FUTURE DIRECTIONS

In spring 2009, IPRO 343 will continue to look at speech intelligibility in other noisy environments. Possible applications of the current research include improving intelligibility of speech in subway and bus announcements and public address systems and improving synthetic speech in ticket terminals and ATMs.

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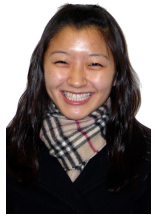

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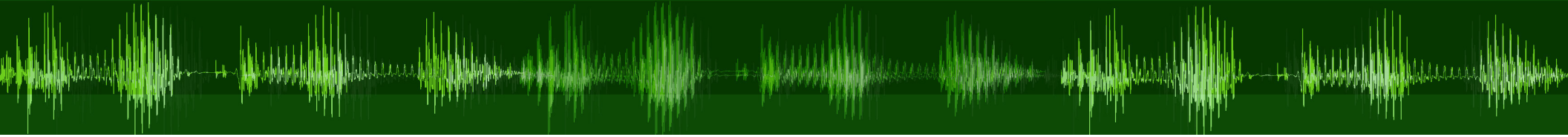
IPRO It takes a team!
INTERPROFESSIONAL PROJECTS PROGRAM

IPRO 343

Improving Communication Quality of the Drive-thru Experience



PROBLEM

The primary objective of IPRO 343 was to address the communication issues which affect the efficiency and effectiveness of the drive-thru experience at quick-service restaurants (QSR). QSR executives wanted the research focus to be on improving incoming communication to order-takers at drive-thru windows.

The problem posed by QSR executives dealt with order accuracy in the drive-thru. Drive-thru employees have to accurately take an order while listening to conflicting speech signals: the voice of the drive-thru customer placing the order must compete with kitchen babble and the voices of customers inside the restaurant.

PROPOSED SOLUTION

IPRO 343 hypothesized that by masking the background babble with white noise, the order would be more intelligible and order accuracy would increase.

In order to test this hypothesis, IPRO 343 designed and conducted an experiment.

EXPERIMENTAL PROCESS

The first step was to apply for Institutional Review Board approval since the experiment would have human participants.

Next, a rating tool -- in this case, an order sheet -- was created to test accuracy.

Q	I'd like a number:	Topping	Side/Drink
1	1 2 3 4 5 6 7 8 9 10	☑ Cheese ☐ Beans ☐ Peas ☐ ~~Pickles~~ ☐ Potatoes ☐ Tomatoes	☐ Pies ☑ ~~Fries~~ ☐ Rice ☐ Sprite ☐ Coke ☑ Diet coke ☐ Lemonade ☐ Gatorade

Third, the QSR problem was broken down into its most basic elements: the order (stimulus), the background noise (babble), and the white noise. These three files were combined to create 80 orders, 20 in each of the four conditions presented during the experiment.

	Low Fidelity (Filtered Sound, ie. telephone quality)	High Fidelity (no filter)
Babble	20 Questions	20 Questions
Babble + White Noise	20 Questions	20 Questions

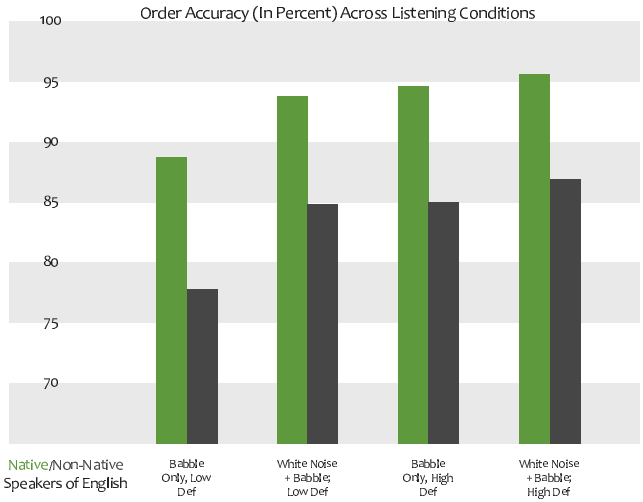
The 80 orders were then embedded into a PowerPoint interface, allowing participants to complete the experiment at a computer workstation.

The team recruited 77 participants (61 native speakers of English and 16 non-native speakers). The experiment was conducted over 4 days.

RESULTS AND CONCLUSION

The results support the original hypothesis that the addition of white noise over background babble will improve intelligibility and order accuracy.

- White noise improved intelligibility.
- Better fidelity improved intelligibility.
- Native speakers scored higher on average.
- White noise improved intelligiblity for native and non-native speakers.



The addition of white noise could be implemented at a quick-service restaurant with little effort or cost to the owner, compared to the large improvement to accuracy and therefore improve customer satisfaction.