The SPAACE Project: Speech Perception by Autistic Adults in Complex Environments

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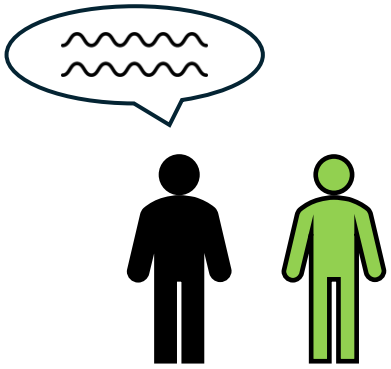
Background Information

Social interactions in general are particularly difficult for autistic individuals.



Prior to this project, many autistic individuals had reported speech-perception difficulties, but the information was inconsistent, and the studies suffered from the following problems:

- Small sample sizes
- Lack of corrections for multiple comparisons
- Listening conditions were isolated
- Lack of input from autistic individuals on experimental design
- Data collection methods not designed around autistic participants

The SPAACE project grew out of work at Autism@Manchester.

Emma Gowen (who has been assisted by Alex Sturrock) had organized an Expert by Experience group at the University of Manchester and was interested in co-producing research with autistic individuals.

AUTISM @MANCHESTER

www.autism.manchester.ac.uk

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Graham Hanks and George Bendo, both of whom had autism diagnoses and were members of the Expert by Experience group, came forward with ideas for audio-related projects.

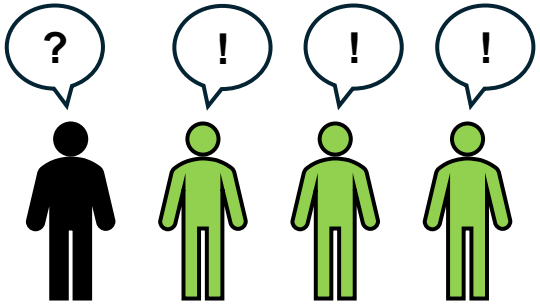
Hannah Guest and Chris Plack at the Manchester Centre for Audiology and Deafness were then invited to collaborate with the group.

Project Structure

The ultimately goals are to identify the autism-related difficulties with speech perception.

The basic research plan is divided into two parts:

1. Get information from the autistic community to develop hypotheses about their listening difficulties.



2. Set up experiments to compare autistic and neurotypical individuals' listening abilities.

Currently Completed Research

Initial interviews (Sturrock & Guest et al. 2022)

- 9 participants (mostly interviewed online)
- Development of initial themes describing listening difficulties

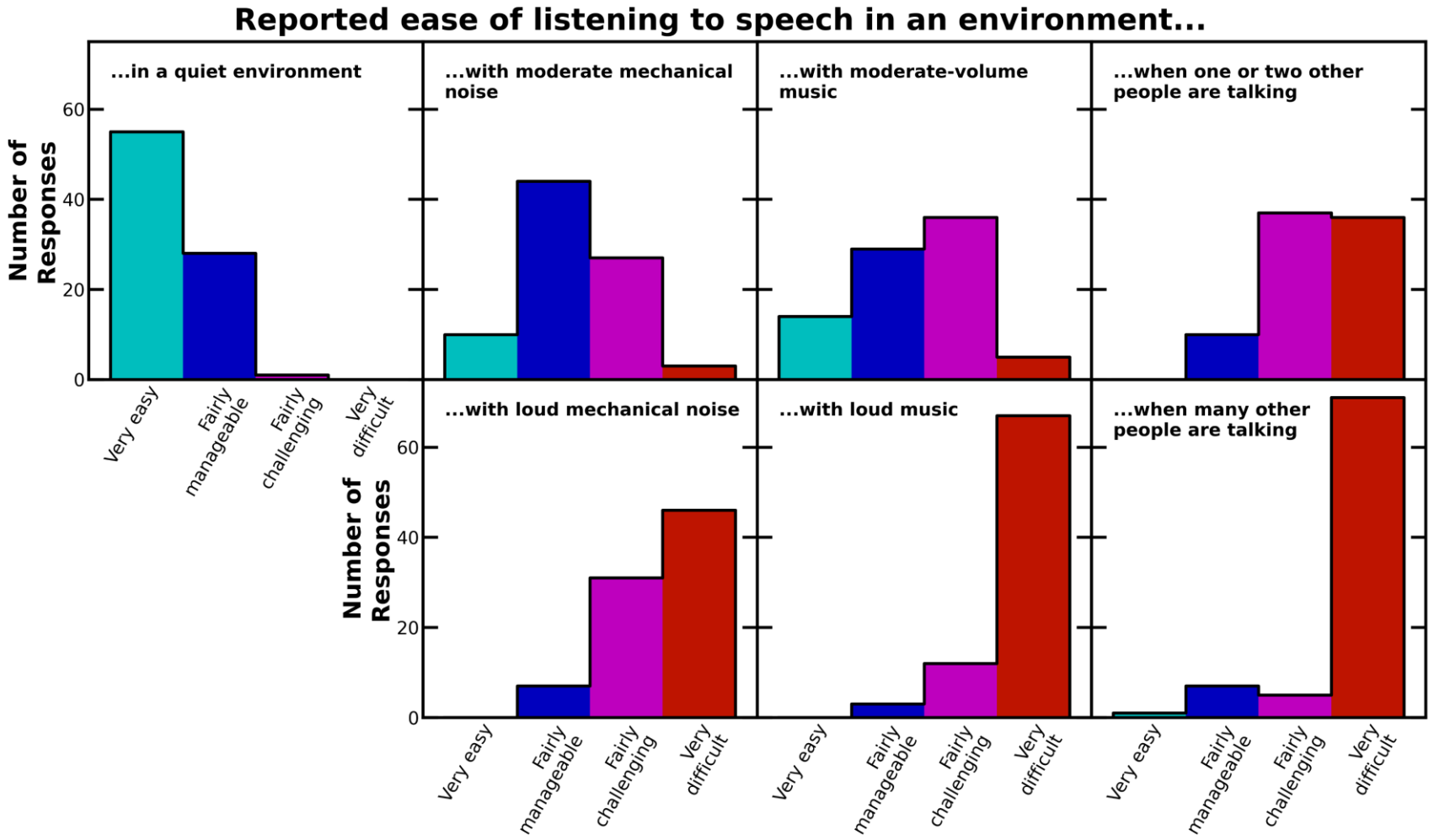
Initial questionnaire (Bendo et al. 2024)

- 79 participants (online)
- Provided more material documenting themes
- Provided supplementary themes not documented in the interviews

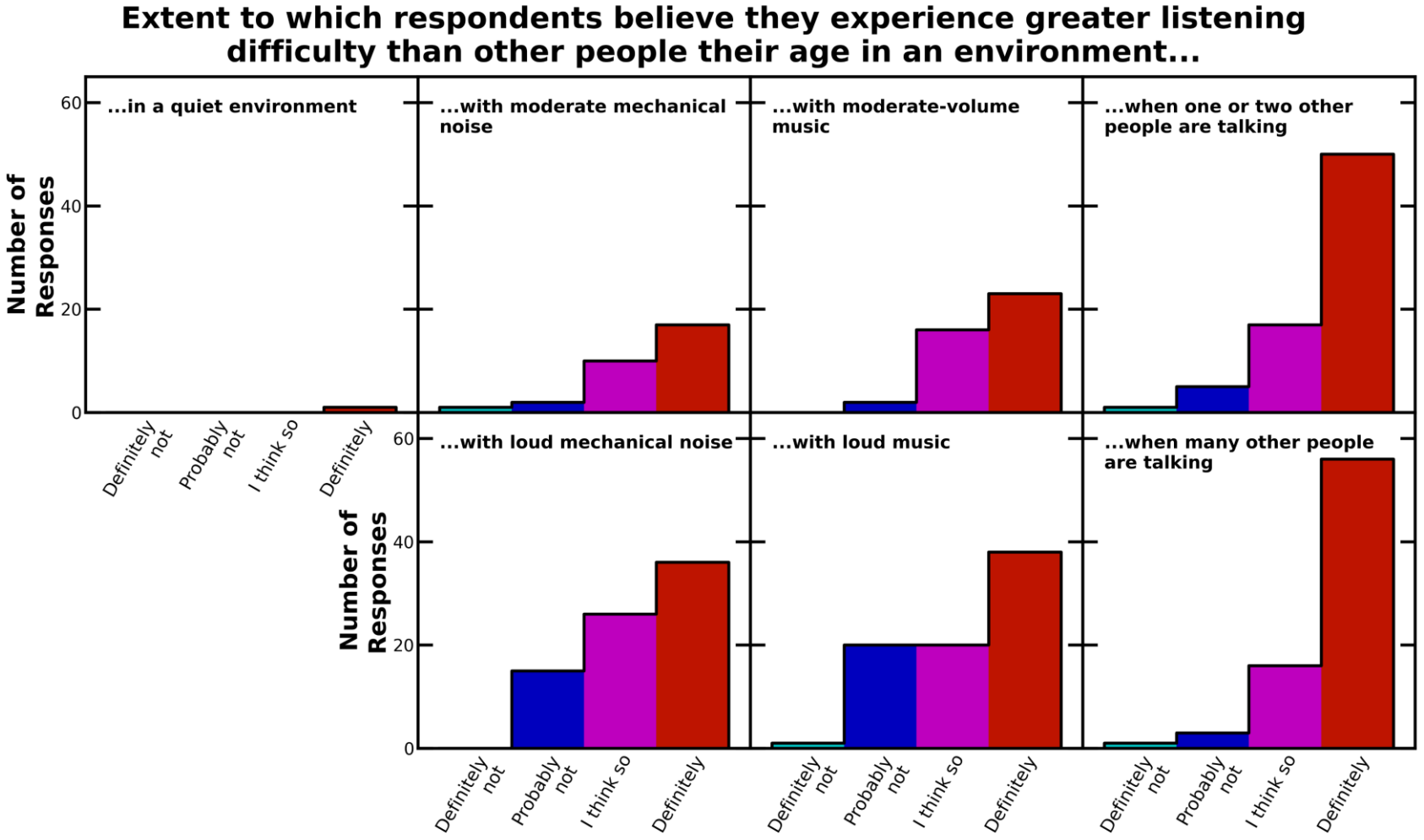
Listening strategies questionnaire (Sturrock et al. 2025, submitted)

- 69 participants (online)
- Follow-up questions about strategies for overcoming listening difficulties

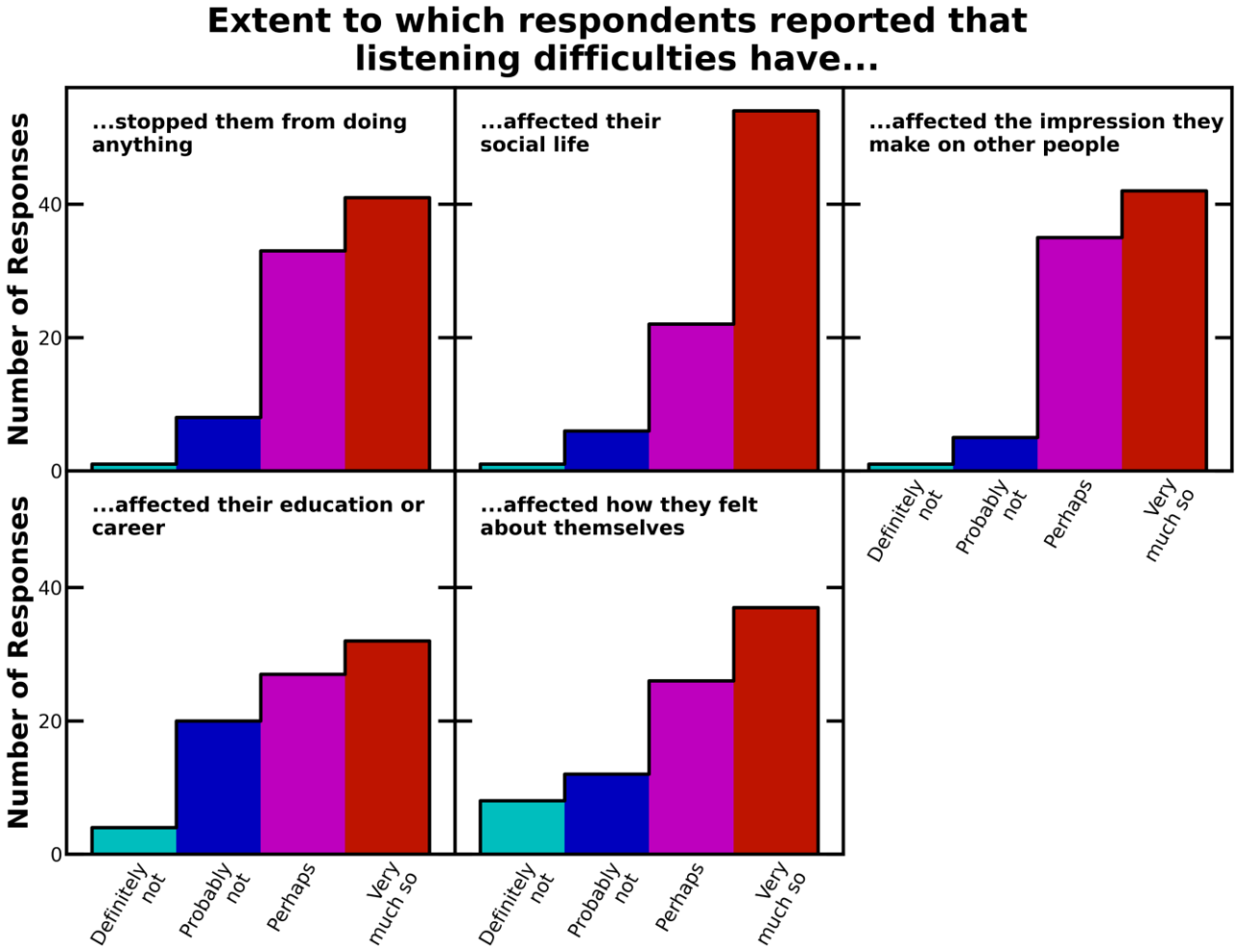
- Listening to a conversation when one or two other people were talking was more difficult than when moderate mechanical noise or music was present.
- Many people talking in the background caused autistic people the most difficulty with understanding conversations.



- Generally, autistic individuals reported that they thought they were having more problems with listening comprehension than their peers.

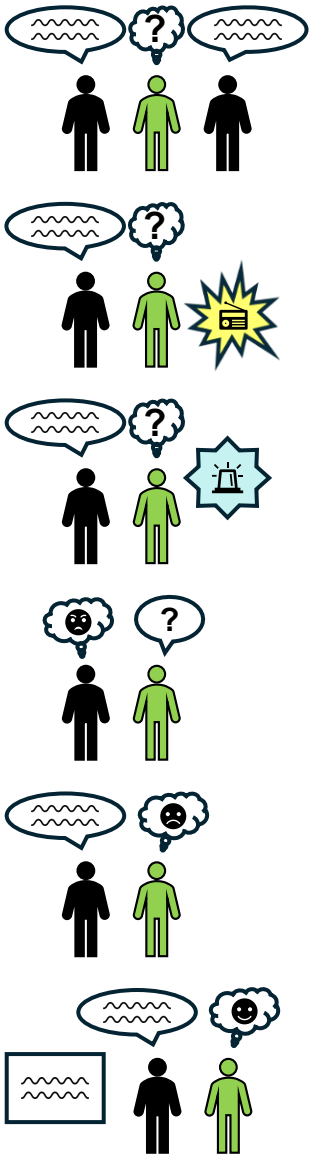


- While listening difficulties generally impacted all aspects of the autistic participants' lives, their social lives were most strongly affected.



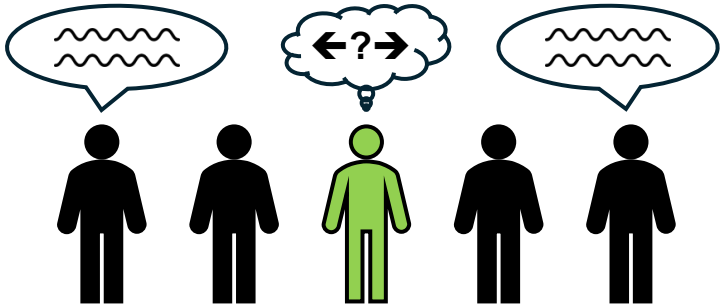
The responses from the initial interviews and free-text questions in the initial questionnaire could be subdivided into six themes:

- Auditory Anomalies
- Contributing Factors (acoustic)
- Contributing Factors (non-acoustic)
- Compounding factors
- Impact
- Coping mechanisms

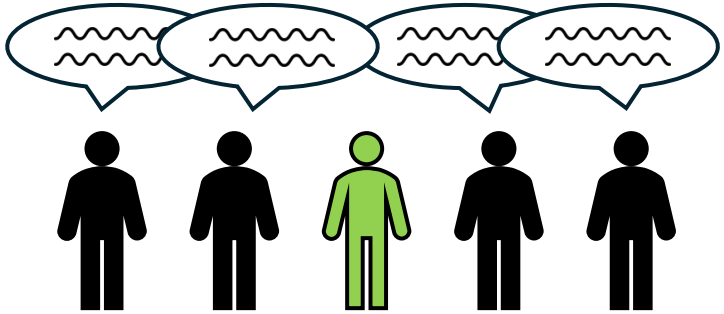


Auditory Anomalies (example subthemes)

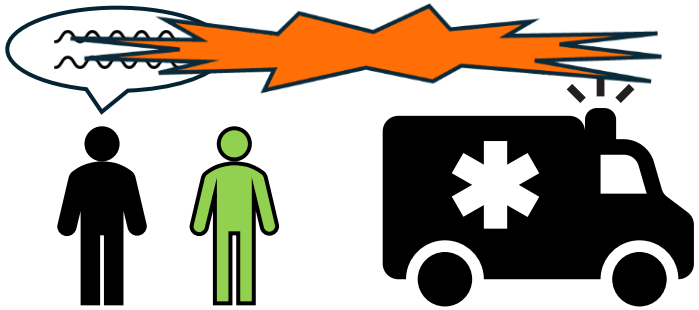
- Difficulty focusing on a speaker



- Difficulty distinguishing a voice from other voices



- Drowning out of a voice by background sounds



Auditory Anomalies (example subthemes)

- Difficulty focusing on a speaker

If there is one other conversation going on I am sometimes distracted listening to it.

- Difficulty distinguishing a voice from other voices

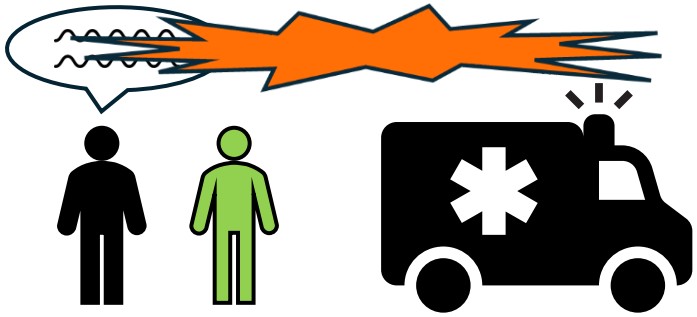
When talking to a person when multiple conversations are happening close-by, i can hardly hear what the person i am talking to is saying.

- Drowning out of a voice by background sounds

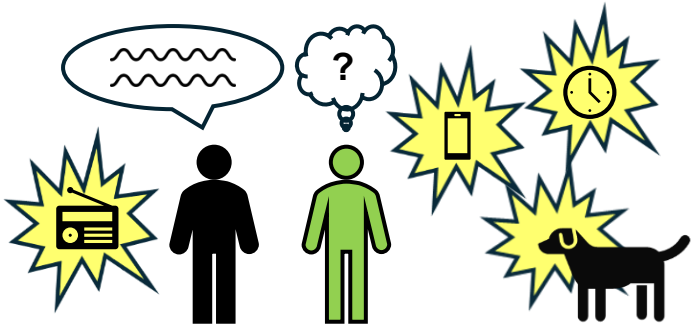
Bars with loud music are a nightmare, I can sometimes barely hear someone talking directly in my ear.

Acoustic Contributing Factors (example subthemes)

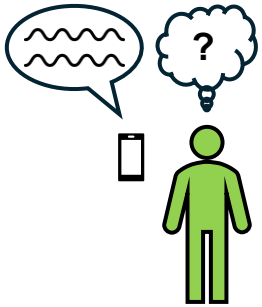
- Loudness of background sounds



- Diversity of background sounds



- Difficulty listening to remote audio



Acoustic Contributing Factors (example subthemes)

- Loudness of background sounds

I find traffic noises the worst to deal with and can not hear someone talking, even if they are standing in front of me, when the traffic is noisy.

- Diversity of background sounds

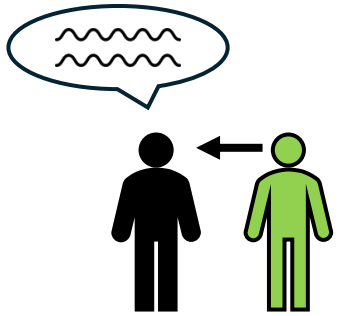
Many low noizes at once like fan, oven, fridge, music etc is difficult to hear what people say.

- Difficulty listening to remote audio

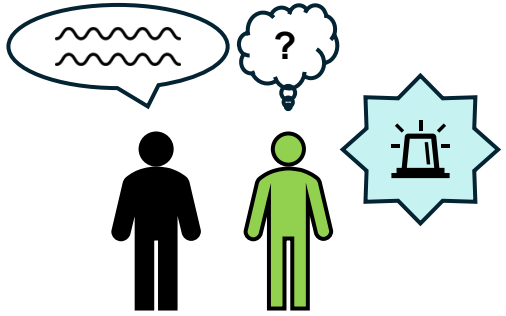
I find the phone difficult, especially if there is background noise on either end.

Non-Acoustic Contributing Factors (example subthemes)

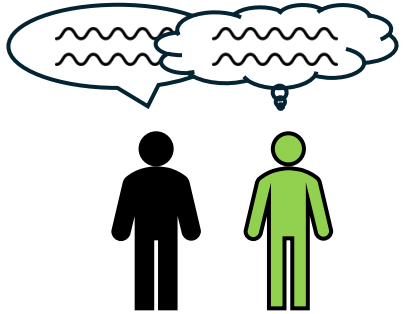
- Visual cues



- Multisensory processing issues



- Cognition and internal state



Non-Acoustic Contributing Factors (example subthemes)

- Visual cues

if someone's trying to start talking to me from behind, if I can't see them start the conversation, I will not pick up that they're talking to me at all.

- Multisensory processing issues

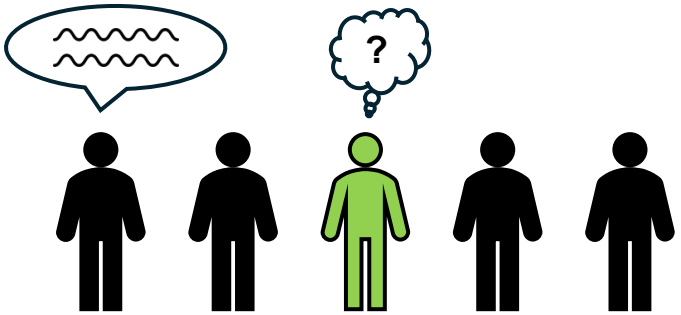
If I have other sensory input happening such as a strong smell or a texture I don't like it makes it very difficult to hear what people are saying.

- Cognition and internal state

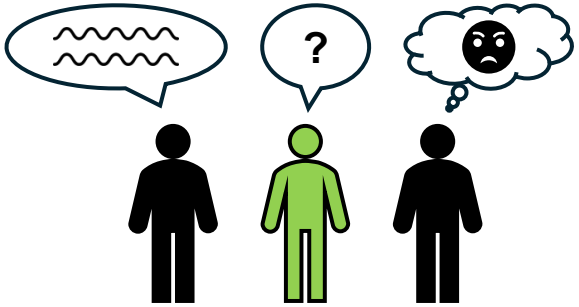
Also harder if I'm preoccupied with something else so may not be giving my full attention.

Compounding Factors (example subthemes)

- Social interaction difficulties



- Lack of understanding of listening difficulties



Compounding Factors (example subthemes)

- Social interaction difficulties

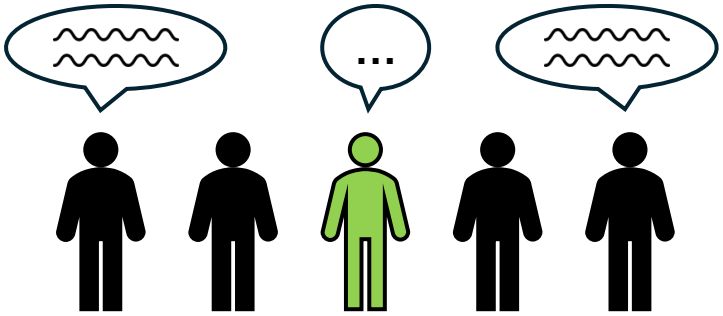
I find it hard to listen in general. Normally I don't feel directly engaged with the person even as I'm listening.

- Lack of understanding of listening difficulties

No one ever talks about how people can have perfect hearing but their brains just don't process it correctly. It's so hard to explain to people.

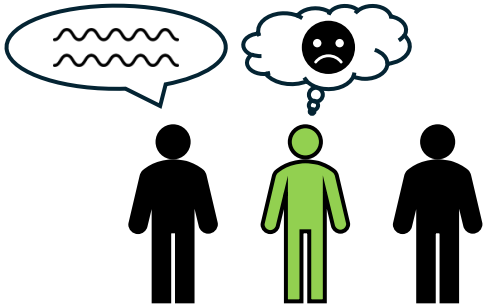
Impact (example subthemes)

- Social participation



- Listening effort and listening-related fatigue

- Emotion



Impact (example subthemes)

- Social participation

…if I were to go to a party, I can't understand people, so I can't effectively socialise, whether I go or not.

- Listening effort and listening-related fatigue

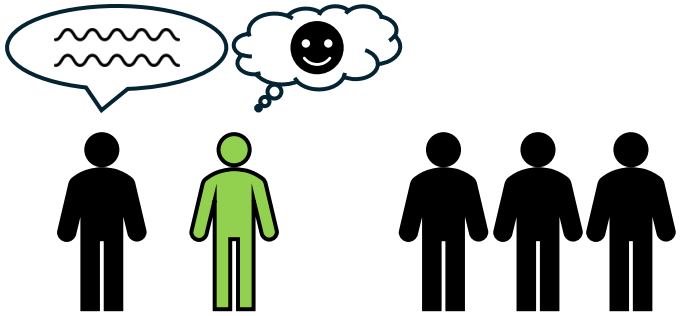
I do feel I have to put in a lot of effort to hear correctly.

- Emotion

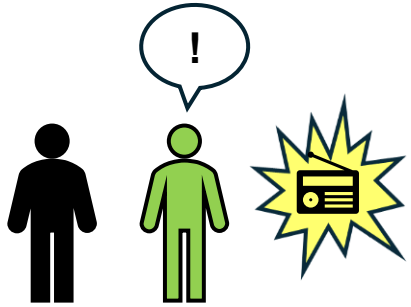
Going to noisy restaurants and malls can cause anxiety because the sounds themselves can feel overwhelming and carrying a conversation feels nearly impossible.

Coping Mechanisms (main concepts)

- Shaping the listening situation



- Disclosing differences



- Requesting and encouraging adaptations

Coping Mechanisms (main concepts)

- Shaping the listening situation

I tend to avoid crowded areas.

- Disclosing differences

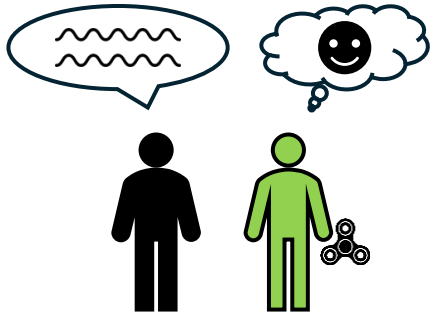
I tell people I can't hear them with the background noise.

- Requesting and encouraging adaptations

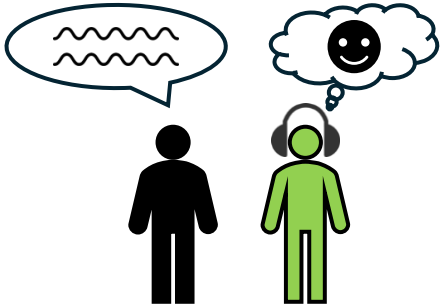
I ask to have the music turned down a bit…

Coping Mechanisms (main concepts)

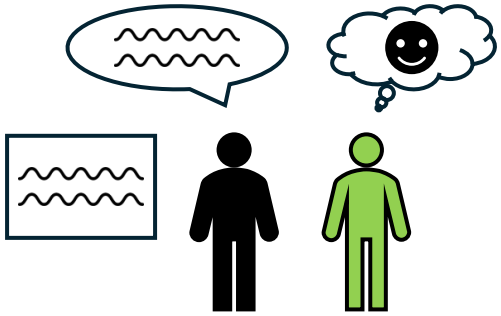
- Using internal strategies



- Using technology



- Using vision



Coping Mechanisms (main concepts)

- Using internal strategies

Have a stim toy… Popularisation has made it easier to have them without standing out…

- Using technology

I use earplugs when in noisy areas, this helps reduce background noise volume but still can hear enough to decipher words…

- Using vision

Using subtitles on films/TV shows/YouTube

Summary

- Autistic individuals' listening difficulties are complex and varied.
- Background conversations in particular can affect autistic individuals' listening comprehension.
- Difficulties with listening comprehension can negatively impact autistic individuals in multiple ways but particularly impacts their ability to socially engage with others and their emotional state.
- Many autistic individual have developed coping strategies for dealing with their listening difficulties on their own.
- After gathering information on these coping strategies, we can provide this guidance back to the autistic community and to professionals to help improve autistic individuals' listening comprehension abilities.