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The Effects of Odd Time Signatures on Pop Song Enjoyment

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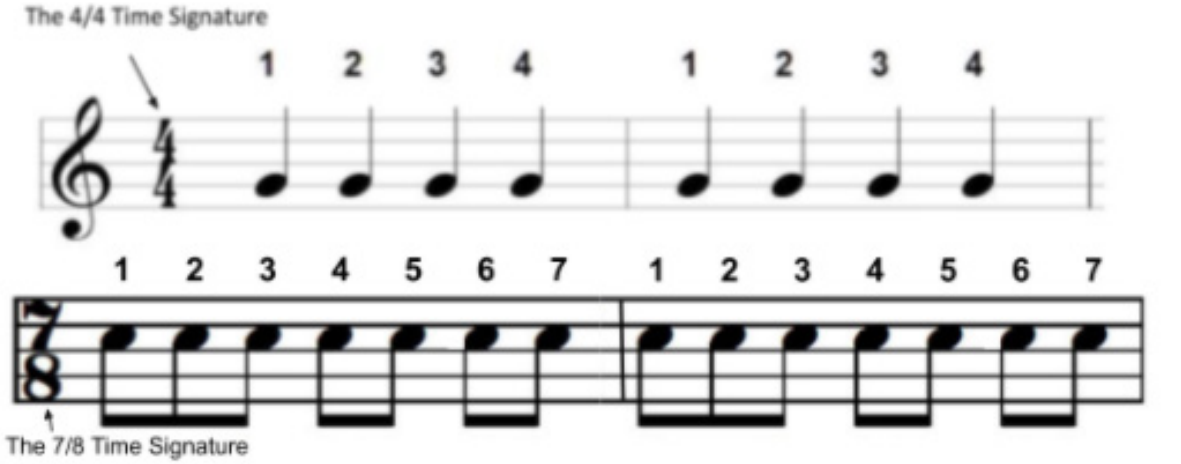
ABSTRACT

Odd time signatures are a music theory concept and are not used often in modern pop music. Additionally, a significant issue of unoriginality is occurring in the modern pop song genre, and very little research has been conducted on time signatures. A study was conducted on how the time signature of a song impacts the enjoyment of a pop song in order to find a solution for artists to improve the quality of their songs. High school music students listened to both previously released pop songs and self-composed variations on a single pop song, rating each song after each listen in order to find this solution. The average enjoyment of all of the ratings of common time signature pop songs were statistically compared to the average enjoyment of all of the ratings of odd time signature pop songs. The previously released pop song segment of the study found that previously released common time signature pop songs were enjoyed significantly more than previously released odd time signature pop songs, but this part may have been subject to dramatic confounding variables. The second part of the study found that there was no significant difference in the average enjoyment of odd time signature variations than the average enjoyment of common time signature variations. These results imply that fans of pop artists would enjoy their songs no less depending on the time signature, and thus pop song artists can increase the originality of their songs by utilizing odd time signatures with almost no consequence.

Introduction

When an artist uses a format of music that works very well once, other artists are bound to replicate that format. Replication of musical ideas leads to unoriginal music, unoriginality leads to boredom, and boredom leads to unenjoyment. This order of events is occurring in the pop music field as musical ideas including chord progression, rhythm, and time signature are constantly used the same ways in almost every pop song (Stack, 2017). Many music listeners have been repelled by this fact, with professional music critics claiming that little talent and effort is required to have a song appear in top music charts as the process can be easily accomplished by just replicating the modern traditional pop format (West, 2019). There are many different concepts of music theory that have yet to be explored and commonly used in modern pop music, one of those being odd time signatures.

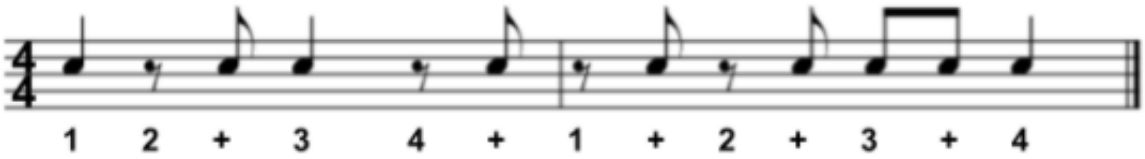
Time signatures provide guidelines that allow players and software to read music easily as seen in Figure 1. Western culture has developed two different forms of time signatures called “common time signatures” and “odd time signatures.” Common time signatures are called such as they have become common in modern music, sound natural to Western listeners, and are easy to bop one’s head to. Common time signatures also sound so natural due to how the human walk-cycle is even and their enormous amount of use throughout Western music history (Galupo, 2009). Oppositely, odd time signatures sound unnatural to Western audiences as they are much less frequently used and can make songs sound as if they skip beats or go on for too long at points. Other cultures use odd time signatures much more frequently in their traditional songs, causing odd time rhythms to come naturally to them (Neely, 2019). Western audiences have not been trained to comprehend odd time signatures as well as common time signatures simply due to their lack of use in Western music history, giving odd time signatures their strange feeling.



Note. Time signatures convey to an individual the amount of beats in a single measure of a song and the length of those beats. In 4/4 time, read "four four time," the first "4" tells the player that there are four beats in a measure, and the second "4," meaning quarter, tells them that the beat is equal to one quarter note. In 7/8 time, read "seven eight time," the "7" tells the player that there are seven beats in each measure, and the "8," meaning eighth, tells them that the beat is equal to one eighth note. The base images used were retrieved from Sussex Guitar Lessons (sussexguitarlessons.com) and Rhythm in Music (rhythm-in-music.com) respectively.

Figure 1. Examples of Time Signatures In Music

Another notable concept of music theory is syncopation, which is depicted in Figure 2. Past research done on syncopation helped catalyze the formation of the research topic of this study. Syncopation is similar to odd time signatures as it can also produce odd sounding rhythms in songs. Also, odd time signatures may even use syncopation in their rhythms depending on how they are structured. To expand further upon the relationship between these two concepts, the general criteria for what is considered "good music" must be defined. When students of varying grades were asked about different topics concerning music enjoyment, most students said "good music" had "fun and exciting" beats while also being catchy (Yackley, 2019). In relation, syncopation is known to increase song enjoyment and catchiness (Witek et. al, 2015). Synthesizing syncopation's effects on song enjoyment with its relationship to odd time signatures engenders one to ponder how odd time signatures could affect song enjoyment, catalyzing the formation of the research question "how do odd time signatures affect pop song enjoyment for high schoolers?"



Note. Syncopation can be seen in this image, occurring with every note with a "+" sign, read "and," under it. The "+" indicates a syncopated rhythm and the "1," "2," "3," and "4" represent even pulses. Syncopation occurs when notes play in between even pulses in a song, or in simpler terms, when one bops their head to the beat of a song and notes play at any time between head bops, syncopated rhythms are present. The base image used was retrieved from Learn to Play Music (http://www.learntoplaymusic.com).

Figure 2. Example of Syncopation In Music

This research topic has a couple reasons why it is important and efficacious. Firstly, the constraints of the question allow for a feasible and relevant study to be performed. Pop song music was specifically selected as since it is one of the most common and popular genres of music in the world, changing it would improve the lives of a large portion of individuals; pop would have one of the biggest impacts on quality of life if changed. High school students were specifically chosen as they are the most facilely accessible population. Also, high school students range from about fourteen to eighteen years of age, which is the age group most likely to enjoy pop music. Amy Watson performed a survey in which she found that in a sample of teenagers, pop music achieved the most votes when the participants were asked which genre of music they would listen to if they could only listen to one for the rest of their lives (2012). Watson also performed a follow up study where she compared favorite music genre and age group, finding that more teenagers said pop music was their favorite music genre compared to any other age group (2020). The issue of pop song originality would most likely affect teenagers and they would be most willing to listen to pop music since pop is most likely to be their favorite genre, solidifying the justification for the two parameters of high schoolers and pop music in the research question. In synthesization, the use of the word "enjoyment" in the research question directly addresses and encompasses the "fun, exciting, and catchy" characteristics that students synonomize with good music (Yackley, 2019). These parameters allow for a focused research topic while not being too specific that a study cannot be performed.

To expand upon its eminence, the research topic also serves to fill a gap in the existing body of knowledge. First, there is a lack of odd time signature research in general. A plethora of databases were searched, using many different keywords, but scarcely any sources on odd time signatures' effects on enjoyment could be found. Most of the sources that had any relation to odd time signatures discussed syncopation and how and why individuals found its use enjoyable. This study will add a source to the catalogue of odd time signature research and help inspire future researchers to add to the catalogue. A second indication of a gap was the lack of experimental and statistical evidence of odd time signatures' effects on song enjoyment in sources that concerned them. Nate Sloan and Charlie Harding claim that the song "Hey Ya!" by Outkast is made more interesting with the use of a technically odd time signature thrown in the middle of a group of common time signatures (2020). The two only state that odd time signatures make songs more interesting to them and thus more enjoyable rather than providing evidence for an increase in enjoyment. Many online music discussion articles declare odd time signatures allow artists to "make incredible and new sounds and songs," but no actual evidence is provided to support this claim (JoyTunes, 2016). These sources simply make unsubstantiated claims about how odd time signatures affect enjoyment of a song. This study will provide actual

experimental and statistical evidence of the effects of odd time signatures on song enjoyment. One final attestation of a gap is the purpose and value of this study. Peter Keller and Emery Schubert discuss in their study on syncopation's effects on catchiness and positive emotions that their results could be used to better structure future studies and music therapy (2011). This study aims to find the relationship between odd time signatures and song enjoyment in order to advise pop artists of an unused music theory concept they could incorporate in their music. A significant gap in the existing body of knowledge surrounding the concept of odd time signatures will be filled with this study.

The possible relationship between odd time signatures and song enjoyment stated above could have considerably different implications based on the results of this study. To understand the differing implications, one must understand the lack of odd time signature use in modern music. The lack of use of odd time signatures may be caused by artists' fear of using them. Odd time signatures can be hard to understand for both fans and artists, causing fans to be alienated from a certain artist's work and artists to be confused while writing a song. This relates to different implications that could be beneficial to the pop music field. If odd time signatures are found to increase song enjoyment, the fears of the artists can be set aside and they can be encouraged to include odd time signatures in their songs. If odd time signatures decrease enjoyability, then the fears of artists will be justified and artists can be wary utilizing odd time signatures. This study is so crucial as its results could heavily influence the direction pop artists explore with their music and an evolution in the pop music genre itself.

Methods

An experimental manipulation without randomization was used to find an answer to the research question. This method consisted of two parts with the second part controlling for the possible confounding variables of the first. At the beginning of the study session, participants were simply told that they would be listening to previously released pop music and self-composed pop music and rating both. The first part was a simulation of how pop music of varying time signatures would chart on a music billboard against each other in a real-world setting. Previously released pop music from the late 2000's to the late 2010's with similar instrumentals and other design elements were chosen in order to ensure odd time signatures were the most prominent difference between the songs. The music was played over built-in speakers in the music rooms they were in. Participants listened to the chorus of each song three times to properly get accustomed to the song and form their full opinion. They then would rate how much they enjoyed each song on a Likert scale in a Google Form and selected which songs were their favorite as secondary, backup data for measuring enjoyment in case the Likert scale results did not provide comparable data. Multiple listens to a song was found to increase song enjoyment, so after rating the songs, participants selected which songs they had heard before participating in this study in the same Google Form to see if previous song exposure skews the data (Madison and Schiölde, 2017). The responses of the participants then filtered into a Google Sheet where models and calculations of the data could be made. This part of the experiment had the possibility of allowing many confounding variables in the music to skew the data, so a second part was performed in order to control for those confounding variables. For the second part of the study, six more songs were included; however, the songs were self-composed and variations on the same song this time. Participants then listened to each composed variation twice and rated how much they enjoyed each one on a Likert scale. Like the first part, they also chose which variations were their favorite. The exact questions asked can be found in Appendices A and B with A containing the questions to the first part and B containing those of the second. The ratings of the self-composed variations were made in a separate Google Form and filtered into a separate Google Sheet than the first part. This method was the best way of answering the research question as with the data gained from the responses given, a direct relationship between time signature of a pop song and song rating could be found, comparing the average ratings of common time signatures to those of odd time signatures and seeing which achieved higher. Since this method was an experiment, causation between time signature and song enjoyability could have been implied respective of the results.

Some specific details should be provided for full understanding of the method. The songs included and their time signature in the first part can be seen in Figure 3. Additionally, the verse of the song "Mountains" was used

instead of the chorus as the chorus was not in 15/16 time. However, the verse has very similar elements to the chorus of the other songs, so using the verse would not cause any differences in enjoyment. Also with "Mountains," the first and second verses had to be stitched together in order to make the song clip the same length as the other clips. For the second part, the songs were written with the application Fl Studio Mobile for mobile devices using the "Grand Piano," "Morphine Orbit Lead," "Picked Bass," "Minimal Kick 55," "FL 707 Snare," and "Attack Shaker 04" instruments in the program to emulate the sound of a modern pop song. There were six variations of a self-composed pop song with varying time signatures, which are depicted in Figure 4. These details were chosen in order to further solidify the relationship between time signature and song enjoyment attempted to be discovered.

Song	Time Signature
3005 by Childish Gambino	4/4 Time
Electric Feel by MGMT	3/4 Time
Run by Joji	6/8 Time
WTF by OK Go	5/4 Time
Bird on the Wing by Sungazer	9/8 Time
Mountains by Biffy Claro	15/16 Time

Figure 3. Previously-Released Pop Songs Used and Their Time Signatures

Version	Time Signature
Variation 1	4/4 Time
Variation 2	3/4 Time
Variation 3	6/8 Time
Variation 4	7/8 Time
Variation 5	11/8 Time
Variation 6	13/8 Time

Figure 4. Versions of Self-Composed Pop Song and Their Time Signatures

Justification of the specific details of the method process must also be made to firmly secure its validity. To begin, the participants were not directly told the purpose of the study as they may feel more inclined to give songs with odd time signatures higher ratings just because they use an odd time signature. Next, previously released songs with similar musical elements and instrumentals were found in order to limit the total possible amount of skewing to the data collected. As stated previously, studies have found other musical ideas could affect song enjoyability, so limiting the amount of elements that could affect enjoyability was crucial. The chorus of songs is one notable possible confounding variable as that section is often where the most catchy part is, thus the chorus of each song was played. Also, the elongation of the "Mountains" clip was done because if the participants had had less time with one song and were thus less accustomed to it, they may have rated it differently. To build upon these ideas, a simulation of the real-world environment was important to the study as real pop songs would not all be structured the same with only their time signature changing. In a non-experimental setting, songs have different dynamics, tempos, keys, etc. that could all affect how much an individual enjoys a song. To note, the ratings of the previously released odd time signature songs may have been subject to skew as they fit more into the rock and jazz genres than the previously released common time signature songs. The population was high schoolers, and teenagers of that age group prefer pop over rock and jazz, which possibly put the odd time signature songs at a disadvantage. However, these songs were the only few songs that had pop influence along with odd time signature use due to the lack of odd time signature pop music delineated above. The real-world simulation would allow relationships between songs of varying time signatures with other differing details and enjoyability to be shown. To continue, the second part used the same instruments, tempo, amount of syncopation, and every other musical concept besides odd time signatures to identify if odd time signatures alone affect song enjoyment. This was done in order to control for all the confounding variables created by the real-world simulation, especially for the fact that the previously released odd time signature songs had more rock and jazz influence than the previously released common time signature songs, which worked in a study concerning syncopation

and the urge to dance (Witek et al., 2016). The two parts work in combination to allow the finding of causation between odd time signatures in a real-world scenario and an experimental scenario.

Participants also all listened to each song the same number of times to ensure that they all had the same experience with each song. If one participant did not get as used to a song as another, they could rate a song lower because they did not get accustomed to it. Furthermore, the second part of the study had the participants listen to each clip twice while the first part had them listen to each clip three times to limit annoyance. The clips played the same phrase of music twice and each clip is a variation of each other. Hearing the same musical idea on repeat could become annoying to participants, so changing the amount of times to listen to the clip limited repetitiveness while still giving participants the chance to determine their true opinion. Participants used five point Likert scales for both parts, ranging from "highly dislike it" (1) to "highly enjoyed it" (5) with the "it" referring to which song they were rating. These scales were formed to limit response possibilities while still giving enough room for participants to choose how they truly felt about each song. Likert scales have been used in previous studies when participants needed to describe the effects on syncopation, and their use allowed researchers to make solid, clear conclusions about their data while still giving their participants freedom to express their feelings (Sioros, 2014). Lastly, the same number of common time signature songs as odd time signature ones were used in each part to be able to allow the participants to have the same amount of exposure to common time signature songs than to odd time signature songs. All of these details serve to strengthen the credibility and efficacy of the main research method.

Now that the method itself has been detailed and justified, justification and explanation of the participant collection process is necessary. The population focused on was music students, so all of the music performance classes at a Northeast Ohio high school were visited to get participants and data. All of the bands directed by one teacher and all of the choirs directed by another teacher were visited on one day, and all of the orchestras directed by one teacher and the remaining band class taught by another teacher were visited the next day. For justification, music students were specifically targeted since their classes often explore odd time signatures, making them more comfortable with hearing odd time signatures than students who rarely experience them. This consequently made participants less biased when rating songs with them as music students were less likely to give negative opinions of songs with odd time signatures just because they cannot understand them. Building upon this, all of the music classes were visited to ensure that every demographic of music students were represented in the data. Music enjoyment may be different based on skill set, dedication to class, and other musical-based factors, so visiting every music class was necessary. Moreover, there is a large number of students participating in the music program at the high school, so this method of participant collecting was guaranteed to provide many data points.

Participant collection and experimentation also followed all necessary and ethical guidelines. The participants had no risk of physical, psychological, social, legal, or economic harm during the study, and the volume of the music was turned to a level that would be comfortable for participants to listen to without damaging their hearing. The songs used either had no swears or were non-explicit versions to avoid violating any individual's morals. Some personal information such as ethnicity, gender, and music class was asked on the Google Form of the first part as certain cultures and classes could influence participant opinion, but no identifying information was asked and no participants were blocked from participating based on personal information. Although every class was visited, participants were still informed that they did not have to participate in the study and could opt out at any point. Participants were not compensated for participation and were informed that they would not be before the study started. Lastly, the high school had specific and safe COVID-19 guidelines due to the COVID-19 Pandemic, so participants were not put at risk of infection for participating in the study. The ethics of this study fittingly conclude the validity and efficacy of this method.

Results and Analysis

Out of all eleven music performance classes, 351 students participated in the first part of the study and 337 students participated in the second part, with a drop off of fourteen students between parts. All students who participated

consented to the study. The teachers of those classes did not make participation a mandatory assignment, so those who did not wish to participate simply did not.

Some unforeseen limitations occurred while conducting the study. Firstly, the speakers in the music rooms had been installed a considerably long time ago and were reaching the end of their lifecycle. This caused them to sound slightly muffled, preventing participants from hearing each song to their full extent. Another variable that affected the overall sound was the lack of a professional pop song artist, making finding and composing songs that truly had pop influence challenging; the true pop genre "sound" was difficult to comprehend without a professional. While data was still able to be compared trustworthily as every song was affected by these variables, the true enjoyment of each song was potentially prevented from being collected as participants could not experience the songs at the best quality. Thus, representation of true pop song enjoyment may be limited.

In addition, the possible song genre and previous song exposure confounding variables may have played a role in influencing the data. Many participants were heard talking about how much they did not enjoy the song "WTF" simply because it sounded similar to a type of band that they do not like, which has nothing to do with the time signature of the song. Furthermore, that song and "Bird on the Wing" sound the least like pop songs out of those chosen, containing heavy rock and jazz influences respectively. These factors can be corresponded to how both songs were the only ones to not achieve an average rating above 3.0 and "WTF" being rated the worst out of all as seen in Figure 5. Moreover, there appears to be correspondence between previous exposure to a song and its average ratings, as seen in Figures 6, 7, and 8. Figure 6 shows "Electric Feel" had the distribution of ratings centered around a value of 4 while Figure 7 shows "WTF" had the distribution of ratings centered around a value of 2. In corroboration, Figure 8 shows that a far greater amount of participants had heard "Electric Feel" than the amount of participants that had heard "WTF." This meant that "Electric Feel" was more accustomed to than "WTF," and the connection could then be made that "Electric Feel" was rated higher than "WTF" as far more participants were used to it. This would follow the findings of Madison and Schiölde addressed previously. Although there is only correspondence displayed in these cases, skepticism towards the first part is justified.

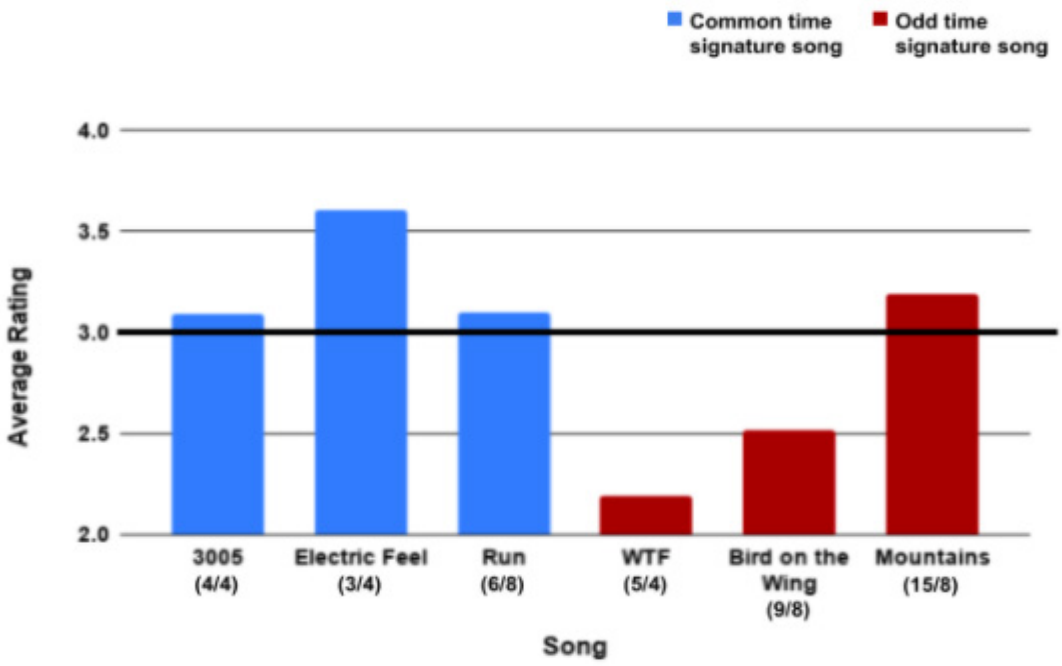


Figure 5. Average Ratings of Previously-Released Pop Songs of Varying Time Signature

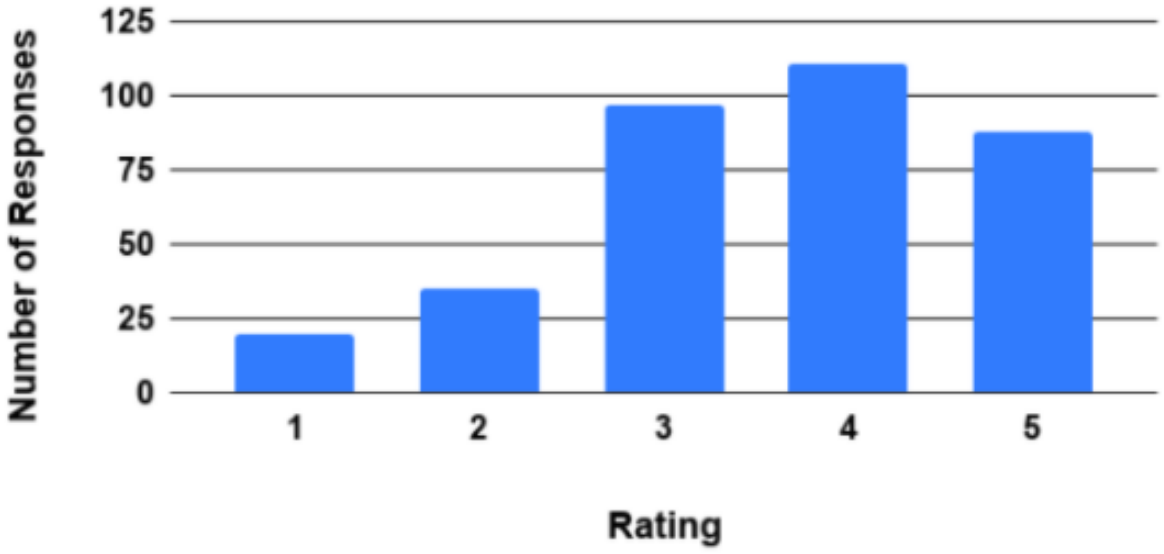


Figure 6. Ratings for "Electric Feel" by MGMT

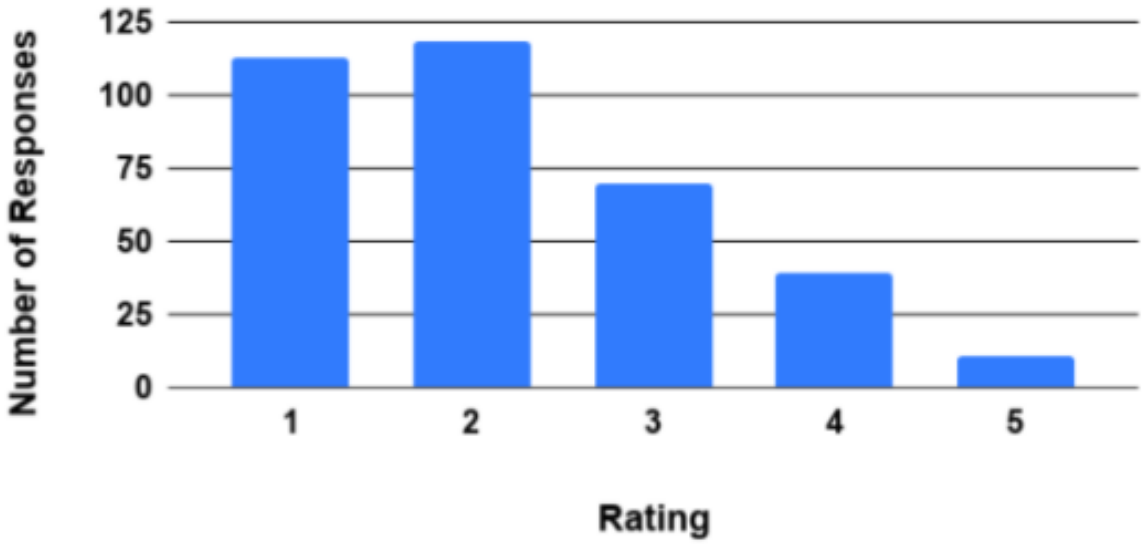
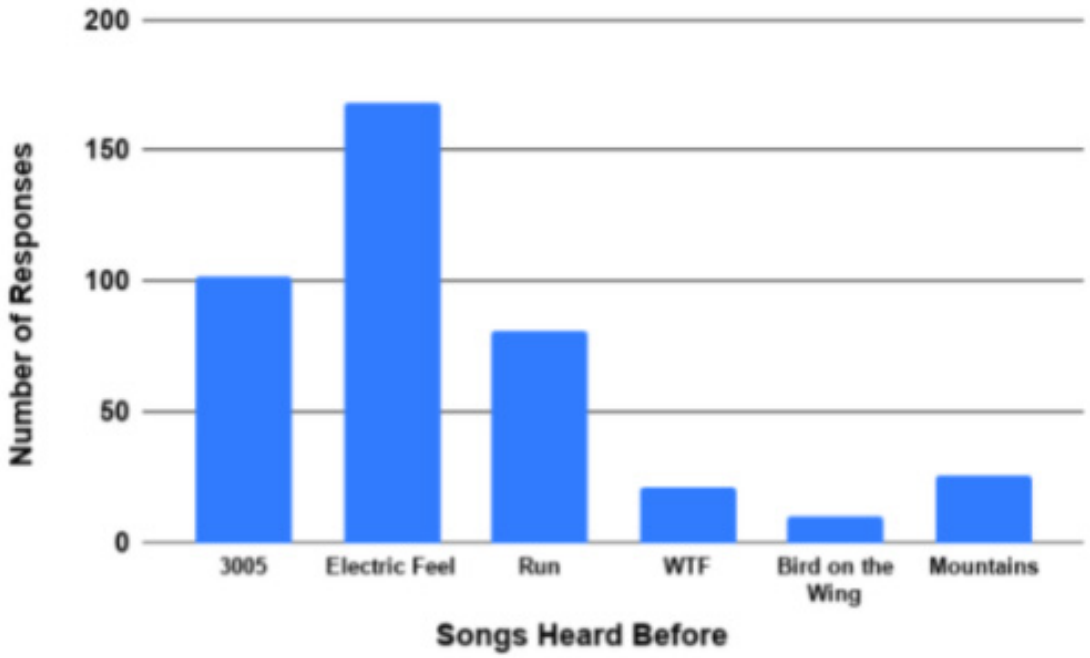


Figure 7. Ratings for "WTF" by OK Go



Note. The total amount of responses to this question in the Google Form does not equal the total amount of responses to the Google Form as this question did not have to be answered if the participants did not hear any of the songs before.

Figure 8. Number of Participants that had Heard Each Song Before

Despite these potential confounding variables, an efficacious study that answered the research question was still performed. Favorite song choice did not need to be analyzed as the Likert scales provided clear, comparable, and understandable results. For both analyses, all of the ratings of common time signature songs were compiled into one sample while all of the ratings of odd time signatures songs were compiled into another as the goal of the study was to compare enjoyment of the whole category of common time signatures to the whole category of odd time signatures, not just individual time signatures. This gave samples one and two of Part One sample sizes of 1053 (351 responses for 3 common time signature songs and 351 responses for 3 odd time signature songs) and samples one and two of Part Two sample sizes of 1011 (337 responses for each 3 common time signature songs and 337 responses for each 3 odd time signature songs). Also, one-tailed and two-tailed t-tests were run for both parts. The two-tailed t-tests were calculated in order to see if there was any difference at all in the average enjoyment of common time signature songs and odd time signature songs, and the one-tailed t-tests were calculated in order to delineate if one average enjoyment was greater than the other. The data and its meaning could now be analyzed from this point.

The most paramount values of part one's analysis were the means of the two samples. The previously-released pop songs of common time signature achieved an average enjoyment of around 3.263 while those of odd time signature achieved an average enjoyment of around 2.633. From these numbers alone, a sizable difference can be noticed. However, the t-test results were needed to see if there was a significant difference. All one and two-tailed t-tests were calculated by the online two sample t-test calculator Usable Stats. The two-tailed t-test stating that the average enjoyment of common time signature songs was unequal to the average enjoyment of odd time signature songs was found to be very statistically significant under an alpha level of .01, $t(2104) = 11.7871$, $p < .00001$. Following initial assumptions, the one-tailed t-test that stated average common time signature song enjoyment was greater than average odd time signature song enjoyment was found to be statistically significant under an alpha value of .01,

t(2104) = 11.7871, p < .00001. This meant that high school music students enjoyed previously-released common time signature pop songs on average more than previously-released odd time signature pop songs, suggesting odd time signatures decrease song enjoyment.

Table 1. Summary Statistics For Previously-Released Pop Song Ratings

Statistics	Previously Released Pop Song Time Signatures	
	Common Time	Odd Time
Mean	3.263	2.633
Median	3	3
Mode	3	2
Range	4	4
Standard Deviation	1.237	1.216
N	1053	1053

The most paramount values of Part Two's analysis were the means and results of the significance tests again. As seen in Table 2, the average enjoyment of self-composed common time signature pop variations was nearly equal to the average enjoyment of self-composed odd time signature pop variations with mean values of around 3.026 and 3.054 respectively. In conjunction, Figure 9 insinuates that time signature may have negligible effect on song enjoyment due to how close the individual average enjoyments of each variation were. Again, t-tests were required to determine if true insignificance existed between the two means. The two-tailed t-test that argued there was a difference in the average enjoyment of common time signature self-composed pop variations and the average enjoyment of odd time signature variations found no statistically significant difference under an alpha value of .1, t(2020) = .5761, p = .5646. Moreover, the one-tailed t-test that argued average self-composed odd time signature enjoyment was greater than average self-composed common time signature enjoyment was also statistically insignificant under an alpha value of .1, t(2020) = .5761, p = .7177. These results meant that high school music students did not enjoy odd time signature pop variations any more than they did common time signature ones, suggesting time signature has no effect on song enjoyment.

Table 2. Summary Statistics For Self-Composed Pop Variation Ratings

Statistics	Self-Composed Pop Songs	
	Common time	Odd Time
Mean	3.026	3.054
Median	3	3
Mode	3	3
Range	4	4
Standard Deviation	1.033	1.200
N	1011	1011

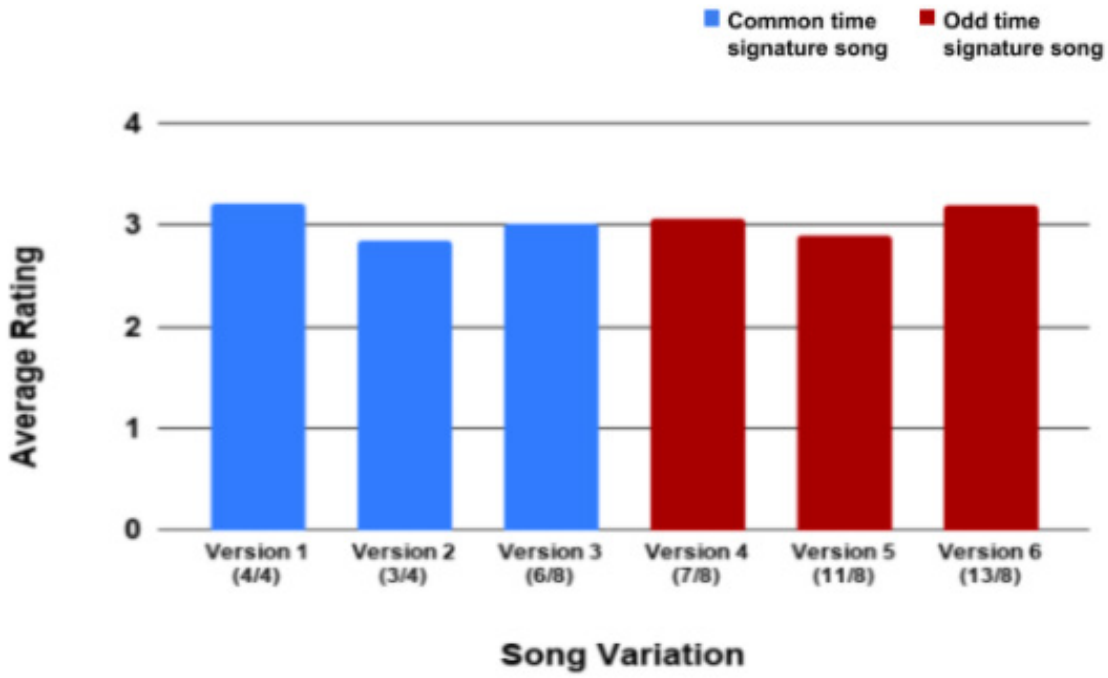


Figure 9. Average Ratings of Self-Composed Pop Variations of Varying Time Signature

A clear issue arose due to the difference in findings between both parts. Due to contrasting conclusions, the second part of the study was prioritized in the formation of the final answer as it has much more credibility than the first. The first part of the study was implemented solely for the real-world simulation, and was subject to many different confounding variables as a result. There is the possibility that many outside influences impacted the opinions of the participants, and there are a myriad more correspondences that can be made with those influences based on patterns in the data, which causes great suspicion in the first part to be logical and justified. The second part was created in order to control for all of these confounding variables, ensuring that time signature was the only variable that could

affect participant opinion. Hence, the second part is logically more trustworthy and relevant to the research question. Synthesizing this data together, the main finding can be developed with focus being directed mostly to the second part of the study. Therefore, the main finding of this analysis and the answer to the research question is that time signature likely has no significant impact on song enjoyment. However, the results of the first part of the study may be indicative of something, and they should not be disregarded entirely.

This conclusion can be generalized to the overall population and a greater population as well. Responses from every single music class were collected as the total number of responses increased after each class was visited. This meant every musical demographic was represented in the population and the results could thus be generalized to the entire high school music student population. Next, the finding could be generalized to the general public as this phenomenon does not occur just because of the specific population targeted. Music students were only chosen in case non-music students had an automatic bias towards the common time signature songs, but this has never been proven true. Additionally, the general public could become more and more familiar with odd time signature music through more exposure if they are, in fact, uncomfortable with it at first. So although the general public may prefer common time signatures over odd ones out of comfort, their average enjoyment would produce more similar results to this study the more they listened to odd time signature music. Lastly, the means calculated should be fairly close to the true population means due to the sample's large size. Thus, the sample size provides strong justification for generalization to the general public.

Conclusion

As discussed previously, this study initially aimed to help improve the enjoyment of pop music. However, due to unexpected results, the implications have shifted to a different focus. These results have implications for how no fan alienation promotes originality rather than the initial aim to have changing song enjoyment invalidate or validate the fear of fan alienation. Thus, the main finding of this research has appreciable implications in the real world regarding the pop genre and its perspectives.

Firstly, the results conveyed that there was no significant difference between teenagers' enjoyment of common time signatures versus odd time signatures in pop music, meaning that when the time signature of a song is changed, the song would achieve about the same reception when using an odd time signature as when using a common one. Since the results indicate odd time signatures do not affect pop song enjoyment in comparison to common time signatures, the assumption can be made that artists altering the time signature of their song will make their fans enjoy it no more or less. Therefore, artists do not have to fear alienating their fans when changing their songs' time signatures. Moreover, the lack of fear of fan alienation encourages artists to explore their creativity when composing. One of the most relevant details in odd time signature research is that a minute amount of pop songs utilize odd time signatures, which transmits the message that pop music is unoriginal by using solely common time signatures. Including odd time signatures in pop music would break away from the normal composition of pop songs, thus making songs more original. Since the results found that changing the time signature would not alienate fans, pop artists can utilize odd time signatures in their music without worrying about composing more original music at the expense of their fans' enjoyment; artists can explore the realm of odd time signatures with seemingly no consequences.

Additionally, the limitations and the gap filled culminate to suggest implications for future research. A reinforcement study with help from a professional in pop music structure with more high-quality instruments is obviously needed as a result of the myriad of confounding variables in the first part of the method. This would allow the previously released music to be determined by an individual who specializes in the true sound of pop, allowing that individual to compose music that sounds drastically more similar to actual pop music and preventing automatic participant bias. These amendments would also help settle the dispute between the results of both parts and affirm if changing the time signature was truly the variable having an influence on song enjoyment. The effects of time signature on memorability and emotions could be tested too as they could be used as representations of enjoyment. Catchiness, how

memorable a song is after listening, is often considered a positive characteristic as worthwhile things are often memorable. Emotion could also represent enjoyment because if a song makes one happy, then they likely would enjoy it since happiness is a positive emotion. Lastly, music is something many people rely on for stress relief, recreation, and other purposes, so improving its quality would serve to deeply benefit society. The value of this research may encourage more studies to be conducted for the purpose of improving the quality of music, bringing more focus on improving the quality of life for many individuals. While there are many detriments in the method process that restrict the trustworthiness of this study, the results remain highly indicative and should be considered.

As the most popular music genre in the world, pop has a meaningful impact on many people. In relation, many people use music as an escape to improve their emotions (Papinczak et al., 2015). Change in time signature causing no change in enjoyment suggests that artists may be able to improve the originality, and thus quality of their songs, with the use of odd time signatures. Therefore, pop music needs to be made of utmost quality to enrich the lives of many across the world, and odd time signatures may serve as a catalyst to improve that quality.

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