

Why are violin concertos more popular than bassoon concertos? Predicting the popularity of solo instruments in concertos as a function of pitch height and performer pool size

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ABSTRACT

Background

In Western classical music, some instruments are more popular for solo roles than others. What accounts for the differences in popularity? A number of factors might be expected to influence the choice of a solo instrument. Acoustical factors might include the loudness capability of an instrument. Also, in light of the high-voice superiority effect (Marie & Trainor, 2012), instrument tessitura may be important. Some instruments may have a more salient or prominent timbre (Chon, 2013), which could make them preferred for a solo role as they might better attract listeners' attention. Some instruments are rarer than others, so the ease of access to an instrument might also have an impact. In this paper, we test two of these many possible factors; specifically, we predict that the popularity of solo use is related to pitch range and performer pool size.

Aims

In the current study, we seek to predict how frequently various instruments are used in a solo capacity. We hypothesize that an instrument will be attractive for a solo role when it can play a high pitch and when there are many skillful performers available.

Method

Of the many possible ways in which an instrument can be featured in a solo capacity, perhaps the most unambiguous can be found in the case of solo instruments in concertos. Therefore, we endeavor to predict the distribution of instruments used in classical concertos using the two factors identified above.

A simple query of "concerto" on allmusic.com returned several thousand compositions. Many of these pieces have a single solo instrument, some have more than one, and some others do not mention any in the title. After excluding concerto titles that did not specify a solo instrument, such as *Concerto for Orchestra* by Béla Bartók (1943), we ended up with a list of 6,559 concertos. The instruments specified as solo instruments in titles were all tallied.

We narrowed the list to the 18 most popular solo instruments. A multiple regression was carried out on these instruments' popularity in concertos with regard to the highest pitch as an acoustic factor and performer pool size as a social factor. Each instrument's highest playing pitch was obtained from Read (2004). The highest pitch information was converted to midi

numbers for numerical analysis. In terms of the performer pool size, we counted the number of teachers listed in the directory of music faculties in colleges and universities, U.S. and Canada 1992-94. These numbers will not perfectly reflect the number of skilled musicians available, especially when they are restricted to the two North American countries. However, we still elected to use these numbers in the absence of better estimates.

Results

From the 6,559 concertos, 138 unique solo instruments were identified. These solo instruments included some exotic instruments such as didgeridoo, Theremin and zither. Among these 138 instruments were some period instruments, which were ancestors or relatives of a modern instrument, such as chalumeau (related to clarinet) or posthorn (related to French horn). The number of concertos for these related instruments was combined with the number of concertos for more typical modern instruments.

Table 1. 18 most popular solo instruments and the corresponding number of concertos

Instrument	Number of concertos	Highest pitch	Performer pool size
Violin	1894	D8	1191
Piano	1169	C8	4337
Flute	606	D7	976
Cello	597	E6	682
Oboe	436	G [#] 6	557
Clarinet	330	B ^b 6	817
Harp	270	F6	413
Trumpet	263	D6	885
French horn	214	F5	685
Viola	212	A6	670
Organ	175	C7	1127
Bassoon	170	E5	499
Guitar	138	A5	1354
Harp	101	G [#] 7	220
Recorder	96	G6	102
Trombone	95	D5	631
Saxophone (alto)	84	B6	702
Contrabass	58	G4	545

Table 1 lists the target 18 instruments and the corresponding number of concertos featuring each instrument, as well as the highest pitch and the performer pool size. The number of concertos for an instrument (for example, a piano) means that there were 1,894 concertos found featuring a piano as a solo

instrument and not necessarily that these concertos had a solo piano and no other solo instruments. As we can see from Table 1, the most popular solo instruments were violin and piano, which account for 45.9% of the sampled concertos [(1894+1169-52) / 6559; 52 concertos were subtracted because they featured both a violin and a piano as solo instruments].

One might argue that harpsichord is an ancestor of piano, hence the two numbers should have been combined for *piano*, which would be more general of the two instruments, or recorder should have been combined with flute. However, we decided to keep them separate, as harpsichord and recorder are becoming more popular as solo instruments in contemporary concertos.

Multiple regression analysis has been carried out with the dependent variable (DV) of the number of concertos and independent variables (IV) of the highest pitch in midi number and the performer pool size. The model came out to be significant, $F(2, 15) = 7.917, p = .004$. However, when the effect of individual factors was compared, only the highest pitch was significant, $\beta = .531, p = .017$. When combined with the highest pitch, the performer pool size failed to achieve a significant effect, $\beta = .306, p = .144$, even though it was significant when it was the only regression factor, $F(1, 16) = 6.275, p = .023, \beta = .531$.

The reason why the effect of the performer pool size failed to reach significance might come from different assumptions reflected in the numbers. The numbers of concertos for 18 instruments are the numbers of compositions in the genre of classical music. On the other hand, the number of university-level teachers includes both the teachers in classical music as well as those in other genres such as jazz or marching band, which are more popular in U.S. than in any other country. This inclusion of music teachers in other genres might explain why there are so many saxophone teachers, for example, even though it is not considered as one of the traditional orchestral instruments.

Conclusions

In this paper, we aimed to predict the popularity of an instrument for a solo role in concertos in terms of an acoustic factor (highest pitch) and a social factor (performer pool size). The numbers of concertos written for 18 most popular instruments were analyzed using multiple regression with the two factors. Even though the performer pool size alone could explain 28% of the variance in the number of concertos, it was not significant when combined with the highest pitch, which by itself explained 43.7% of the variance. The results are mostly consistent with our hypothesis that an instrument is popular for a solo in concertos when it can play a high pitch and when there are many skilled musicians on it.

There must be other important factors that may explain the solo popularity in concertos that have not been considered in this analysis. For example, we did not consider the historical factor of the instrument age. The violin has been available for a much longer period than a clarinet, for example; hence it is natural to see more concertos featuring a violin solo than a clarinet solo. There also could be the factor of “traditional

practice” that can be summed up as “because that’s the way it’s been done.” This might be related to why the viola was not as popular as the violin although it can play pretty high, its timbre is similar to the violin timbre, and it has been around for as long as the violin has been. It just could have been the standard practice to put a violin in the foreground and the viola in the background that led to less number of viola concertos.

There could be other acoustic factors, such as the loudness capacity or timbre salience of an instrument. An instrument capable of playing loudly will be heard more easily with a polyphonic orchestral texture, which could make it more popular for a solo role. An instrument with a more salient timbre might be preferred for a solo capacity because it tends to stand out of the mixture of concurrent instrument sounds. These factors will be considered in a follow-up study.

The popularity of high-pitch instruments for solo use suggests the importance of the high-voice superiority effect that the auditory stream of higher pitch tends to carry more cognitive importance. Perhaps the human auditory cognition system assigned more importance on higher pitches to begin with, which might have led to a more foreground role for high-pitched instruments that was evident in many concertos written for high-pitched instruments.

Keywords

Concerto, solo popularity, timbre, pitch height, performer pool size.

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