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**Introduction**

Previous studies have shown that exposure to different types of music can enhance performance on a variety of cognitive tests (Schellenberg et al, 2008) as well as increase focus (Schellenberg et al, 2007). Specifically, it has been suggested that listening to upbeat music can increase focus and productivity. For example, one study demonstrated that undergraduates performed better on IQ subtests after listening to an up-tempo piece of music composed by Mozart in comparison to a slow piece by Albinoni (Schellenberg et al, 2007). Furthermore, it has been suggested that “listening to music facilitates the neurogenesis, the regeneration and repair of cerebral nerves by adjusting the secretion of steroid hormones, ultimately leading to cerebral plasticity” (Fukai, Toyoshima, 2008), which leads to increased ability to focus and be productive. In addition, Rauscher et al. found that listening to a Mozart piano sonata produced significant short-term enhancement of spatial-temporal reasoning in college students (1994). This experiment also demonstrated that listening to ‘repetitive’ music (such as lyrical music with a repetitive chorus) does not enhance reasoning, along with stories on tape. Our objective in this paper was to evaluate whether swing jazz (upbeat music) or cool jazz (low-key, slow music) affects Organic Chemistry students’ ability to focus and be productive during their weekly workshop. We hypothesize that upbeat, swing jazz will increase the students’ abilities to focus and facilitate enhanced learning in comparison to the cool jazz and the no-music control.

**Methods**
In order to test our hypothesis on the effects of different styles of music on the workshop, we decided to pick a somber, mellow type of music in contrast with an upbeat and fast-paced one. We decided to select cool jazz and swing jazz as our two music samples, because we perceived cool jazz to be somber and swing to be upbeat. Other than the “mood” of these two genres, they share similar song lengths and instruments, which makes for a more accurate comparison. Also, these two types of music usually do not have lyrics, and because we believe lyrics to be distracting during workshop, this passed another of our criteria. In order to play this music, we decided to use Pandora internet radio. This program could tailor a playlist to a particular genre, and this allowed for a reliable set of songs in terms of following the genre we had intended. We would also have the ability to skip songs which either would have lyrics or not convey the intended mood.

We then decided to allow one of the radio stations to play for the duration of each workshop, so swing jazz would play for one workshop and then smooth jazz the next week. We decided to have a week where no music was played in order to establish a control. This would allow for the students to appreciate any difference in focus that arose from the music. The three of us played different music stations (or no music) each week. This was an attempt to balance any differences in the workshop material that would be reflected in the students’ evaluations. To analyze these evaluations, we distributed a survey after each workshop. The survey asked the students to rate how focused, relaxed, and productive they felt on a scale from one to ten. The last question asked the students to describe how helpful the music (or no music in the case of the control) was in the workshop. The data could then be analyzed graphically to determine any significant effects of either type of music.

Results
The surveys were then analyzed qualitatively. The number values on each individual survey were added together with other students in each workshop while that particular music was played and averaged to give an overall score for each question with respect to each particular kind of music. We decided to focus on the questions that asked the students to rate focus, productivity, and overall perceived helpfulness. This led to three graphs corresponding to each question. Each graph had three data points signifying the type of music that was played. In terms of ability to focus, swing music carried the highest rating with a 7.50, cool jazz was 7.06, and the control was 6.26. For productivity, cool jazz showed the highest rating at 8.28, swing was 8.16, and the control was 6.84. Finally, the overall perceived helpfulness of each kind of music showed cool jazz with 6.58, swing with 5.75, and the control at 4.61. Each question showed a standard deviation of over 2 units, and each kind of music fell within one standard deviation of each other.

Discussion

The idea that music makes one smarter is not new, and has received considerable attention from scholars. Current interest in associations between music and intelligence stems from various areas of research, one of which is the focus on short-term effects of simple listening to music (Schellenber, 2004). This is often referred to as the “Mozart effect”, which is the finding that “passive listening to music composed by Mozart produces temporary increases in spatial abilities” (Schellenber, 2004).

A very large portion of being able to do well in organic chemistry is about spatial reasoning. In fact, it has been observed that students who have more developed special reasoning skills are more apt to do better in the course. We theorized that while playing some
kind of music in the background may have a significant effect on student learning due to a duel
effect: first the notion of perceived improvement in concentration, and secondly because the
music was potentially enhancing the students’ spatial reasoning abilities. Several studies have
indicated that listening to music, being able to play an instrument, and being able to read sheet
music increases the ability to think in 3D, or “spatial reasoning”. For example, in 1993, Rascher,
Shaw and Ky reported a positive effect of listening to classical music on spatial reasoning. In
another study conducted by Newman et al. 114 students were pretested on items form “the
Raven’s Progressive Matrices-Advanced Form”, and then were instructed to listen to either 8
minutes of Mozart’s music, relaxation instructions, or silence. The subjects were then tested
again. There was a slight increase in performance of the students who had been exposed to the

However, there is no clear consensus regarding this topic. A very large portion of
literature rejects the idea that music enhances any kind of learning. Many studies have found that
music does not have any effect on learning, whatsoever. For example, Steele et al. examined
whether brief exposure to upbeat classical music (Mozart) produced an effect on a backwards
digit span task. In this experiment, 36 undergraduates were exposed to 10-minute period of
upbeat, Mozart music, a recording of rain or just silence. Following each stimulus, the
undergraduates had three attempts to hear and recall different 9-digit strings in reverse order. The
authors found no significant difference between the treatment conditions.

Ultimately, the Mozart effect is very difficult to replicate. Although classical music is
usually used in experiments like ours, we explored whether a more upbeat kind of music would
have an effect (swing jazz), similar to what has been seen with the Mozart Effect. Furthermore,
another goal was to evaluate whether having any kind of music playing in the background would have an effect.

Although the data revealed that background music in general greatly benefits productivity and focus in workshop, many potential sources of error were present in the study. One major source of error was the limitations on the number survey participants. With only 86 students surveyed, the limited number of participants created inaccuracies in the data due to an incomplete reflection of the entire student population. Research error also occurred due to bias from the students toward the type of music playing. Students that enjoy listening to the types of music played in the background were more likely going to report feeling more focused and productive during workshop so that it would continue to be played in future workshops. Another source of error was the variation in difficulty of workshop problems during each session. During weeks with easier workshop questions, students are likely to report feeling more productive and focused regardless of the type of music playing. Finally, error may have been present due to the bias of students to be “good” study participants. Research has demonstrated that subjects are more likely to report answers that support the study that is being conducted; in this case feeling more focused and productive with music playing.

In order to eliminate some of these potential sources of error, careful steps must be taken in future studies. To eliminate the inaccuracies due to the limited number of study participants, surveys could be conducted across the entire class of organic chemistry students rather than a select few workshops. Playing multiple types of upbeat and somber music over the course of multiple workshops could also help to eliminate some of the error caused by subjects’ preferences for certain styles of music. Workshop difficulty can be held more consistent and the week each type of music is played in each workshop could be randomly selected in order to
allow a more accurate study. Also, evaluations of student performance on practice problems could be conducted to support the survey data. Lastly, by not telling the students the subject of the study or hypothesis, student compliance bias to confirm the hypothesis could be eliminated. By reducing error in the research data, a more accurate conclusion regarding the effects of music style on workshop focus can be produced.

References:


Steele, K., Ball, T., Runk, R. “Listening to Mozart Does not enhance backwards digit span Performance”. Perceptual and Motor Skills, 1997, 84, 1179-84.