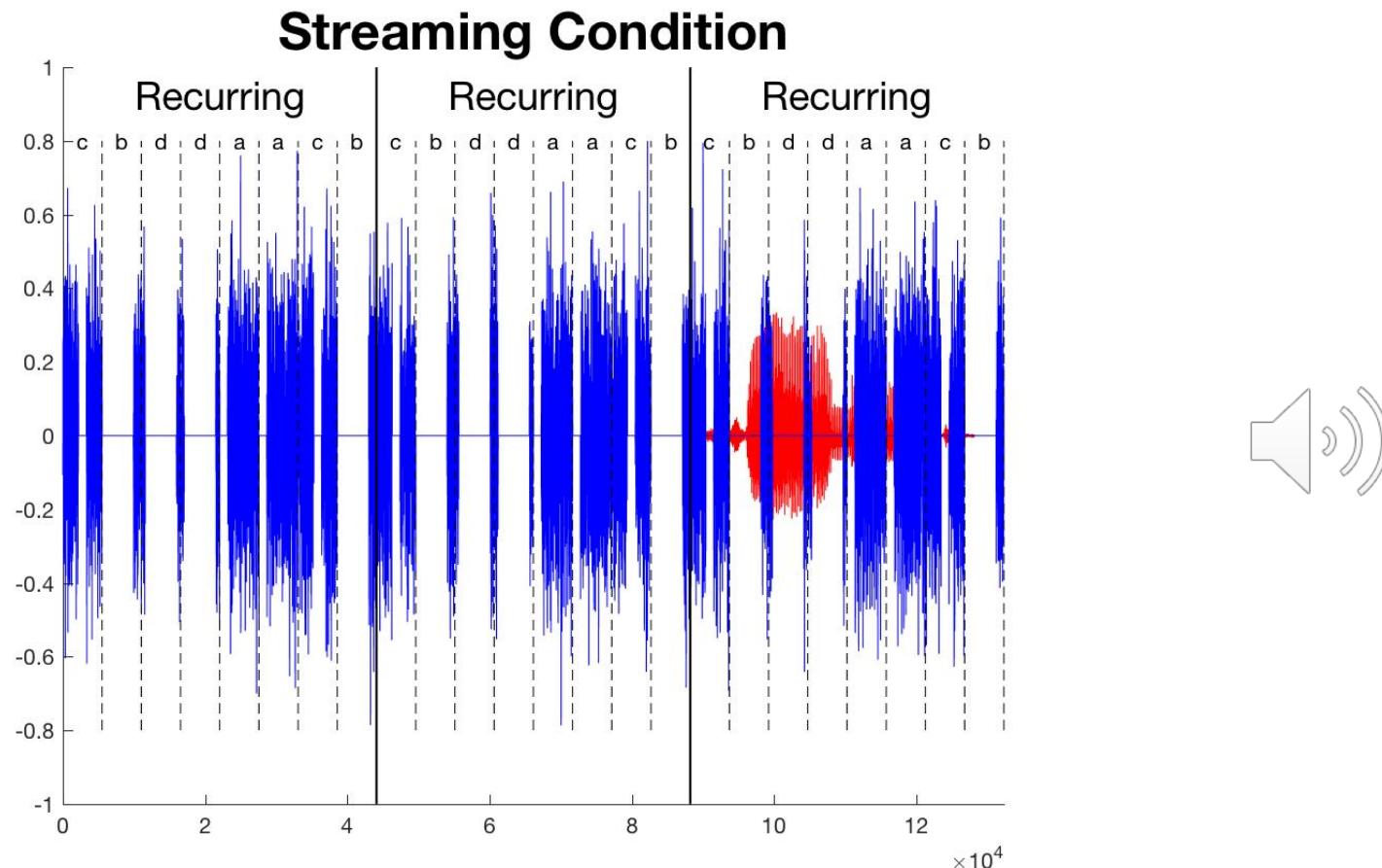
# Trial Conditions

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- 3 patterns occurred in each 3 second trial
  - First two were preamble patterns
  - Third pattern masked the target
- Streaming Condition: The recurring pattern repeated 3 times
- Learning Condition: 2 random patterns, then the recurring pattern masking
- Random Condition: 3 random patterns

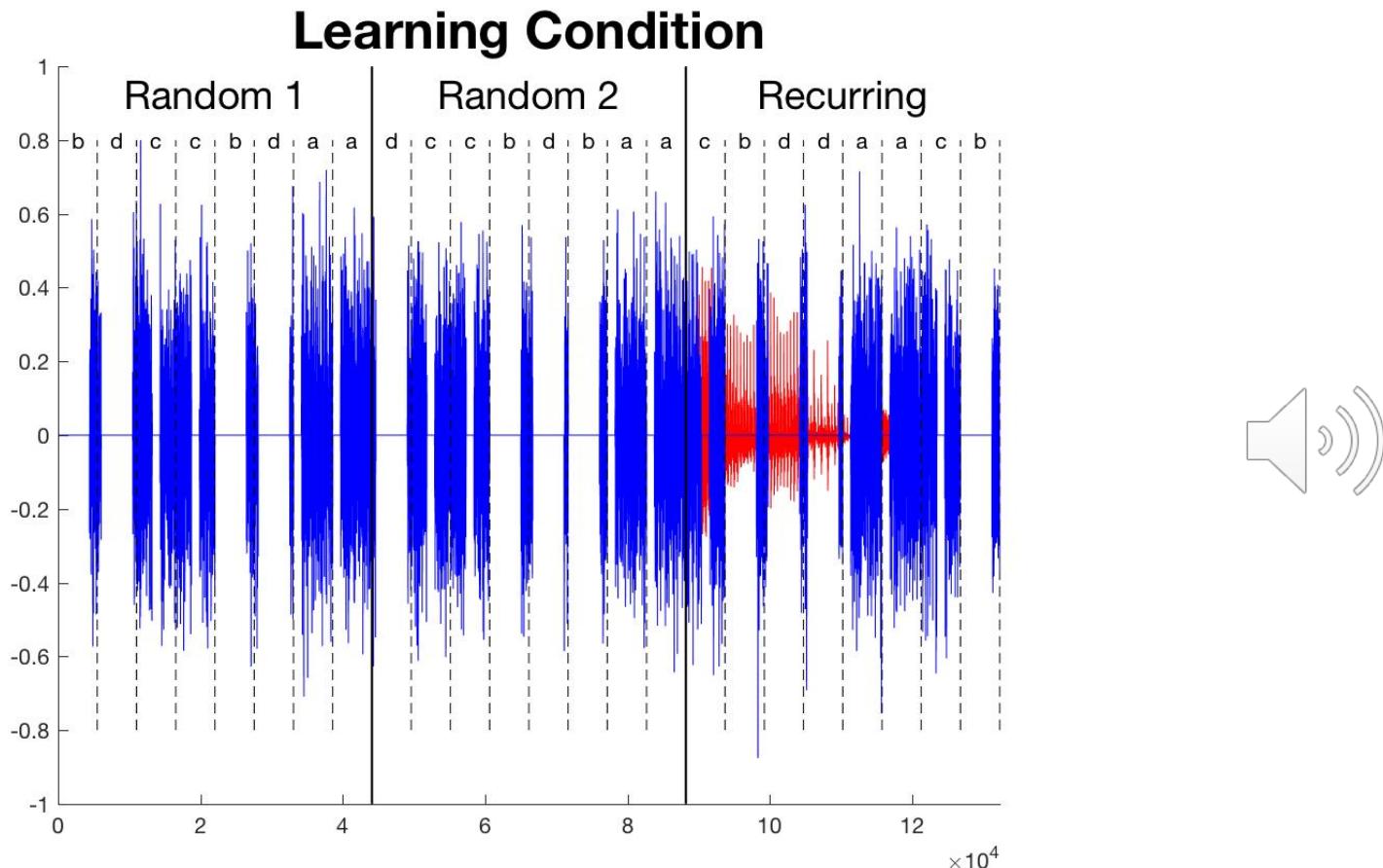
# Streaming Condition (#1)

- Condition 1: Online repetitive information available for streaming



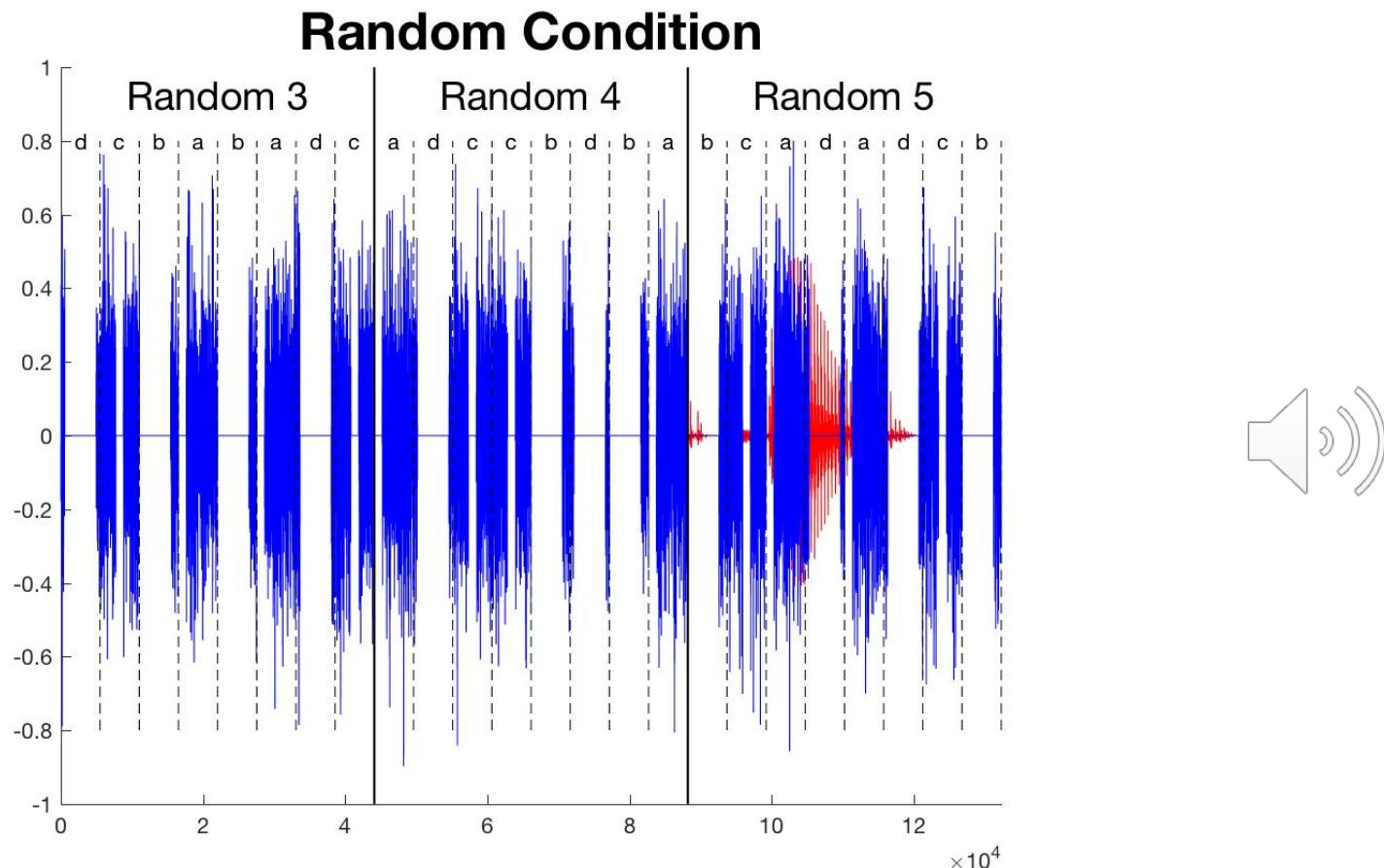
# Learning Condition (#2)

- Condition 2: Offline information available for learning across trials



# Random Condition (#3)

- Condition 3: Task performance, SNR, and glimpsing duration baseline



# Predictions

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- Streaming Condition: 3 repetitions of the recurring patterns
  - Ryhthmic structure may allow streaming, and participants may learn the pattern
  - Maximum advantage for intelligibility
- Learning Condition: 2 random, 1 recurring pattern
  - Participants may be learning the masking pattern
  - Possible advantage over base levels
- Random Condition: 3 random patterns
  - Without repetitive or re-occurring information, participants should perform at base speech perception in noise levels

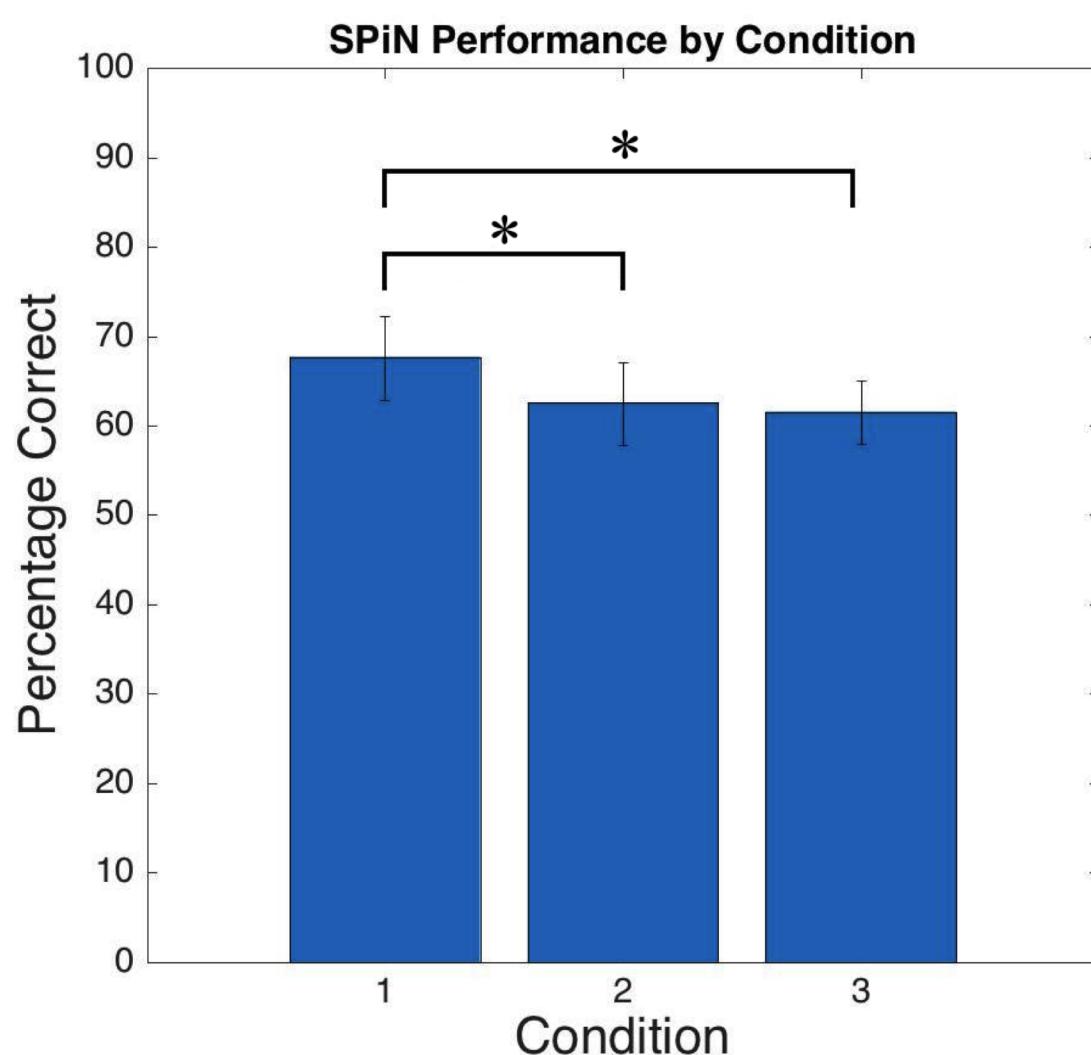
# Experiment Format

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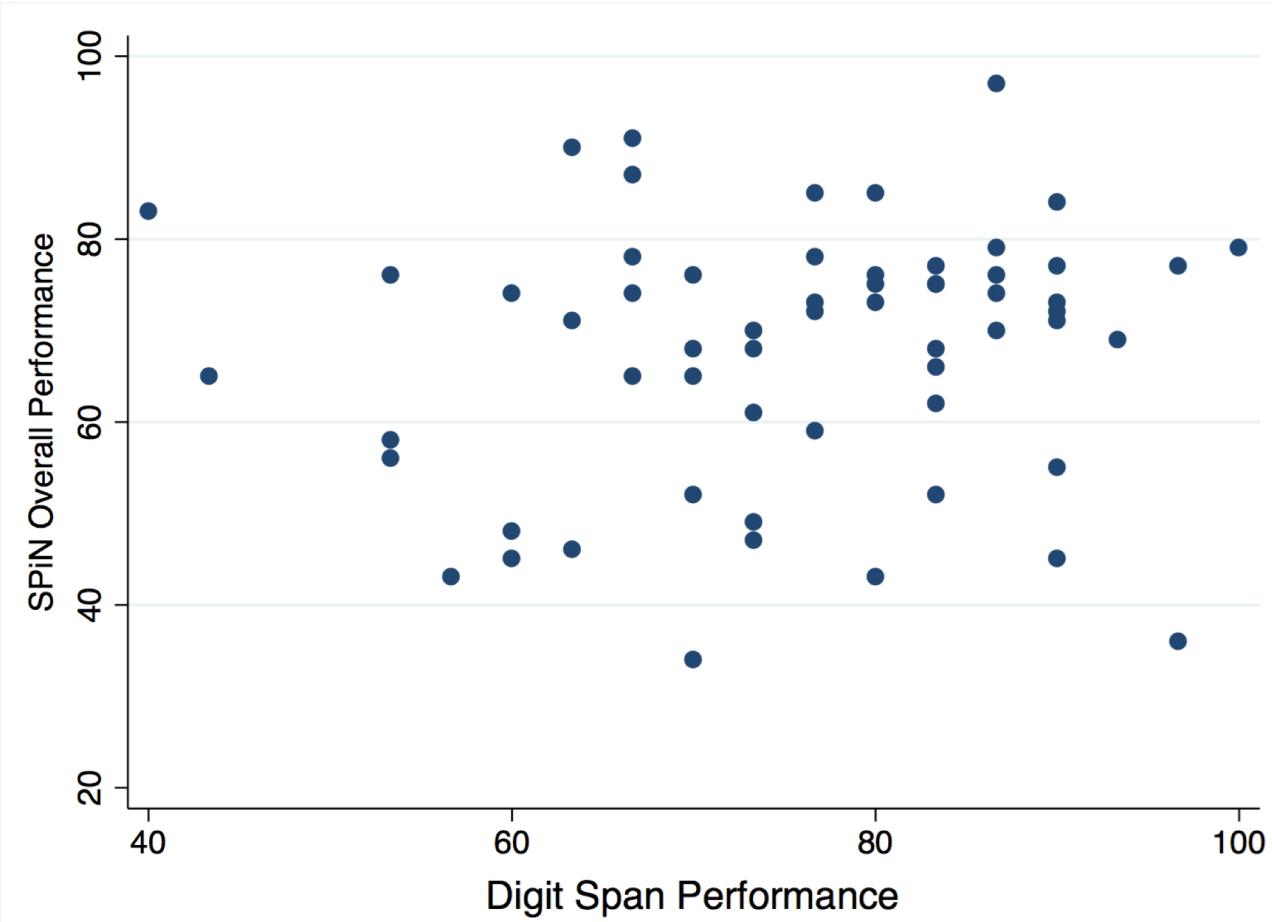
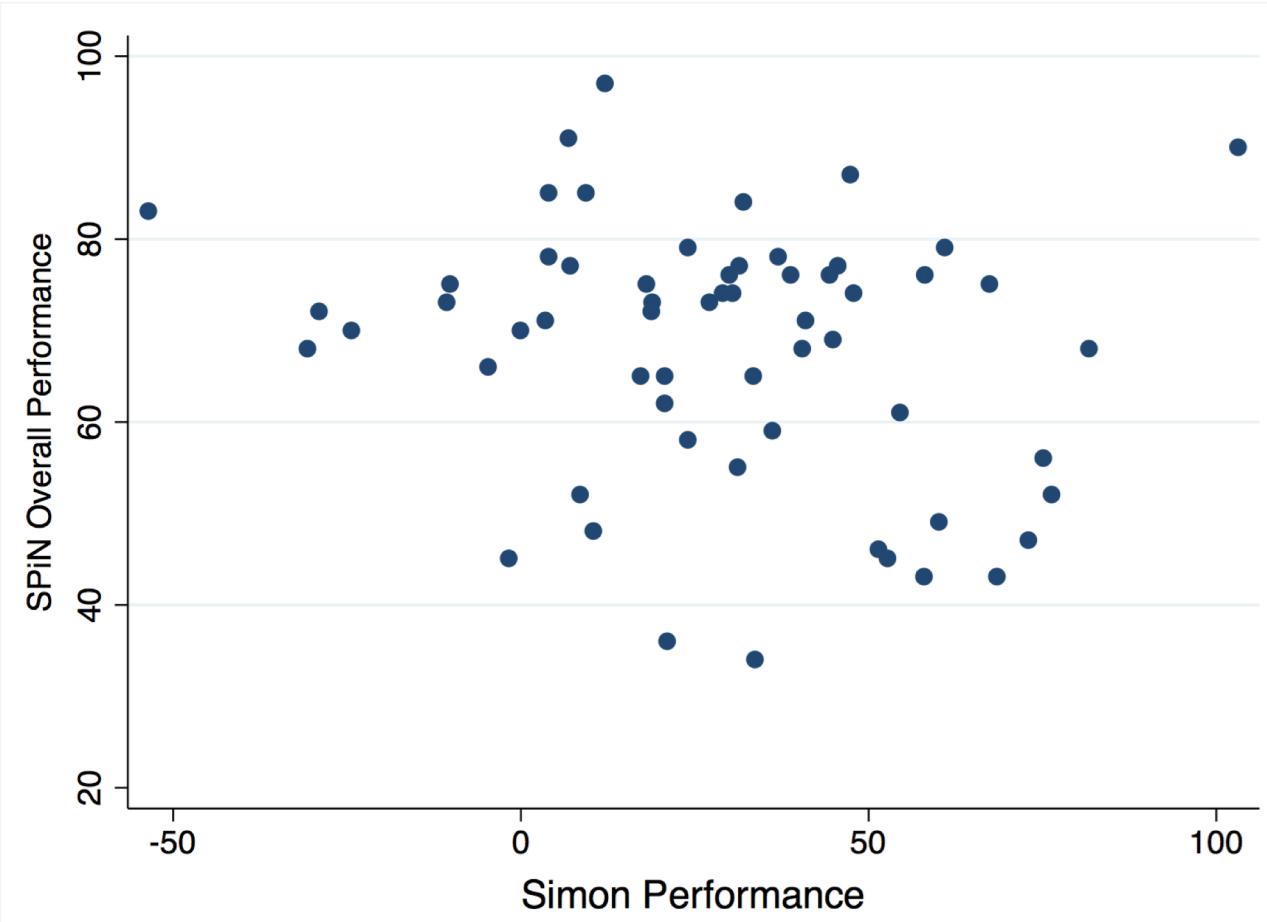
- Open-set word-recognition task
- Used 108 multisyllabic words as targets
- 60 Undergraduates at USC ( $n = 60$ )
- Executive function and working memory tasks followed

# Results

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# Executive Function & Working Memory tasks



# What have we found evidence for?

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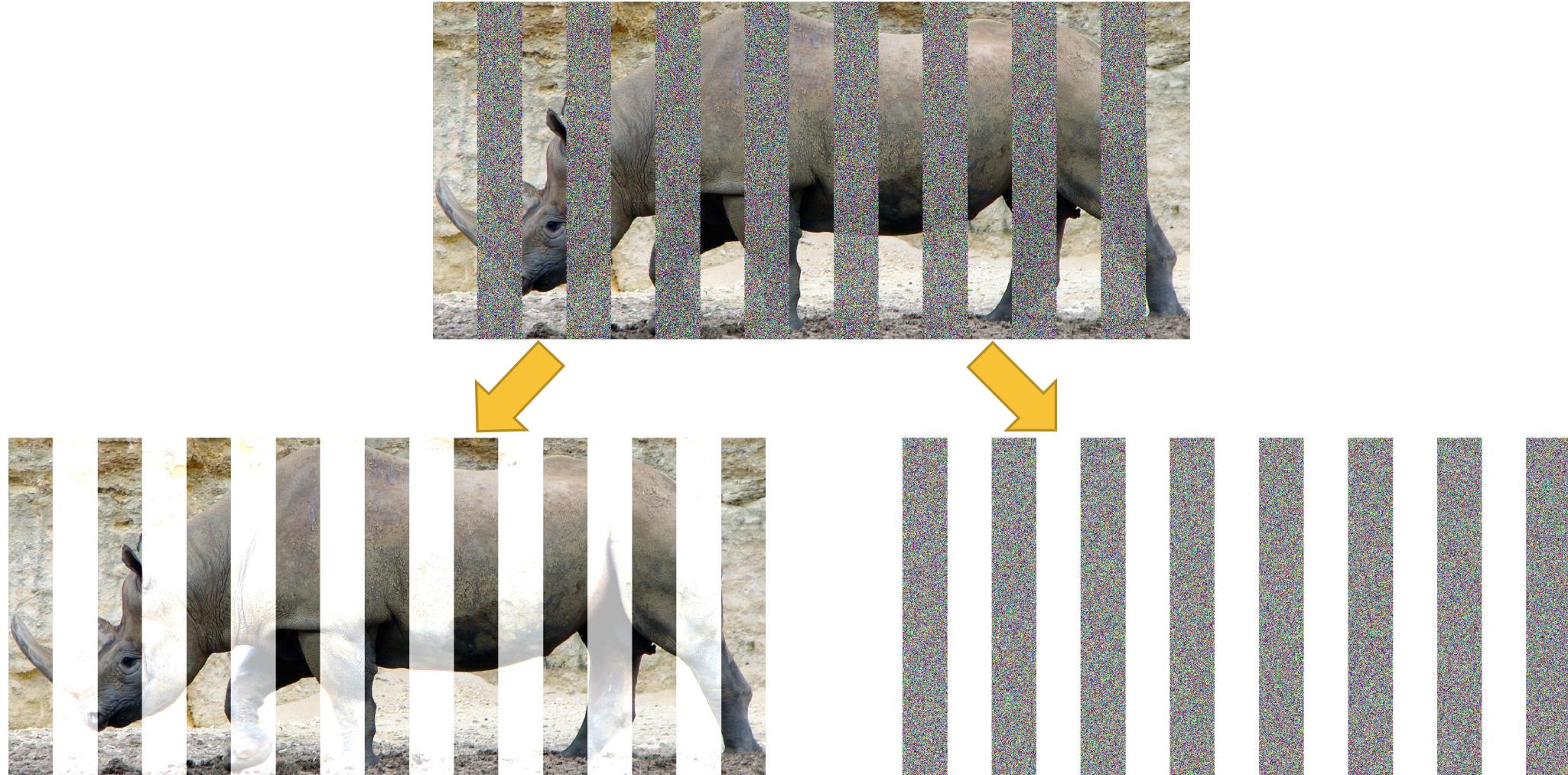
- What mechanism(s) underlies the streaming condition advantage?

A couple accounts are plausible:

- The first is segregating the target stream from the noise stream
- The second is a prediction of glimpsing opportunities

How can we use their properties to uncover which it is?

# Streaming vs. Glimpsing: Streaming



# Streaming vs. Glimpsing: Glimpsing



# Future manipulations

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- Frequency manipulation
  - Spectrally fluctuating maskers
- Inter-pattern gap
  - Insert silence between patterns
    - Should not affect timing calculations
    - Should defeat streaming
- Auditory attention manipulation
  - Manipulate attended stream

# THANK YOU!

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SHOUTOUT TO ZEVIN LAB AND THE R.A.S! AND THE PARTICIPANTS  
WHOSE DATA ENABLED THIS RESEARCH!

# References

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