The **Neurodivergent Scale for Interacting with Robots (NSIR)** (Sadownik, 2025) and the research in **"Why Loudness Matters"** (Anikin et al., 2024) intersect in the design and evaluation of social robots, particularly concerning how vocal characteristics like loudness affect the comfort and trust of neurodivergent users.

The application of the NSIR to Anikin's findings centers on the following areas:

1. Predictability vs. Aggression in Vocal Design

Anikin et al. (2024) demonstrate that **loudness** is a primary indicator of physical strength and aggression in vocal communication.

- **NSIR Application:** The NSIR measures **Social Comfort, Trust, and Safety**. If a robot's voice is designed with high loudness levels—which Anikin associates with "vocal intimidation"—it may negatively impact an individual's score on NSIR Item 7 (*"I feel comfortable undressing in front of my robot"*) or Item 8 (*"I believe that my robot is the same with me as it is with anyone"*).
- **Designing for Safety:** Because the NSIR is designed specifically for neurodivergent populations who may have sensory sensitivities, the "loudness-frequency trade-off" identified by Anikin provides a technical blueprint for creating robot voices that avoid sounding aggressive or intimidating.

2. Anthropomorphism and Vocal "Formidability"

Anikin's research highlights how listeners use loudness and pitch to judge the "formidability" and body size of a speaker.

- **NSIR Factor:** The NSIR subscale for **Anthropomorphic Connection/Kinship** tracks how much a user relates to a robot.
- **Kinship through Sound:** If a robot's voice lacks the "honest" indicators of human-like vocal production (e.g., the trade-off between being loud and being low), it may hinder the connection measured by NSIR Item 1 (*"The robot is more like me than anyone else I know"*). Conversely, using Anikin's findings to create "submissive" or "non-threatening" sounds can enhance the sense of kinship for neurodivergent individuals who find human social interaction overwhelming.

3. Sensory Sensitivity and Social Trust

Neurodivergent individuals often experience heightened sensitivity to sensory input, including sound intensity.

- **The Loudness Code:** Anikin argues for a "loudness code" where loud voices are physiologically demanding and evolutionarily significant.
- **NSIR Item 3:** The item *"I think I can share my thinking with the robot without speaking"* suggests a preference for low-pressure communication. By applying Anikin's research, developers can ensure that a robot's vocal output does not trigger the "arousal"

or "unpleasantness" typically associated with high loudness levels, thereby maintaining the **Social Comfort** measured by the NSIR.

Summary: Scale Application

Goal	"Why Loudness Matters" (Anikin et al., 2024)	NSIR (Sadownik, 2025)
Research Focus	How loudness signals strength and aggression.	How robots provide social comfort and trust.
User Impact	High loudness levels can cause physiological arousal and fear.	Sensory-safe interaction is required for social safety.
Design Utility	Provides rules for non-aggressive vocal profiles.	Measures if the robot’s persona is perceived as "safe".
Connection	Establishes the "loudness-frequency trade-off".	Tracks the "Anthropomorphic Connection" resulting from that design.