Music and Emotion in Williams Syndrome

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Introduction

Williams Syndrome (WS) is a rare neurodevelopmental genetic disorder, with an estimated prevalence of 1 in 7,500 live births. Williams Syndrome is present at birth, affects males and females equally, and has been found in all ethnic groups throughout the world. It is characterized by a deletion of about 25 genes on chromosome 7. Of interest to cognitive scientists is the uneven profile of strengths and weaknesses found in their cognitive profile characteristic of WS individuals. In spite of mild to moderate retardation, with full scale IQs of around 55 to 60, a complex pattern of weaknesses and strengths is found in their cognitive abilities. Weaknesses include visuo-spatial skills, conceptual reasoning abilities, and motor control, whereas strengths are seen in linguistic abilities, facial processing, and sociability. Numerous anecdotes exist regarding musical abilities in WS individuals. To understand better the musicality of WS individuals, the present study seeks to examine the production of music in this population. In addition, the excessive social phenotype characterized by this syndrome is analyzed through narratives as it may play a role in how individuals with WS interact in the domain of music.

Questions of Interest

What is the nature and the extent of musicality in the Williams Syndrome population?

a) When describing the way the music makes them feel, do individuals with WS describe their feeling using more evaluative devices than typically developing (TD) individuals?

b) When creating a song on demand, do individuals with WS produce music more quickly and play music for longer periods of time than TD individuals?

Methods for Task 1: Music Elicited Emotional Narrative Task

Participants

- 12 Individuals with WS (Mean age = 14.5 years, SD = 2.7 years).
- 12 Individuals with TD (Mean age = 13.2 years, SD = 1.6 years).

Procedures

- After listening to emotional music, subjects were asked to tell a story about a time when he/she felt the way the music makes him/her feel.

Coding

- Narrative Coding - In addition to the plot, narratives include evaluative information, i.e., the narrator’s interpretation of the events - Reilly Evaluative Coding System (1998)
- Categories of Evaluative devices: General Evaluations, Mental Verbs and States, Emotion States and Verbs, Hedges, Intensifiers/Emphatics, Sound Effects, Character Speech, and Audience Hooks, etc...

Hypothesis

- When creating a narrative in response to emotional music, individuals with WS will describe their feelings with narratives that contain more evaluative devices than TD individuals.

Analysis

- A t-test will be used to see if there are any differences between the two groups, both for Duration and Latency.

Methods for Task 2: Create a Song Task

Participants

- 10 Individuals with WS (Mean age = 17.6 years, SD = 5.9 years).
- 10 Individuals with TD (Mean age = 12.7 years, SD = 0.9 years).

Procedures

- Subjects were asked to create a song that they made up. They could not create a song that they had a choice of either singing or playing 1 of 4 instruments. (keyboard, tambourine, bongo drums, and two egg-shapped shakers)

Coding

- Multimodal Behavioral Coding using ELAN

Hypothesis

- When creating a song on demand, individuals with WS will produce music more quickly than TD individuals.
- WS will play music for longer periods of time compared to TD individuals.

Analysis

- A t-test will be used to see if there are any differences between the two groups, both for Duration and Latency.

Results for Task 2: Create a Song Task*

- Figure 2. When creating a song on demand, individuals with WS produced music more quickly than TD (p < .01). On average, WS individuals were 27.8 seconds faster at producing music than TD.
- Figure 3. When creating a song on demand, individuals with WS produced longer musical pieces than TD (p < .02). On average, WS individuals played 46.9 seconds longer than TD.

Discussion

Individuals with Williams Syndrome reflect a relatively consistent behavioral phenotype that can provide a rare opportunity to explore the relationship between genetics, cognition, and behavior. In task 1, it was found that individuals with WS use more evaluative devices when telling an emotional narrative. In task 2, it was found that individuals with WS were faster to produce music and produced music for longer periods of time. These results suggest that those with WS are engaged with music, and this musicality is a characteristic of the WS phenotype. It could be that their musical responses are related to their sociability and to their “willingness to please” and that their overt social responses to both the narratives and music production task, provide another opportunity to display their social expressivity.

Future Questions

- Are music and language connected? Are there areas in the brain that are activated in both domains?
- Is musicality correlated with sociability? Are WS using music as a way to express their sociability?
- Are their neuro-anatomical links to this musical profile?
- Can music therapy lower anxiety in individuals with WS?
- Can music be used as a teaching tool to improve areas of deficits in individuals with WS?

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References