Measuring the Musical Skills of a Prodigy: A Case Study

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Abstract

While there is a strong interest in and fascination with music prodigies, very few measurements have been conducted on this rare phenomenon and very little empirical data exist. We document the case of LN, an 11-year-old music prodigy. We tested him on his cognitive skills (non-verbal reasoning and working memory), rhythm and melody discrimination skills, sight reading, improvisation, pitch accuracy, and musical memory. The data were then compared to various controls: a group of music students of the same age group (for cognitive and discrimination skills); three university music students with perfect pitch (for pitch accuracy and musical memory); and a music prodigy of similar age who was tested almost one hundred years ago (for pitch accuracy and musical memory). This is the first study that compares the test results of a contemporary music prodigy with the rare data of a prodigy studied in the early 20th century; the results are remarkably similar. LN's results on cognitive skills confirm the exceptional working memory often associated with prodigies. Most interestingly, musical ability results revealed a phenomenal level of melody discrimination, pitch accuracy and musical memory (skills related to auditory pitch memory), but just average rhythm skills, below average sight reading ability and he was not able to improvise. This suggests the potentially important role of exceptional auditory pitch memory in the development of musical prodigies.

1. Introduction

In recent years we have seen a great deal of interest in exceptional young music performers. Music prodigies are regularly featured in the media, from television appearances on popular programs such as *60 Minutes* and *The Ellen DeGeneres Show* to the more than 13,000 results generated from a search for "music prodigy" on *YouTube*, or to over 3000 videos resulting from a more specific search for "child prodigy piano" on *Google*. Less prevalent, however, is scientific research on the specific abilities of these music prodigies, and case studies with empirical data are quite rare.

Although rare, published reports of music prodigies are not new. Barrington (1770) authored a descriptive account of Mozart at eight years old, which included tests for sight reading and improvisation. Barrington's study of Mozart was outlined years later in a science magazine where the author noted the lack of knowledge about the study despite its value: "for it is a rare thing: a scientist's study of an artist" (Tolansky, 1959). However, it is not until the 20th century that investigation, in the tradition of psychological experimental study, on prodigies began. Such is the case with a 1924 report of a young girl whom musical critics called "youthful Paganini," in which Stedman was investigating the most effective method to train prodigies. Much later, Feldman and Goldsmith (1986) followed six prodigies for a period of nearly 10 years through interviews conducted with the young prodigies, their parents, and their teachers.

More recently, McPherson (2007) investigated, over a 3-year period, a talented young pianist who was first interviewed when she was 7. So far, almost all case studies have been descriptive in nature, and papers with quantitative measurements and empirical data are rare. Two early German case studies were among the first psychological studies to look into the prodigy phenomena: Baumgarten (1930) examined nine prodigies including two pianists, two violinists, and one orchestra conductor; Révész (1916/2007) observed and tested the young prodigy Erwin Nyiregyházi from 1910 to 1914 (starting when the boy was 7 years old) and reported his findings in *The Psychology of a Musical Prodigy* (initially published in German in 1916 and translated into English by the author in 1925). We then have to move to the 21st century to find more empirical studies on prodigies. In 2003, Ruthsatz and Detterman (2003) used "a summation approach to investigate the cognitive, musical and practice elements involved in becoming an extraordinary performer" (p. 509) and in 2012, Ruthsatz and Urbach (2012) examined the cognitive and developmental profiles of eight prodigies. Besides the results reported in these recent studies, we have little empirical data on the abilities that characterise music prodigies; while we know they have a good

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