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Relationships Between Instrumental Experience and Sight-Singing Proficiency

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Abstract

The purpose of this descriptive quantitative research study was to investigate the relationship between instrumental experience and sight-singing proficiency. This research was conducted in two phases: a quantitative survey of known high-achieving sight-singers and a comparison of sight-singing proficiency among participants with diverse musical backgrounds. Results indicated that participants with more than one type of previous musical experience might achieve higher sight-singing scores than those with only one type of previous musical experience. Participants with both choral and instrumental experience achieved higher sight-singing scores than participants with only one type of experience. Notably, participants who had taken a music theory course scored higher than participants with any other type of musical background. We discuss implications for future research.

Keywords: Sight-singing, instrumental, music theory

We may define sight-singing as "the ability to conceive with the mind and execute with the voice musical effects indicated by musical notation" at first sight (McNaught, 1899, p. 36). In this research by McNaught, which was published in 1899, the author analyzed the psychology of sight-singing and sought to draw teachers' attention to how the mind processes this skill. Since 1899, sight-singing has continued to be an integral part of music teaching. Many choral contests, festivals, and assessments (Demorest, 2001) now include sight-singing, and some scholars have investigated the use of sight-singing in the instrumental classroom. For example, Rawlins (2005/2006) stated that "singing is the only true test to see if the instrumentalist actually can hear the music [playing] with the mind's ear, without an instrument" (p. 27). Overall, sight-singing instruction remains prominent in our music curriculum today.

Choir students learn to sight-read through different approaches that have been evaluated by various researchers. Some of the most common pattern-based methods for sight-singing are movable-*do* and fixed-*do* solfège approaches, which stem from the original Tonic Sol-fa system (Demorest, 2001). These appear to be the most successful methods due to their usefulness in helping students understand music in a sound-based way (Demorest, 2001). Other systems used for teaching sight-singing strategies include scale-degree numbers and intervallic relationships (Kuehne, 2007). In addition to using a diverse set of strategies, scholars have investigated music teachers' practices regarding materials used for sight-singing instruction and the amount of time devoted to sight-singing during class. Kuehne (2007) indicated that choral directors tend to use method books, self-created exercises, or choral literature to support sight-singing instruction, and may utilize the piano initially but tend to discontinue its use as students become more proficient. Kuehne (2007) noted that sight-singing instruction is taught in most choral classes but generally receives a fairly small portion of the class time (around 5-15 minutes of class time). These results

suggest that while music teachers may view sight-singing instruction as important, may not be afforded a prominent place in some choral classrooms.

Some researchers have investigated demographic factors, including musical background, as an influence on sight-reading achievement (e.g., Daniels, 1986; Mishra, 2014). Mishra (2014) conducted a meta-analysis of 92 studies in which researchers reported a correlation between sight-reading ability and at least one other factor. Mishra grouped variables from these studies ($n = 154$) into 17 larger constructs for analysis. The constructs which showed the strongest correlations with sight-reading ability were those that are generally considered "teachable" and improved with practice. These included improvisational ability, ear-training, technical ability, and musical knowledge. Constructs that are "inherent" or stable, including personality measures, IQ, and music aptitude, were less strongly correlated with sight-reading achievement. Mishra (2014) concluded that sight-reading "should be viewed as a teachable activity" (p. 461) and that improving students' overall musicality may be one way to support their sight-reading success. Specifically, Mishra suggested that activities that aid in improving audiation and predicting musical construction may help develop sight-reading skills.

While Mishra's (2014) study was focused on sight-reading more broadly, Daniels (1986) conducted a more specific focus on sight-singing achievement. Daniels found that factors related to the school environment and students' previous musical experience were more significant predictors of sight-singing success than factors related to the teachers' sight-singing curriculum. Daniels reported that some of the strongest predictors of students' sight-singing scores were the school's demographic characteristics; students were likely to receive higher sight-singing scores if they attended schools that were larger in rural areas and with a predominantly white student body. Additional factors that were significantly related to sight-singing success were those

describing students' overall musical experience, including the percentage of students in a school with a piano at home, the percentage of students with prior instrumental experience, and the percentage of students who participated in an All-State chorus. Although the ethnic makeup of the school was the strongest single predictor of sight-singing success, Daniels (1986) suggested that differences were likely to be more strongly connected to the overall social conditions within a school. Daniels also suggested that the lack of significant relationships between curricular structures and sight-singing scores indicated that methods of sight-singing instruction might have been ineffective. While Daniels's (1986) findings regarding demographics are contrary to those of Mishra (2014), these findings may still support the conclusion that factors related to developing a student's overall musicality (such as prior instrumental experience and access to a piano at home) may be an important part of sight-singing achievement.

Other authors have investigated the use of specific strategies to improve sight-singing achievement. In one such study, McClung (2008) investigated the effectiveness of Curwen hand signs in supporting sight-singing success. In this study, the researcher gave sight-singing tests to high-school choral students who had extensive training in using moveable-*do* solfège with Curwen hand signs. McClung was interested in the effects of using the Curwen hand signs as well as the effects of prior instrumental experience on sight-singing success. After analysis, McClung (2008) concluded that there was no statistically significant difference between students' sight-singing scores when they used Curwen hand signs and when they did not. Similarly, McClung found no statistically significant difference in sight-singing scores between students who had prior instrumental experience and those who did not. McClung (2008) did report, however, that there was a significant interaction between the two variables of interest in this study. Students with previous instrumental experience had significantly higher sight-singing

scores than those without when using the Curwen hand signs. In comparison, students without instrumental experience had significantly higher scores without the use of hand signs than those with instrumental experience. McClung (2008) suggested that these results may stem from differences in kinesthetic inclination between the groups.

Killian and Henry (2005) conducted a broader study of practice strategies that singers use when preparing to sight-read in an audition setting. The researchers observed 200 high-school students at All-State choir camps as they completed a sight-singing examination, with special attention to the strategies that the students used during a 30-second study period. Researchers divided the participants into high-accuracy, medium-accuracy, and low-accuracy groups based on the participants' final sight-singing scores, which allowed the researchers to conduct a variety of comparisons between groups. Practice strategies that distinguished the high-accuracy group of singers included the use of Curwen hand signs, physically keeping a beat, singing aloud during the given practice time, tonicizing the key, and finishing the entire melody within the 30 seconds of practice time (Killian & Henry, 2005). The researchers also investigated differences in background characteristics between the groups. The most prevalent characteristics in the high-accuracy group included membership in a select ensemble (All-State or All-Region), private voice or piano study, instrumental ensemble membership, and regular sight-singing tests in their choir class. Factors that did not differ significantly between the groups included age, gender, years of musical experience, and self-reported daily sight-singing practice in participants' choir classes at school. Killian and Henry (2008) suggested that both rhythmic and tonal awareness and stability may play a role in students' sight-singing success.

Demorest and May (1995) analyzed 414 high school choir members' sight-singing skills in relation to factors such as private musical training, choral experience, melodic exercise

difficulty, and the sight-singing system used. Contrary to findings by Killian and Henry (2008) and Daniels (1986), Demorest and May (1995) reported that years of school choral experience was the strongest predictor of sight-singing success. Similar to Killian and Henry (2008), Demorest and May (1995) concluded that private lessons in piano, voice, or another instrument significantly predicted individual sight-singing success. Demorest and May (1995) further reported that years of instrumental experience was significantly related to sight-singing success. However, they noted that it was not a strong predictor when considered in isolation from other variables in their model. Finally, the researchers reported that students from schools using moveable-*do* solfège received significantly higher sight-singing scores than those using fixed-*do* solfège. However, they noted several other factors that may have accounted for these results. Schools using the fixed-*do* system had more inconsistency in sight-singing instruction, less frequent evaluations, and possibly varying demographic factors compared to those using the moveable-*do* system. Demorest and May (1995) suggested that further research was necessary to examine potential influences on sight-singing success more thoroughly.

Other authors have attempted to measure more discrete skills related to sight-singing achievement. Henry (2011) conducted a study to examine interactions between pitch and rhythm challenges in sight-singing tasks. Henry also noted a trend in the literature indicating that prior instrumental and/or piano experience might influence sight-singing success and included these factors in her analyses. In their study, Henry tested a group of 252 high-school singers on one of three randomly assigned melodies containing specific pitch or rhythm challenges. They concluded that success on rhythmic challenges was significantly affected by the presence of pitch challenges, although the reverse was not true.

Further, participants were overall more successful with challenging pitch tasks than with challenging rhythmic tasks, especially when the two exist concurrently. The author suggested that this result may indicate that singers prioritize pitch tasks over rhythm tasks in sight-singing examples. Henry (2011) also reported that participants who had previous instrumental or piano experience sight-sang more accurately than those who did not. This difference was particularly pronounced for rhythm challenges and for rhythm and pitch challenges encountered simultaneously. Although all subgroups in Henry's study appeared to prioritize pitch over rhythm, these results suggest that participants with different backgrounds may approach sight-singing tasks differently.

In many of the studies reported here, instrumental experience emerged as a notable contributor to sight-singing success. Given these results, it seems likely that instrumental experience may be related to sight-singing achievement. In most cases, however, this was an ancillary finding and not related to the researchers' primary objectives. Perhaps, as a result, many previous researchers have provided scant discussion of these findings, and their implications have been difficult to ascertain. Further, in all cases, participants in previous studies have been identified as singers. To our knowledge, no previous researchers have attempted to examine the relative sight-singing success of musicians with instrumental experience but no concurrent vocal background. Given these gaps in the literature, further research is needed to understand better how instrumental experience may interact with sight-singing achievement. Accordingly, the purpose of this descriptive quantitative research study was to investigate the relationship between instrumental experience and sight-singing proficiency.

Methodology

Phase 1

This research used a two-part descriptive quantitative approach. In the first phase of the study, the first author used a researcher-designed descriptive quantitative survey to gather data from members of the 2018 Florida All-State High School Reading Chorus. This four-part mixed-voice honor choir, which takes place on an annual basis, comprises 100 singers (25 per voice part) from throughout the Florida state who demonstrate exceptional sight-singing skills on the annual All-State Chorus examination. Singers must generally achieve a score of 37 to 40 correctly sung measures (out of 40) on the examination for this ensemble. The choir meets for one weekend in January to sight-read 75 pieces of choral literature in a variety of languages, with no intensive rehearsal of any piece. The choir then performs a concert including a selection of their favorite works from the weekend as well as one completely novel piece that they sight-read on stage.

Students selected for this ensemble on the basis of outstanding sight-singing ability provided an opportunity to investigate the backgrounds and experiences of known high-achieving sight-singers. The first author received permission to distribute an online survey instrument to all students in the 2018 Reading Chorus (in which the first author was also a participant). The survey gathered demographic information, including previous musical experience, information about participants' music literacy background, and other related skills. Participants completed the survey during a break in rehearsals for the Reading Chorus. The survey was completed and returned by 45 members of the ensemble (a 45.45% response rate, excluding the primary researcher).

Phase 2

The second phase of this research was a descriptive quantitative study further to investigate the relationship between musical background and sight-singing proficiency. For this phase, the first author recruited 38 music students from a single high school: 17 students who had taken only vocal music classes, seven students who had taken only instrumental music classes, six students who had taken both instrumental and vocal music classes, and eight students who had taken an AP music theory course which included a strong sight-singing component. Of the students who had taken the music theory course, six also had only instrumental experience, one had only vocal experience, and one had both instrumental and vocal experience. The first author individually administered a sight-singing test to each participant. All tests were conducted in practice rooms at the high school and took place during the participants' normal music class periods or after-school ensemble rehearsals.

During the tests, each participant was asked to sight-serve two excerpts and completed a five-question pitch dictation sample. The pitch dictation sample was not used for analysis, and so the procedure is not described here. Participants also completed a short musical background survey and consent form. To create an effective sight-singing test, the first author modeled the examination after the Florida Vocal Association (FVA) All-State examination (the same test used to select students for the Reading Chorus studied in Phase 1). Participants were given instructions from a modified version of the FVA adjudication script, and the sight-singing excerpts for the test were the Level 1 and Level 2 excerpts from the FVA High School 2011-2012 packet.

To administer the test, the first author followed the FVA sight-singing examination procedure. Each test began with an unscored warm-up exercise, followed by two test exercises at

different difficulty levels. For each exercise, the researcher established the tonality for the exercise by playing a major scale in the appropriate key on the piano as the participant sang along, and then provided the starting pitch for the exercise. Participants were then allowed a short silent study time (10 seconds for the warm-up, 10 seconds for Level 1 and 20 seconds for Level 2), after which the researcher again provided the starting pitch for the exercise. Finally, the researcher asked the participants to sing the exercise and recorded them doing so.

The scoring procedure for this portion of the test replicates the FVA scoring process. Participants received one point for every correct measure sung, with a maximum total score of 16. Points were awarded only for accurately sung pitches and rhythms, with no points for correct contour or other approximations. The first author completed the scoring process during the examination. After each examination, the first author reviewed the recording of that examination to verify scoring accuracy.

Results

For Phase 1 data, we calculated descriptive statistics for each survey item to provide information about the background of participants selected for the 2019 Reading Choir. (Any discrepancies in totals are due to rounding.) Responses indicated that 96% (n=43) of participants had previous instrumental training. Participants generally reported substantial amounts of training in both vocal and instrumental music; 67% (n=30) had had five or more years of instrumental experience, and 80% (n=36) had had five or more years of vocal experience. Among those with instrumental experience, 61% (n=26) were pianists, 23% (n=10) played a string instrument, and 16% (n=7) played a woodwind or brass instrument. No participant reported playing a percussion instrument.

Regarding previous sight-singing instruction and experience, 42% of participants (n=19) indicated that their instructors provided sight-singing instruction only before an external event, such as Music Performance Adjudication events or All-State ensemble auditions. Less than a quarter (22%, n=10) of participants reported that their instructor provided daily sight-singing practice in their classrooms. Slightly more than half of the participants (51%, n=23) indicated that their teachers regularly applied sight-singing skills to learning concert repertoire, and a further 31% (n=14) reported that these skills were applied to concert repertoire somewhat regularly. The majority of participants (64%, n=29) reported that they used a movable-do solfège system for sight-singing. Other common approaches included sight-singing on lyrics (40%, n=18), neutral syllables (31%, n=14), and numbers (24%, n=11). Further, 29% of Phase 1 participants (n=13) self-identified as possessors of absolute pitch (AP).

For Phase 2 data, descriptive statistics revealed that participants who had taken a music theory course had the highest mean sight-singing score (15.13), followed by participants who had both instrumental and vocal experience (9.00), participants with vocal-only backgrounds (6.76), and participants with instrumental-only backgrounds (5.86). To determine whether these differences were statistically significant, we conducted inferential tests to compare sight-singing proficiency scores across the four groups. Preliminary testing revealed violations of assumptions for normality and homogeneity, likely due to the groups' small size. Accordingly, we used a nonparametric Kruskal-Wallis H test for our statistical analysis. Results indicated that there were statistically significant differences between groups ($\chi^2_{(3)} = 17.004, p = 0.001, \eta^2 = 0.412$), and post-hoc testing revealed that participants who had taken the music theory course had statistically significantly higher scores than either vocal-only participants ($p < 0.001$) or

instrumental-only participants ($p=0.003$). There were no other statistically significant differences.

Discussion

The purpose of this descriptive quantitative study was to investigate the relationship between instrumental experience and sight-singing proficiency. Our results suggest that students with both choral and instrumental music experience may achieve higher sight-reading scores than those with only a single type of music experience. In the present study, we were able to support this conclusion through two different modes of examination. First, we found that students with both choral and instrumental experience scored noticeably (although not statistically significantly) higher on a sight-singing examination than students with only one type of experience. In addition, we showed that a strong majority of our sample of known high-achieving sight-singers had both choral and instrumental experience. These results support earlier findings by Henry (2011), Killian and Henry (2005), and McClung (2008), who previously suggested that instrumental music experience might contribute to higher sight-singing scores among vocalists.

Of particular interest is that students who had taken both instrumental and choral classes scored noticeably higher than students who had taken only one or the other. Although this difference was not statistically significant (perhaps due to the small sample size), the magnitude of the difference was relatively high. Students with both instrumental and choral backgrounds scored 48% higher than students with only a choral background and 71% higher than students with only an instrumental background. These results suggest that it is not instrumental

experience that leads to improved sight-singing scores, but a combination of instrumental and choral experiences.

One possible explanation for this (although not substantiated in the present research) is a potential focus on different skills in instrumental and choral sight-reading practices. Vocalists may receive more training than instrumentalists in strategies for managing pitch challenges in sight-singing tasks, such as how to audiate and vocally reproduce notated pitches. Conversely, instrumentalists may be better able to manage rhythmic challenges than those with a vocal-only background; Henry (2011) previously found that singers with instrumental experience were more likely to perform with rhythmic accuracy sight-singing tasks. Although we did not collect specific data on pitch and rhythm accuracy in the present study, it seems possible that the combination of pitch benefits from choral training and rhythmic benefits from instrumental training may result in higher overall sight-singing scores.

Another result of note in the present study was that students taking a music theory course with a strong sight-singing component scored noticeably higher than all other groups and statistically significantly higher than the instrumental-only and vocal-only groups. This is particularly interesting given the other musical backgrounds of students in the music theory group. In addition to the music theory course, six of the eight students in this group had only instrumental experience, and one had only vocal experience; only one student had both. The six students with only instrumental experience who were enrolled in the music theory course had an average score of 15. In contrast, the instrumental-only group in the broader study had an average score of 5.86. Similarly, the one vocal-only student in the theory course scored 15 (compared with an average of 6.76 in the broader study), and the student with both vocal and instrumental experience in the theory course scored 16 (compared with an average of 9.00 in the broader

study). Overall, it seems clear that students in the music theory course scored markedly higher than their backgrounds would otherwise suggest.

There are several possible explanations for this disparity in scores. It is possible that students in the music theory course were older and therefore had more musical training and more experience in sight-reading, which led to their higher scores. Another possible explanation is that students in the music theory course received more regular training in sight-singing than students in the choral or instrumental ensembles. However, these potential explanations contradict Killian and Henry's (2005) findings that neither age nor daily practice resulted in significant differences in sight-singing achievement. Further, our Phase 1 results indicated that only 22% of the high-achieving sight-singers in our sample reported receiving daily sight-singing training in their ensembles, casting further doubt on the idea that additional practice would result in such a large disparity. Another possibility is that students who elect the music theory course are likely to be those who already have high levels of musicianship. We lack the participant data in the present study to thoroughly examine any of these possible explanations. We suggest, however, that it is possible that studying music theory provides students with a more comprehensive understanding of both rhythmic and pitch relationships, creating an effect similar to the combination of choral and instrumental training that we discussed above. This more in-depth understanding of musical structure and relationships may also contribute to students' ability to anticipate musical content and therefore improve sight-singing ability, as suggested by Mishra (2014).

Future researchers may wish to investigate the differences between students with choral and instrumental backgrounds more closely with regard to sight-singing success. While Killian and Henry (2008) previously studied strategies used by sight-singers with and without instrumental experience, all of the participants in their study had previous vocal experience. In

the future, it may be beneficial for researchers to specifically compare the strategies used by students with an instrumental background, students with a choral background, and students with both backgrounds as they prepare for and execute sight-singing tasks. Likewise, it would be helpful to measure sight-singing accuracy among these groups in more detail. Notably, a specific investigation of potential differences in pitch and rhythmic accuracy among the groups would shed further light on possible explanations for the results we have reported here. Finally, it may be helpful to conduct additional research to substantiate further the potential sight-singing benefits of taking a music theory course that we have reported here. If taking a music theory course does improve sight-singing ability, this may provide additional avenues for research into effective pedagogical strategies.

Due to the small scope of the present study, we are unable to draw strong conclusions about the results we have reported here, especially causal ones. As a result, it is difficult to make concrete statements about implications for practice based on these results. More research is needed to investigate further specific differences in the ways that vocalists, instrumentalists, and those with both backgrounds approach sight-singing tasks and possible explanations for score discrepancies between these groups. We do suggest that music teachers may benefit from collaborating with colleagues in different specialties to discuss sight-reading strategies and pedagogy. While sight-singing is often considered a part of choral music, many instrumental ensembles also use sight-singing as an instructional strategy.

Further, the audiation skills used for sight-singing are likely to be valuable in any musical endeavor. Choral teachers may realize benefits by incorporating sight-reading strategies commonly used in instrumental or music theory classes, and vice versa. It may also be beneficial for choral teachers to increase their use of strategies related to rhythmic accuracy and keeping a

steady beat, as recommended by Henry (2011). Finally, music teachers may wish to incorporate more ideas related to musical theory and construction in their teaching to help students better anticipate musical structures and challenges. In general, all music teachers may benefit from encouraging their students to enroll in diverse music courses and include ideas and activities from other traditions in their own courses. Given the results of our research and the findings of previous scholars, it seems apparent that a wide variety of musical experiences is likely to result in the highest levels of student sight-singing success.

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