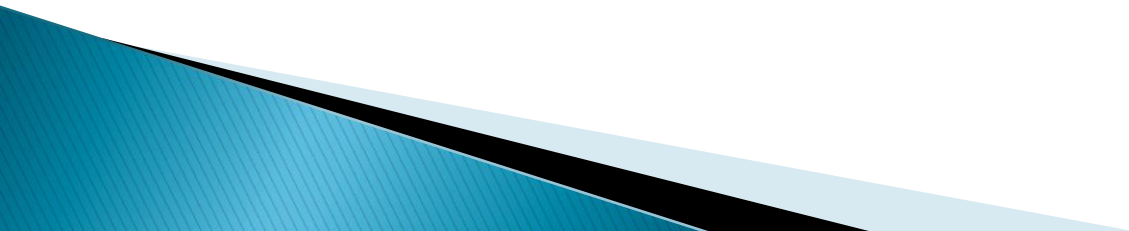




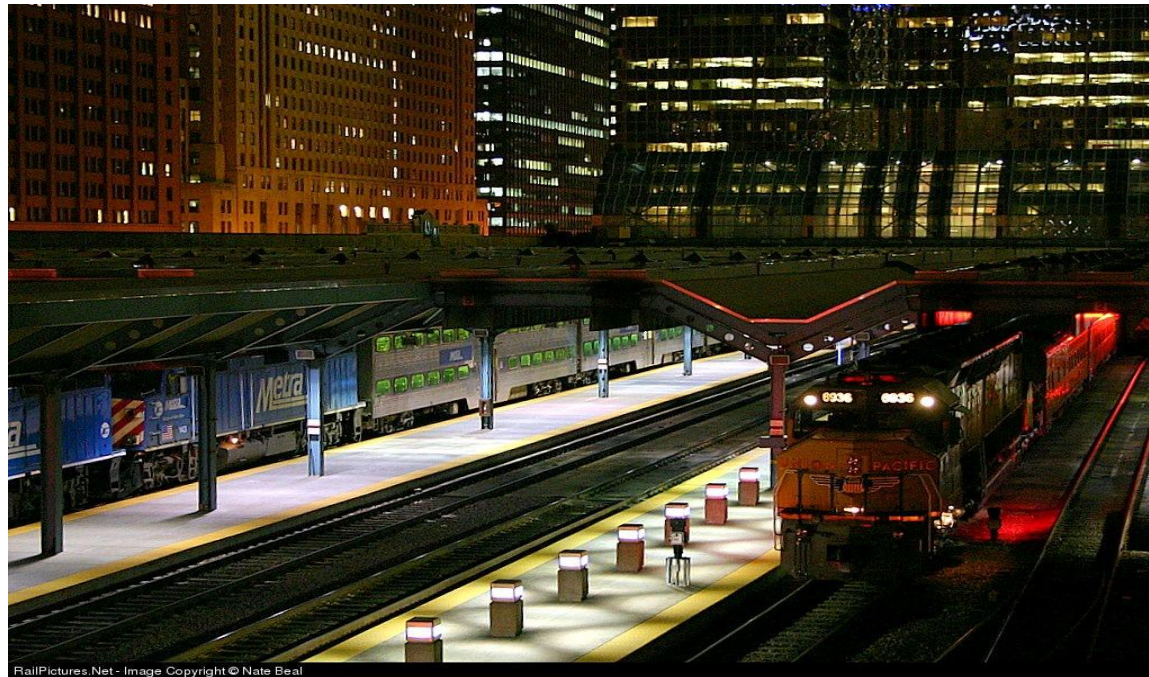
IPRO343
IMPROVING
COMMUNICATION
QUALITY
IN NOISY &
DISTRACTING
ENVIRONMENTS



- ▶ Should you become aware of any suspicious items or parcels on or about our facilities or trains, please alert an Amtrak or Metra employee immediately.

Problem

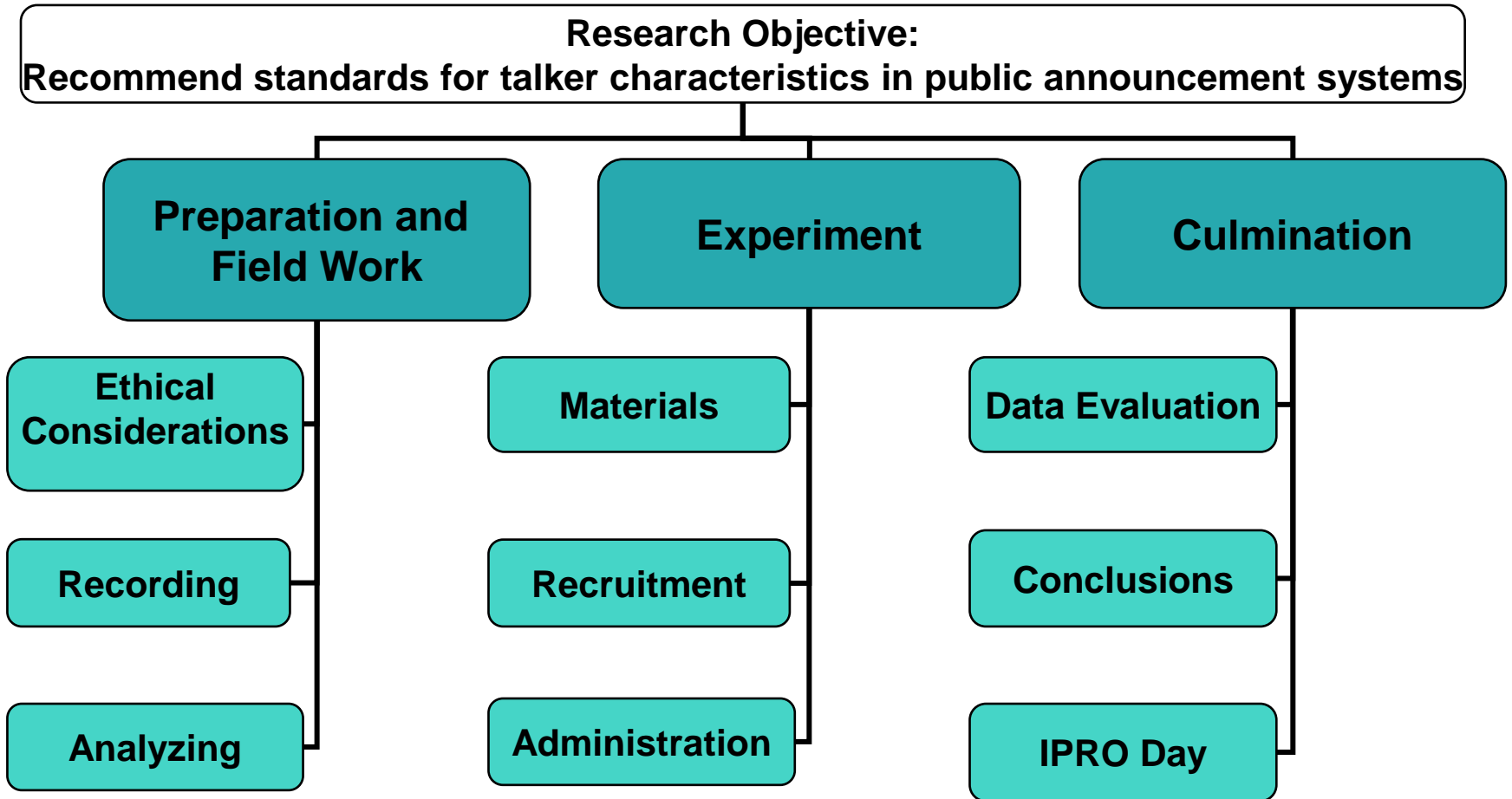
- ▶ There are no standards for talker characteristics in public announcement systems.



Goals

- ▶ Research Objective: Recommend standards to improve talker characteristics in public announcement systems
 - Record
 - Evaluate
 - Design
 - Administer
 - Analyze

Team Organization



Ethical Considerations

- ▶ Approved under Institutional Review Board proposal submitted by IPRO 343 Fall 2008
- ▶ 20+ hours of NIH ethics training for human subject research
- ▶ Developed a code of ethics



Recording

- ▶ Recorded 22 public announcements and took sound pressure (loudness) readings
 - CTA Platforms
 - Buses
 - “L” trains
 - Metra Stations
 - O’hare Airport



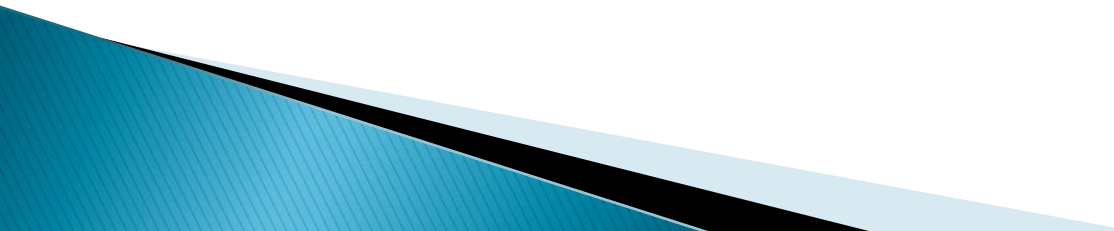
Analysis

▶ Characteristics

- Words per minute: 89.91–182.74
- Duration: 1.97–20.16 seconds
- Pitch: N/A



Challenges and Resolutions

- ▶ Recording Quality
 - Managed to analyze words per minute and duration of announcements, despite difficulties recording
 - ▶ Experimental Interface
 - Adapted user-friendly software
 - Created a tutorial
 - ▶ Grading Experiment Results
 - Used tools available (Excel)
 - ▶ Recruitment
 - Used creative approaches (Facebook, fliers, etc.)
- 

Experiment Design

- ▶ Human subject-based experiment designed
 - Tested the variables analyzed in recordings: duration, words per minute, and pitch
 - An accepted experimental procedure was used
- ▶ Team hypothesized the following:
 - Higher pitch = No effect
 - Short duration = higher intelligibility
 - Slow speaking rate = higher intelligibility

Materials



40 Phrases manipulated for use in experiment



Words were combined to form 60 distinct phrases of 5 or 10 sets of three words

1350 sets of three words were recorded using a speech synthesizer on an Apple Computer

Examples:

Low pitch, slow, short duration
and
High pitch, fast, long duration

Example:

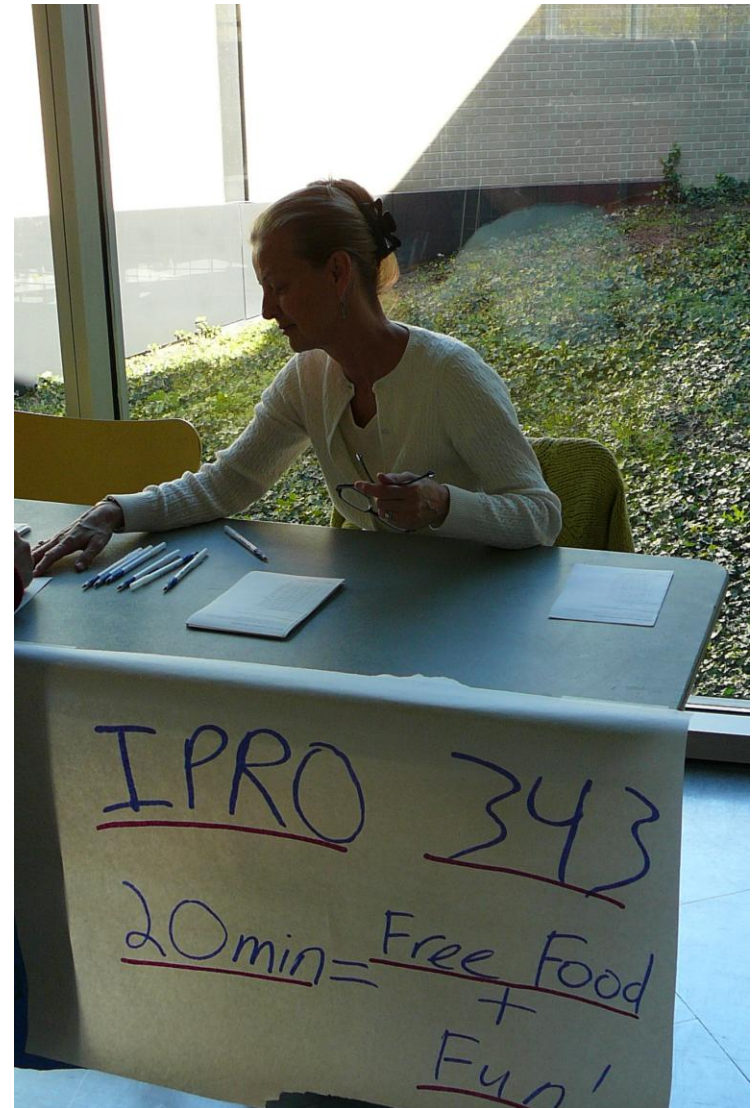
“red, star, right, circle, blue,
down, green, square, up, left,
orange, star, purple, cross, right”
= one phrase

Example:

“red, star, right” = one set

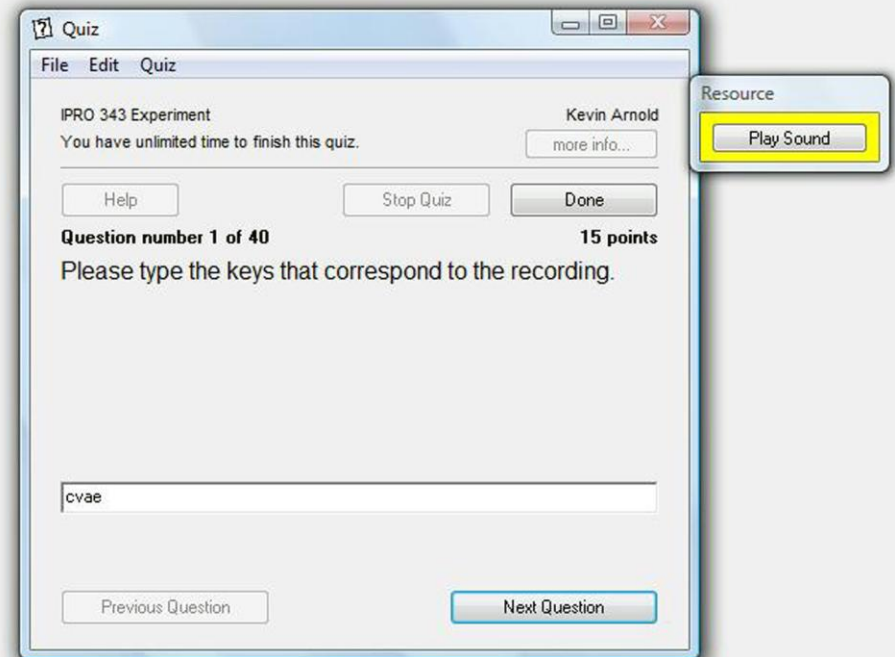
Recruitment

- ▶ 77 participants
 - MTCC bridge table
 - Facebook group
 - Fliers
 - Email
 - Compensated with lunch



Administration

- ▶ Starquiz was used as the interface
- ▶ 40 short answer questions

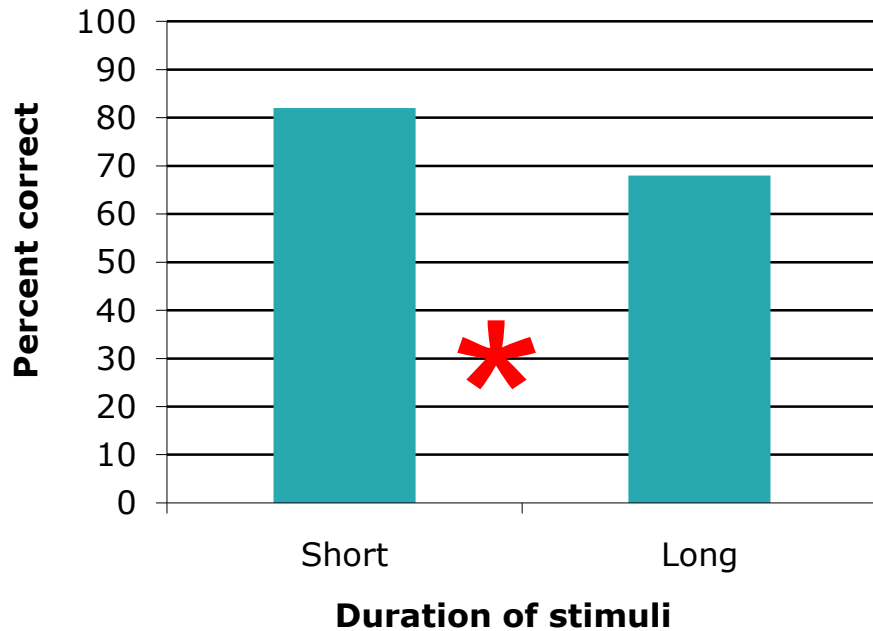


Administration

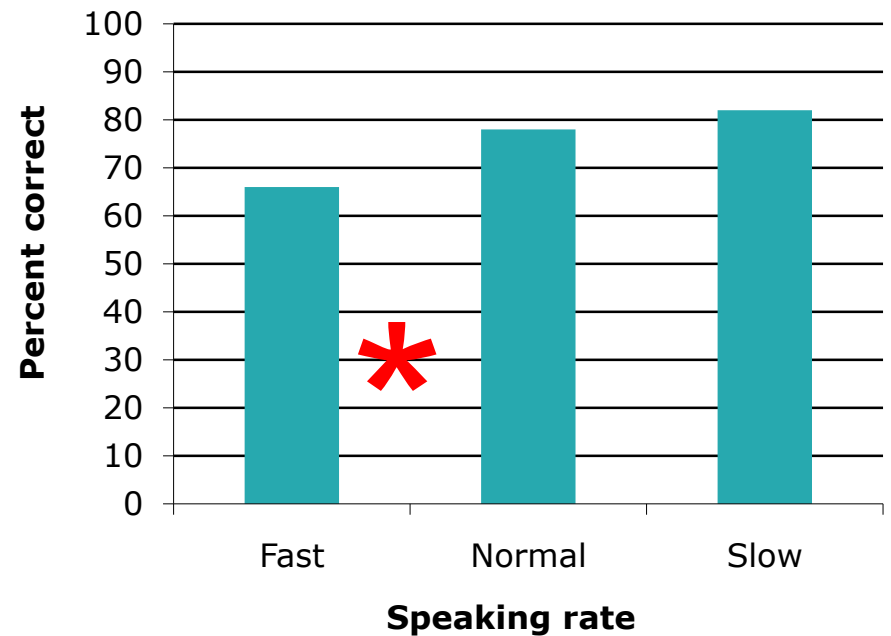


Data Evaluation

Average speech intelligibility for stimuli with different durations

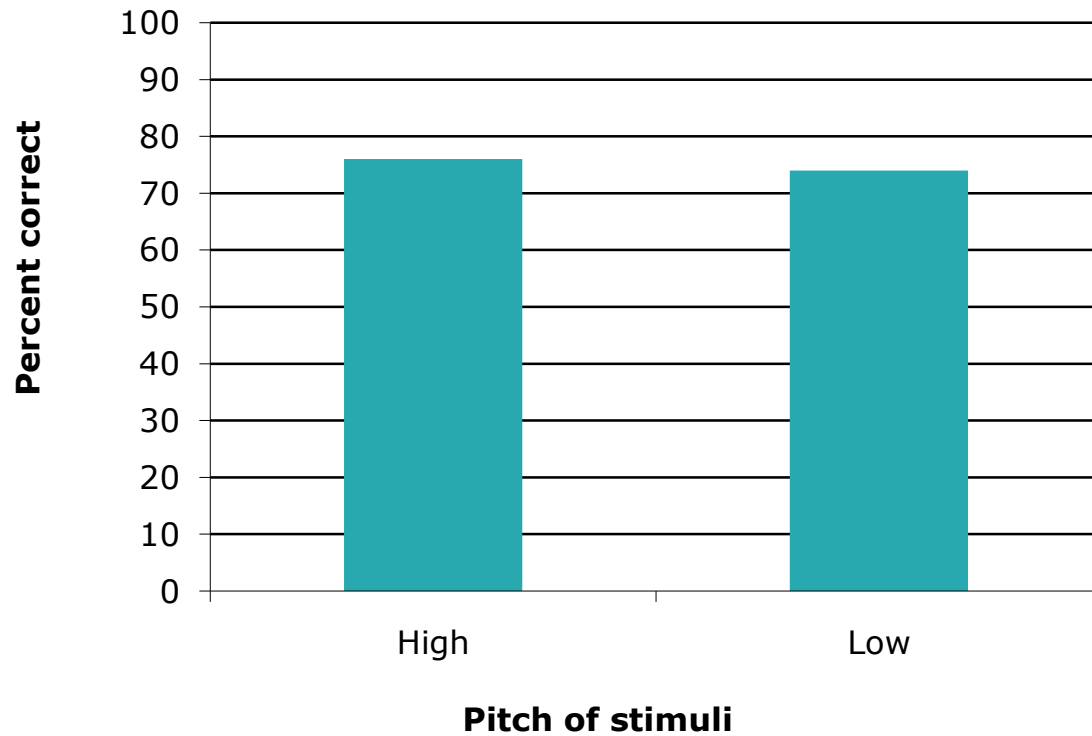


Average speech intelligibility for stimuli at different speaking rates

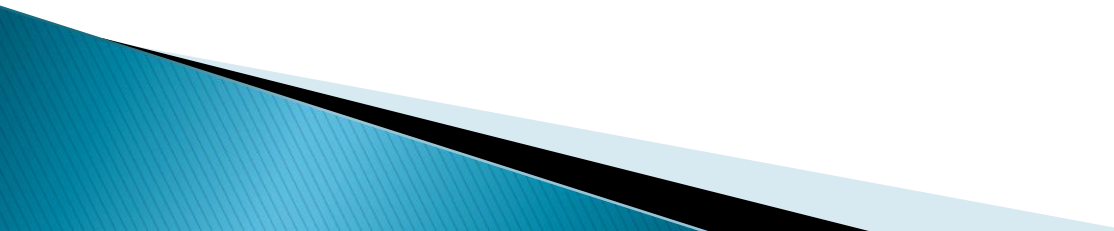


Data Evaluation

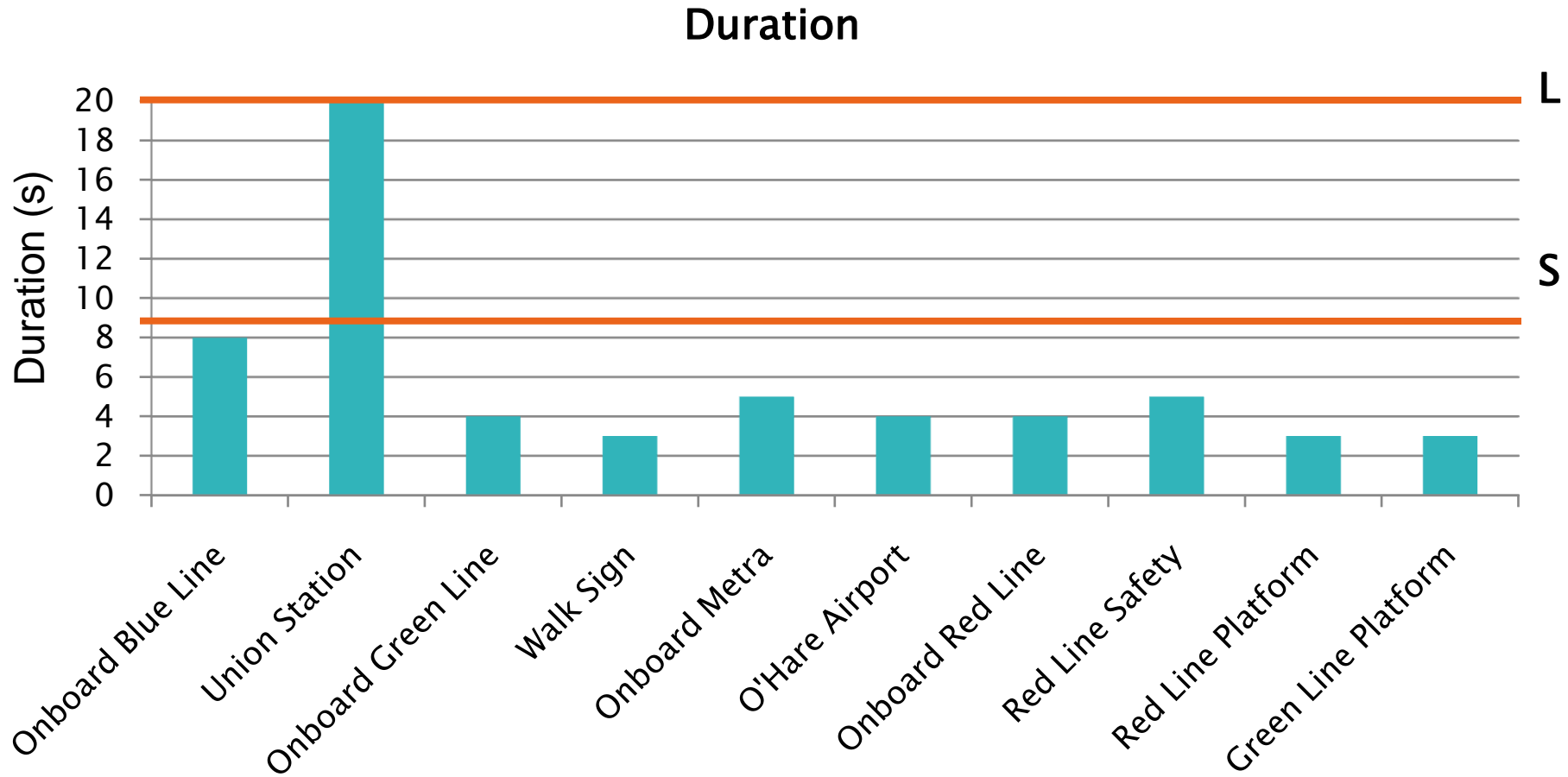
Average speech intelligibility for stimuli with different pitches



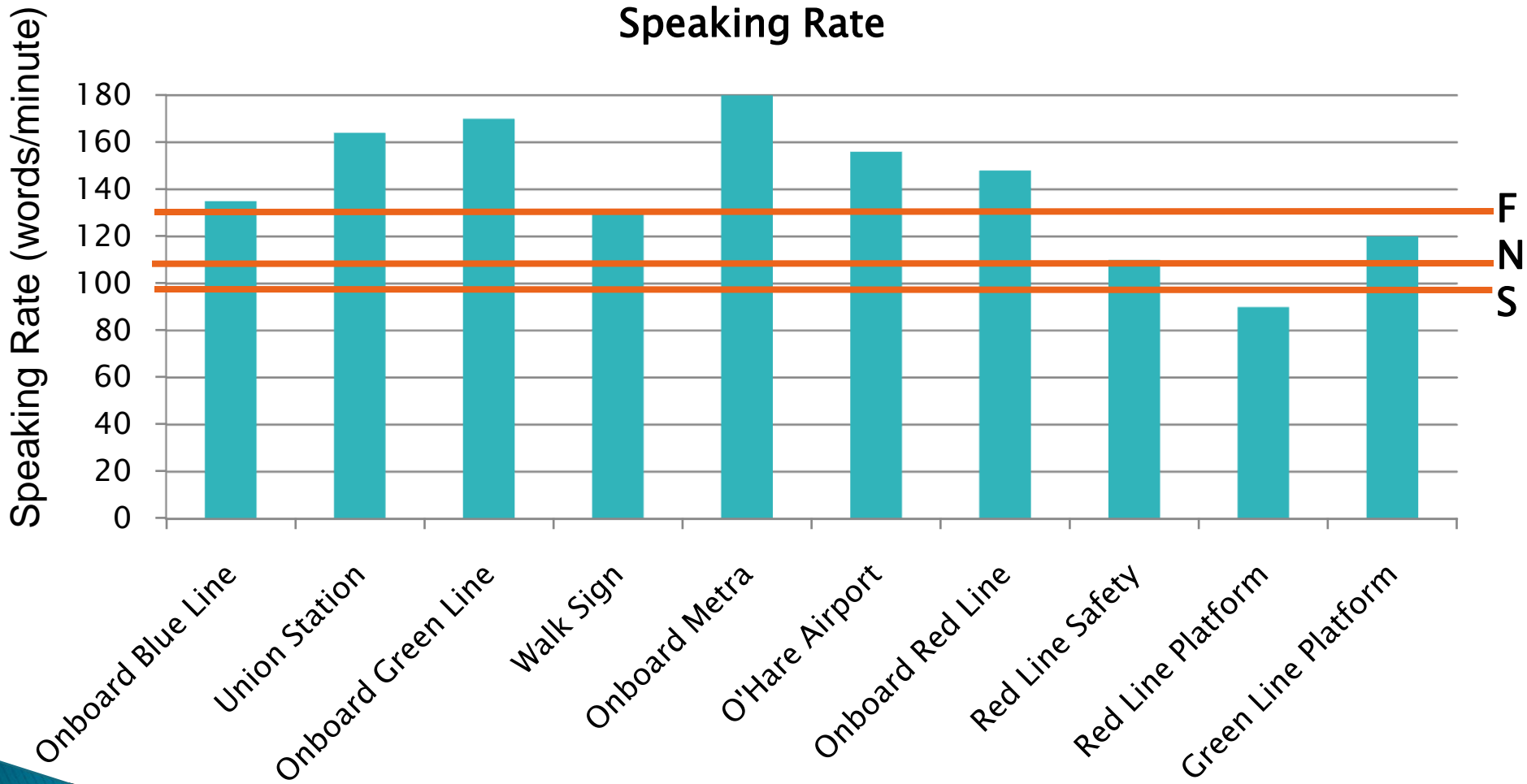
Recommendations

- ▶ Longer messages should be broken into shorter messages.
 - When not feasible, longer messages should be spoken at slow speaking rates.
 - ▶ Shorter messages should use slow or neutral speaking rates.
 - ▶ Pitch had no significant impact on speech intelligibility
- 

Recommendations



Recommendations



Summary

- ▶ Problem
 - ▶ Focus
 - ▶ Challenges and Resolutions
 - ▶ Recommendations
- 