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Master Thesis
June 2020

# Advertising and Music: A Commercial Marriage?

**Abstract:**

*The aim of this thesis is to explore whether artists benefit in terms of attention from having their music featured in commercials.* The research follows a quasi-experimental research design and the main method of analysis takes the form of a short-interrupted time series. *The data for the advertisements is collected from two main sources: (1) all Super Bowl 2020 TV commercials which contained a commercially available song; and (2) All TV commercials from brands that appeared on the Forbes Most Valuable Brands of 2019 list, which also contained a commercially available song. The data for attention towards an artist is measured as daily evolution of Spotify monthly listeners obtained from the music marketing analytics tool Soundcharts. In order to assess whether the advertisement affected the attention the time series was divided into a pre and post period with release date of the advertisement serving as the interruptive element. The research design consisted of two complementary statistical methods: (1) an OLS regression based on the differences times series and (2) an OLS regression analysis based on the analysis of the residuals. This study has found that that in general featuring music in a commercial that is related to a Most Valuable Brand, classified as 'regular', has a more positive outcome on the attention towards an artist, than featuring music in a mass advertising event such as the Super Bowl. It was also shown that with regards to popularity, less popular artists benefit more in terms of attention if the advertisement is released in an independent way and more popular artist profit from mass promoted events. The findings enhance our knowledge of the relationship between advertising and music, and the study has thrown up many questions in need of further investigation. The insights provided may be useful for both artists and advertisers, not only from the creative point of view but also the more economic and business side.*

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# Introduction

If an advertisement is the cake, then the music used in it, is the cherry on top. The question is, if you ate the cake would you remember the cherry? While at first this sounds quite absurd it is something worth pondering about when seeing a commercial with a song in it. Traditionally advertisements focus on the advertised product, but what if the song that is used in the advertisement has retained in the memory of the consumer and he decides to look up the song and listen to the respective artist?

An extraordinary case that often serves as the framework of reference in which the featuring of a particular song or multiple songs in advertisement clearly affected the popularity of the artist, is when Moby licenced his whole 1999 album Play, a total of 18 tracks to be used in a large amount of TV and Radio commercials. At that time Moby was a fairly unnoticed artist with minimum amount of airplay and exposure, which drastically changed after his songs appeared in TV commercials of brands like Volkswagen, Nissan, Nordstrom. As his songs were widely distributed in several commercials he gathered enough attention to become a multi-platinum selling artist and cash in for about one million dollars (Klein, 2009; Taylor, 2012). This instance was considered for other artist to be exemplary of the beneficial opportunities that are involved in having your music featured in advertisements, (Taylor, 2012) yet in general much uncertainty still exists whether artist benefit from this.

The aim of this thesis is therefore to assess whether artists benefit in terms of attention from having their music featured in commercials. The research follows a quasi-experimental research design and as statistical method a short-interrupted times series analysis will be carried out. By comparing the attention towards an artist in the period before the release of the advertisement, with the period after the release it would be possible to assess whether the advertisement had effect on the attention towards the artist.

The research data in this thesis is drawn from three main sources: (1) The attention towards an artist is measured as the daily evolution of Spotify monthly listeners. Data for the advertisements was collected using: (2) all Super Bowl 2020 TV Commercials which contained a commercially available song; and (3) All TV commercials from brands that

appeared on the Forbes Most Valuable Brands of 2019 list, which also contained a commercially available song.

It is expected that mainly due to informational cascades, the attention towards the artist will increase after the release of the commercial. By investigating this largely unexplored area it will provide an opportunity to advance our knowledge in this exciting field of research.

The thesis has been organized in the following manner. The first chapter will summarize and discuss the literature that provided the theoretical points of departure. Chapter two is concerned with defining the research design of this study. In this chapter the approach for data collection and the justification of the overall methodology for each respective sample will be explained. The thesis will then move on to presenting and interpreting the results of the statistical analysis. The final two chapters draw upon the entire thesis with a discussion and will end with some concluding remarks.

# Theoretical Framework

## Advertising and Music: A new Venue?

What we know about advertising and music is largely based upon empirical studies that investigate the effect of music on the success of the advertisement and there seems to be a general consensus that the appropriate music can positively influence the effect of the advertisements (Allan, 2006, 2008; Alpert, Alpert, & Maltz, 2005; Gorn, 1982; Huron, 1989; Kellaris, Cox, & Cox, 1993; Oakes, 2007; Yalch, 1991; Zander, 2006). Yet not only does music aid the advertisement, it turn out to be an essential part of the total creative process of an advertisement (Allan, 2006; Gorn, 1982; Kellaris et al., 1993; Yalch, 1991).

David Huron (1989) identified six manners in which music supports advertising, namely 1) entertainment, 2) structure/continuity, 3) memorability 4) lyrical language, 5) targeting, and 6) authority. Traditionally the musical additions in advertisements were specifically written

for the advertisement and defined as jingles. Described as a phonetical combination of the used music and verbal information, these jingles functioned as a mean to create a fun, positive and most importantly catchy image of the advertised product (Kellaris et al., 1993; Oakes, 2007; Yalch, 1991).

In addition, Gail Tom (1990) identified that between songs that are specifically written for the advertisement and songs that are borrowed from popular artists, it seems that specifically written songs have more effect on brand memorability. This view is supported by Oakes (2007, p. 45) who put forward that "music and brand information are interconnected in advertising jingles because the lyrics form an integral part of the musical composition". A notable example of a jingle that holds this interconnection of brand and music is the exemplary McDonalds jingle. Every advertisement ends with the characteristic words I'm loving it preceded by the equally characteristic music and words. The music and the respective words enhance the full advertisement effect for the brand and this so to say 'full package' is inseparable from the brand.

Conversely Allan (2008) identified that current developments concerning music placement in advertising show that there is an increase in popular music placement rather than specifically written jingles. It is important to notify the time frame prominence of this this study in comparison to the other studies mentioned before as it shows the increased influence of popular music in the commercial oriented field. Rather than creating an original song specifically for the ad, popular music is selected in accordance to what is appropriate (Hecker, 1984; Zander, 2006). The evidence of such musical fit Zander (2006, p. 468) clearly explains with the example of a car commercial. When rock music is used is used the commercial most likely will conceive the message of "power, speed and competitiveness" whereas classical music will symbolize "interior trim, luxury and elegance". All together this shows that while at first using a jingle was the most used method by advertisers in adding music to advertisements, the increased influence of popular music generated a paradigm shift where advertisers became more inclined using a popular song.

However, a major problem with the majority of these studies is they treat music as an auxiliary component of the advertisement and analysis is performed at a one way level,

meaning they investigate the effect of music on the success of the advertisement and not the other way around. The next section will therefore review the relationship between advertising and popular music from the perspective of the artist.

## Selling Out? Or Cashing in?

Theodor Adorno (1944, p. 25) famously wrote that "advertising and the culture industry merge technically as well as economically" and an often cited source within the field of advertising and music that supports this view is the news article of Valerie Block ( 2003) named "Death of the Advertising Jingle". In this article Block (2003) argues that there is a form of positive reciprocity between advertising and music placement, meaning that they both benefit from each other. However there appears to be a general consensus among musicians and other artist about the of artistic integrity, which is manifested in condemning this idea of selling out to the commercial industries (Allan, 2005, 2008; Klein, Meier, & Powers, 2017). As music made its infamous boom to mass popularity in the 60s, many advertisement executives were aiming at making use of popular songs in the advertisements in order to boost their brand and effectively reach the youth (Brabec & Brabec, 2011; Klein et al., 2017; Ogden, Ogden, & Long, 2011; Taylor, 2012). A well noted example was when the American car manufacturer Buick approached the iconic counterculture band The Doors to use 'Light my Fire" in a car commercial. Lead singer Jim Morrison became infuriated and he promised he would smash the car on television (Patton, 2002). While the condemning sentiment of selling out was very present among many bands during these times, there is strong evidence that over the years this changed to a rather more positive attitude towards licensing their music in advertisements (Klein et al., 2017). According to Klein et al. (2017) it seems that the initial shame and denouncing of breaching artistic integrity has made way for a celebration of the career enhancing possibilities that advertising holds.

In his seminal book on music use in advertising Taylor (2012) draws upon an extensive range of sources to show that there is a very clear development in the use of popular music in advertising. Taylor (2012) identified that starting from the 1960s there has been an increased interest in placing music in advertising, having its epitome during 1980s with the boom of the Music Television (MTV) and the portable stereo devices. This increased interest

in placing music in advertisements is associated with what appears to be a sudden realization of artists that licensing your music in an advertisement can enhance your popularity in two different ways. According to Allan (2008) one benefit of licensing music to ads is a redesign of securing your royalties for which it has been proved that fees could go as high as over 1 million dollars for the licensing of a single song (Brabec & Brabec, 2011). Yet more importantly Allan (2008, p. 406) points out that "the widespread and repeated exposure of commercials provides either for revival of or new interest in the particular songs and/or artists featured" which serves as a useful theoretical point of departure that artist could profit from advertisements.

With regards to a popularity revival of a deceased artist a well noted example is when Volkswagen used the song Pink Moon from the late Nick Drake for their 2000 Tv commercial. In his short-lived career Nick Drake did reach much fame and fortune, which after his death also did not happen until his music was used in the Volkswagen Commercial. The sales for Drake his 1972 album increased with 600% and so to speak a dead artist was brought back to life (Morris, 1998).

Conversely, extensive academic discourse has identified that markets such as the music industry, are dominated by a handful of superstars who through a combination of excessive talent, pure luck and bandwagon effect have acquired fame and fortune whereby most of the attention is focused on them (Adler, 1985; H.Leibenstein, 1950; Rosen, 1981). According to Ohanian(1991) the use of superstars in advertising, significantly benefits attention, which suggest that advertisers will most likely license the songs of well established artists rather than smaller bands. This is illustrated with Pepsi who consequently licenced huge superstars such as Madonna, Michael Jackson and Britney Spears, to appear In their commercials and use their songs which Taylor (2012, p. 190) refers to as the "show businessization of the advertising industry".

Khatri (2006) on the other hand put forward that licencing superstars does create a buzz surrounding the brand, but the success is related to strategic positioning rather than focusing on who is the most popular which is confirmed with the example of Nick Drake and Moby. The main difference lies in the fact that almost all consumers are familiar with

Superstars, whereas not all consumers are familiar with smaller artist such as Moby and Nick Drake. For smaller artists that are featured in a successful campaign the effect on their attention could therefore be higher than for Superstars that are licenced for a campaign.

While both examples of Moby and Nick Drake seem to indicate that artist can profit from letting their music appear in advertisements, the generalisability of this issue is problematic as a one or several exemplary cases are not representative for other artists that licence their music to commercials. It is currently hard to avoid advertisements that do not contain a commercially available song, yet it seems that not every song that appears in an ad, increases in sales by 600% or becomes multi-platinum.

## Informational Cascades

There are two important factors that play a role in generating attention after the commercials have been released. The first factor is the most obvious were somebody after seeing a commercial with a song, decided to look up the song and started listening to it. In theory this could happen at any time, within the time frame that the advertisement campaign runs. It is possible that the one might not come across the commercial until the last day of the campaign, and still at that point like to song that is used, and hen start listening to it.

The second factor involves the informational cascades which is a useful phenomenon, commonly prescribed in network theory to explain mass behaviour. According to Bikhchandani, Hirshleifer, and Welch, (1992, p. 994) an informational cascades develops when the "private information" is ignored and decisions are based on "the behaviour of the preceding individual without regard to his own information".

With the examples of Moby and Nick Drake, it is unlikely that their success is caused solely by the people have seen the commercial. People who saw the commercial, and on a personal account were triggered to provide attention to the artist, could influence other people who have not seen the commercial, to listen to the artist and therefore triggering an information cascade (Bikhchandani et al., 1992). For example, after the song Pink Moon of

Nick Drake appeared in the Volkswagen Commercial the sales of the song increased with 600% and people started to notice it. It could very well be that Nick Drake's sudden appearance in the charts triggered other people to listen to him, even if they have not seen the respective commercial. The decision to listen to the song is therefore based on the decision previously made by others and hence ignoring the personal information which in this case refers to actually seeing the commercial.

## Super bowl and Most Valuable Brands

The Super Bowl is considered to be the largest and most watched sports event in the world and is seen by advertisers as their holy grail. With millions of people watching at the same it is their chance to effectively persuade them and results in millions of dollars spent by brands to have their advertisements shown during the intermissions (Yelkur, Tomkovick, & Traczyk, 2004). The output of commercials is very concentrated and is mostly decided on who has the most financial means to actually have a commercial during the event, which is not entirely different from markets that are dominated by Superstars (Rosen, 1981, p. 847). Research has identified that since 1990 the price of a 30 seconds commercial during the peak of the event has skyrocketed to an astronomical price of 2,3 million dollars (Tomkovick, Yelkur, & Christians, 2001). Yet these high prices do not scare of advertisers as the hundreds of millions of people that watch the event, fully outweigh the risks of not earning the money back (Tomkovick et al., 2001; Yelkur et al., 2004).  Considering  the fact that the presence of music in advertisement serves as a stimulus to grasp the attention for consumers towards the advertised product (Allan, 2008) it is highly presumable that advertisers in the Super Bowl will use music as well. With millions of people watching it is fairly logical to assume that advertisers will not hold back in means to create the best possible most engaging commercial and therefore use music.  Even if a small percentage of the millions of people watching, starts to listen to the artist after the event, it could trigger an informational cascade. Therefore, the combination of millions of people watching at the same time and the additional strong focus on advertising, makes the Super Bowl an interesting event to analyse trough the scope of the proposed research question.

The Forbes list for the World Most Valuable Brands (Forbes, 2020) features the top 100 brands ranked on their valuation. Brands such as Pepsi, Nike and Apple are featured om this list and are considered to have long history with popular music general (Klein, 2009). Yet it is fact that practically all brands in the list are globally known, and if a brand is globally known, it is almost certain that advertising played a role.

## Hypotheses

Overall the studies presented so far provide a clear indication there is a relationship between advertising and music. As mentioned before this thesis will investigate this by analysing all Super bowl 2020 TV Commercials which contained a commercially available song; and all TV commercials from brands that appeared on the Forbes Most Valuable Brands of 2019 which contained a commercially available song. Therefore, in view of all that has been mentioned, it leads to following operational hypotheses

**Research Question:** *Do artists benefit in terms of attention from having their music featured in commercials?*

**Hypothesis 1:** *Artists who had their music featured in commercials that aired during the 2020 Super Bowl, have profited in terms of attention after the Super Bowl, measured in evolution of Spotify listeners.*

**Hypothesis 2:** : *Less popular artists who have their music featured in commercials that appeared on the Super Bowl, benefit relatively more in attention, in comparison to more popular artists, measured in evolution of Spotify listeners*

**Hypothesis 3:** *Artists who had their music featured in commercials of brands that appeared on the Forbes Most Valuable Brands of 2019, have profited in terms of attention after the commercial has aired, measured in evolution of Spotify listeners*

**Hypothesis 4:** *Less popular artists who had their music featured in commercials that are related to a Most Valuable Brand, benefit relatively more in attention, in comparison to more popular artists, measured in evolution of Spotify listeners*

# Methods

## General Research Design

The study uses a quasi- experimental research design where a quantitative analysis approach is employed as an approach to quantify a certain behaviour and therefore generalize the results on a larger population. By quantifying the attention towards songs before and after they were featured in an advertisement it is possible to effectively answer the research question whether the inclusion of music in advertisements has effect on the attention of the artist.

The main method of analysis to asses this this relationship takes the form of a short-interrupted time series and the model is prepared according to the procedure used by, William Shedish, Thomas Cook and Donald Campbell (2002) which is illustrated in Table 1 below. Here T refers to the day of treatment or intervention, and t – n the data observation points before and after the intervention,

**Table 1: Basic model of short interrupted time series where T= 0 is day of treatment**

| t - 4 | t-3 | t-2 | t-1 | T=0 | t+1 | t+2 | t+3 | t+4 | t+5 |
|-------|-----|-----|-----|-----|-----|-----|-----|-----|-----|

There are several reasons why this particular method is chosen and to better understand the chosen method is it necessary explain the 3 main elements it consists of, which are (1) Time series (2) Short and (3) Interrupted

Times series is defined as a "time oriented or chronological sequence of observations on a variable of interest" (Montgomery, Jennings, & Kulahci, 2008, p. 2). It applies well on the research proposed in this study as the variables of interest that are researched in this study

are time related and/or appear in certain sequence. Both attention towards the artist and advertisements are time-oriented variables as they rely on specific factors that appear over time. For instance, attention to an artist can increase at the release of a new album or announcing a new tour, and the strategy behind releasing an advertisement involves the investigation when is should be released and how low the campaign should be. Generally speaking times series analysis involve data collection over a long time period. The reason the time series in this study are relatively short is because of restrictions in the collection of the data, which will be described more specifically later in the part that deals with the data collection. The logic behind the interruption in the time series is rather straightforward as the variable that creates the interruption in the time series is the advertisement.

The main advantage of employing time series in a quasi - experimental research design is that it allows for non-randomization in devising the research sample. The fundamental criteria, that the advertisement must a contain a song, does not allow for including a random selection of advertisements. However, a major drawback concerning this research design involves the assessment of the internal and external validity. As there is no control group,  it cannot be controlled for that the variable of interest, which in this case is the attention, could be influenced by other factors that preceded or were present at the time of the treatment date (Bryman, 2012; Shedish et al., 2002). The non-randomization in creating the sample and the specific setting of the experiment could make it difficult to generalize the results on a large population (Shedish et al., 2002).  Advertisements and music are often restricted to certain time period, and while it is difficult to generalize, identifying certain trend is plausible.

In order to assess whether the intervention had any effect, the following two statistical methods of analysis are used:

(1)  An OLS regression analysis based on the differences times series in broad lines based on Tryon 's (1982) approach of short interrupted time series  (Time = independent variable, Attention = dependent variable).

(2)  An OLS regression analysis based on the analysis of the residuals similarly in broad lines based on Tryon 's (1982) approach of short interrupted time series  (Time = independent variable, Attention = dependent variable).

## Statistical methods

### *Differencing*

In order to assess whether the intervention had an effect on the post period it is necessary to remove any significant trend in pre-intervention period. In other words, the data observations over time in the pre-period must be stationary because if there is a significant trend it would be difficult to assess whether the intervention had an actual effect the psot period.  One method to achieve stationarity is differencing which is performed over the entire time series and the possible results are summarized as:

(1) If the pre intervention data is stationary and the post intervention data is non stationary, then there is an indication that the intervention had an effect on the attention
(2) If both pre and post intervention data are stationary then there no indication that the intervention had an effect on attention

### *Analysis of residuals*

An alternative statistical method to assess whether the intervention had effect on the attention, is the analysis of the residuals. This is done by performing an OLS regression for each data observation in the pre-intervention period = $Y_t$ , then extrapolating the regression formula onto the post period to obtain the predicted values = $e_t$. These predicted values are then subtracted from the observed values to obtain the residuals = $\varepsilon$.  Hence the formula for obtaining the residuals is: $\varepsilon = Y_t - e_t$ .

The possible results are:(1) If the residuals in the post period contain a statistically significant trend, then there is an indication that the treatment had effect on the attention. (2) if the residuals in the post period do not contain a statistically significant trend, then there is no indication that the treatment had effect on the attention.

## Methodology Super Bowl

The 2020 Super Bowl aired on the 2$^{nd}$ of February and the data for this study was collected using all Super Bowl 2020 TV Commercials which contained a song. Data was collected in a very systematic way and was done in the following way. The first step was to obtain all commercials that aired during the Super Bowl and the complete list was available on NFL Website in order to identify whether a commercial contained a song, each commercial was watched separately. If the commercial contained a clear and audible song, the name of the song and performing artist was identified using Shazam Music Recognition Service (Wang, 2006). If Shazam recognised the song and the song was available on Spotify, it was validated to be in the sample. Once this was repeated for every commercial I ended up with total of 25 songs and 24 commercials (N = 25 as 1 commercial contained 2 songs).

After establishing the sample size of the songs, it was necessary to identify the amount of attention each song had before and after it appeared in the commercial. This was done using the music marketing analytics platform called Soundcharts. This platform aims to "monitor, analyse and structure data for all sides of the music business" (Soundcharts, 2020) and to identify the attention, the daily evolution of Spotify monthly listeners (rolling 30 days) was used. This data describes the monthly listeners to the artist in general and not for the particular song that is used in the commercial. Attention data for a particular song was unfortunately not available, which is an obvious limitation, but the logic behind using overall attention to an artist is that it clearly indicates whether an artist could benefit in total from having the music featured in a commercial

First, data were obtained for the total monthly listeners for each artist on the day the commercial is released, which in this case was the 2$^{nd}$ of February 2020. With regards to the time series analysis, this day refers to the treatment day, or in other words the interruption. Once the number of listeners on the treatment day was identified, 8 additional observations that listed the monthly listeners before and after the treatment date were created. The observations included 6 weeks before and after the treatment date, and 2 days before and after the treatment date. Since the Super bowl is such an immense popularised media event with millions of people watching, the 2 days were added to include any immediate effects on

the attention. For the sake of clarity, the time series was therefore divided in two periods:

(1) The pre period consists of data ranging from 23-12-2019 till 01-02-2020

(2) The post period, including the treatment day consists of data ranging from 02-02-2020 till 22-03-2020

An example of the results of this procedure is seen in Table 2 (see appendix A for the table with all songs and artists.  A drawback of using the Super bowl as a data source for commercials that contained a song is that the choice was fairly limited and that all commercials aired on the same date.

## Operationalization and preliminary analysis.

Once all the raw data was collected, it was necessary visualize the variation in variables and explore some preliminary statistics. Table 2 and Graph 1 show an overview of the time series for the untransformed data.  What is apparent from preliminary visual analysis of this graph is that it is characterised with a clear noticeable density in the lower regions and several extreme outliers in the higher regions. With such a big disparity in the data it is impossible to perform and interpret any statistical analysis as the results would be unreliable. Therefore, in order prepare the raw data for statistical analysis it was normalised applying a method of indexation.

**Table 2:  Raw time series data of all songs that appeared in a Super Bowl commercial where T=0  day of intervention ( 2-2-2020)**

| Artist | Idina Menzel | Twisted Sister | Sonny & Cher | Wolfmother | SebastiAn | Etta James | Raun Burnham | 2 Unlimited | Usher | Lil Nas X | Four Tops | The Rolling Stones |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Song | Let It Go - | I Wanna Rock | I Got You Babe | Victorious | Crescendo - Final | Tell Mama | Love Is The Reason A | Get Ready | Yeah! (feat. Lil Jon & Ludacris) | Old Town Road - Remix | Reach Out I'll Be There - | Paint It, Black |
| Popularity | 64 | 69 | 64 | 52 | 26 | 46 | 2 | 55 | 79 | 87 | 60 | 77 |
| T | N = listeners | N = listeners | N = listeners | N = listeners | N = listeners | N = listeners | N = listeners | N = listeners | N = listeners | N = listeners | N = listeners | N = listeners |
| -8 | 14318843 | 3117572 | 1086260 | 2212521 | 307975 | 3608023 | 377 | 919951 | 16892601 | 28757980 | 4083 | 15719693 |
| -7 | 16552087 | 3177287 | 1064267 | 2166460 | 275987 | 3673825 | 364 | 929926 | 17177327 | 29593087 | 4233 | 15888510 |
| -6 | 15975241 | 3180261 | 1076374 | 2163690 | 267953 | 3727079 | 349 | 968787 | 17557938 | 30402638 | 4469 | 16147345 |
| -5 | 14778969 | 3167271 | 1117362 | 2169133 | 264252 | 3782112 | 356 | 993835 | 18237089 | 30267488 | 4875 | 16312751 |
| -4 | 13671017 | 3172371 | 1166820 | 2224664 | 266965 | 3828195 | 372 | 1030105 | 18328026 | 29959732 | 5038 | 16507321 |
| -3 | 11585410 | 3140104 | 1185044 | 2273374 | 282798 | 3775539 | 392 | 1046193 | 18299573 | 29179139 | 4928 | 16459565 |
| -2 | 9555483 | 3119616 | 1175321 | 2327978 | 312325 | 3684005 | 401 | 1043867 | 18138471 | 28327018 | 4846 | 16254027 |
| -1 | 9048001 | 3114493 | 1172890 | 2341629 | 319706 | 3661121 | 403 | 1043285 | 18098195 | 28113987 | 4825 | 16202642 |
| 0 | **9048001** | **3120651** | **1175490** | **2344114** | **322449** | **3661154** | **405** | **1046726** | **18123933** | **28150832** | **4820** | **16213666** |
| 1 | 9048001 | 3126809 | 1178090 | 2346599 | 325191 | 3661187 | 407 | 1050166 | 18149670 | 28187676 | 4815 | 16224690 |
| 2 | 8982538 | 3132966 | 1180690 | 2349084 | 327933 | 3661220 | 409 | 1053607 | 18175407 | 28224520 | 4809 | 16235714 |
| 3 | 8669090 | 3159474 | 1194278 | 2359684 | 341865 | 3673291 | 415 | 1072827 | 18293013 | 28383839 | 4786 | 16312622 |
| 4 | 8226855 | 3176733 | 1215972 | 2368321 | 360042 | 3783984 | 405 | 1100117 | 18397730 | 28243834 | 4800 | 16482669 |
| 5 | 8120926 | 3216301 | 1232671 | 2363362 | 359661 | 3982355 | 414 | 1113997 | 18498356 | 28113241 | 4912 | 16609126 |
| 6 | 8010049 | 3238666 | 1241320 | 2353808 | 340688 | 4005873 | 398 | 1125547 | 18409816 | 26773866 | 4843 | 16654836 |
| 7 | 7975499 | 3242182 | 1245736 | 2261881 | 323843 | 4038025 | 387 | 1119297 | 18109337 | 25756434 | 4867 | 16661719 |
| 8 | 7935487 | 3244488 | 1252193 | 2363556 | 307151 | 4041039 | 394 | 1117724 | 18054826 | 25029405 | 4858 | 16698385 |
| 9 | 7841447 | 3224184 | 1228748 | 2342665 | 293046 | 3787503 | 384 | 1103818 | 17668223 | 24173613 | 4745 | 16602291 |

**Table 2 continued:  Raw time series data of all songs that appeared in a Super Bowl commercial where T=0  day of intervention ( 2-2-2020)**

| Artist | Cloax | Men At Work | Pearl Jam | A Great Big World | Mc Hammer | The Standells | Max Richter | Gramatik | Warrant | Slim Whitman | Dua Lipa | Foo Fighters | Richard Strauss |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Song | Fissatore | Who Can It Be Now? | River Cross | Say Something | U Can't Touch This | Dirty Water | A Catalogue Of Afternoons | Aymo | Sure Feels Good To Me | I'm Casting My Lasso Towards The Sky | Don't Start Now | Walk | Also Sprach Zarathustra, |
| Popularity | 13 | 64 | 55 | 71 | 73 | 47 | 50 | 31 | 27 | 26 | 73 | 68 | 48 |
| T | N = Listeners | N = Listeners | N = Listeners | N = Listeners | N = Listeners | N = Listeners | N = Listeners | N = Listeners | N = Listeners | N = Listeners | N = Listeners | N = Listeners | N = Listeners |
| -8 | 345 | 4153692 | 9037277 | 6278258 | 1758608 | 86050 | 3035806 | 1214542 | 1508054 | 70684 | 41959826 | 10496102 | 535590 |
| -7 | 341 | 4211779 | 9257855 | 6236876 | 1765737 | 81999 | 2885771 | 1220533 | 1483858 | 70508 | 42803999 | 10523999 | 546175 |
| -6 | 345 | 4331021 | 9343634 | 6157485 | 1804821 | 82523 | 2844681 | 1223498 | 1492651 | 71760 | 43893929 | 10613915 | 553976 |
| -5 | 367 | 4400824 | 9296683 | 6106360 | 1899138 | 85207 | 2847495 | 1177693 | 1520185 | 72635 | 45594351 | 10681520 | 569187 |
| -4 | 359 | 4460635 | 9224489 | 6080345 | 1922449 | 90149 | 2914185 | 1149335 | 1540969 | 74735 | 46293134 | 10851495 | 576937 |
| -3 | 351 | 4469487 | 9324924 | 6024609 | 1918358 | 92917 | 3031300 | 1138324 | 1564497 | 74554 | 46757268 | 10934242 | 584434 |
| -2 | 341 | 4432783 | 9654508 | 6003676 | 1872146 | 84223 | 3137243 | 1130594 | 1583347 | 74345 | 46730808 | 11033730 | 590354 |
| -1 | 338 | 4423607 | 9736903 | 5998442 | 1860593 | 94549 | 3163728 | 1128661 | 1588059 | 74292 | 46724193 | 11058602 | 591834 |
| 0 | **339** | **4430571** | **9759780** | **5995370** | **1868377** | **94939** | **3162794** | **1127094** | **1591295** | **74505** | **46852866** | **11052531** | **594626** |
| 1 | 339 | 4437534 | 9782656 | 5992298 | 1876161 | 95329 | 3161860 | 1125527 | 1594530 | 74718 | 46981539 | 11046459 | 597418 |
| 2 | 339 | 4444498 | 9805532 | 5989226 | 1883945 | 95719 | 3160926 | 1123959 | 1597765 | 74931 | 47110211 | 11040387 | 600210 |
| 3 | 340 | 4476955 | 9923776 | 5972474 | 1923087 | 97425 | 3156140 | 1113977 | 1614247 | 75940 | 48003495 | 11004084 | 618124 |
| 4 | 340 | 4499972 | 10156502 | 5955896 | 1974403 | 98158 | 3151708 | 1090072 | 1639242 | 77072 | 49975091 | 10927837 | 699681 |
| 5 | 339 | 4419221 | 10277361 | 6005477 | 1997306 | 98685 | 3161897 | 1101209 | 1654226 | 78522 | 51041594 | 10947588 | 702071 |
| 6 | 336 | 4447244 | 10007025 | 5979245 | 2014262 | 99925 | 3150657 | 1098693 | 1663432 | 81167 | 52305935 | 10873863 | 699771 |
| 7 | 319 | 4436946 | 9966941 | 5961099 | 1998686 | 100216 | 3119007 | 1104922 | 1665986 | 83492 | 52338875 | 10886258 | 667264 |
| 8 | 299 | 4442183 | 9958733 | 5924924 | 2007033 | 102495 | 3106143 | 1119823 | 1676984 | 83854 | 52609770 | 10894399 | 633489 |
| 9 | 283 | 4405821 | 9850660 | 5791171 | 2275587 | 101933 | 3078457 | 1141080 | 1665812 | 83606 | 53014553 | 10775546 | 614368 |
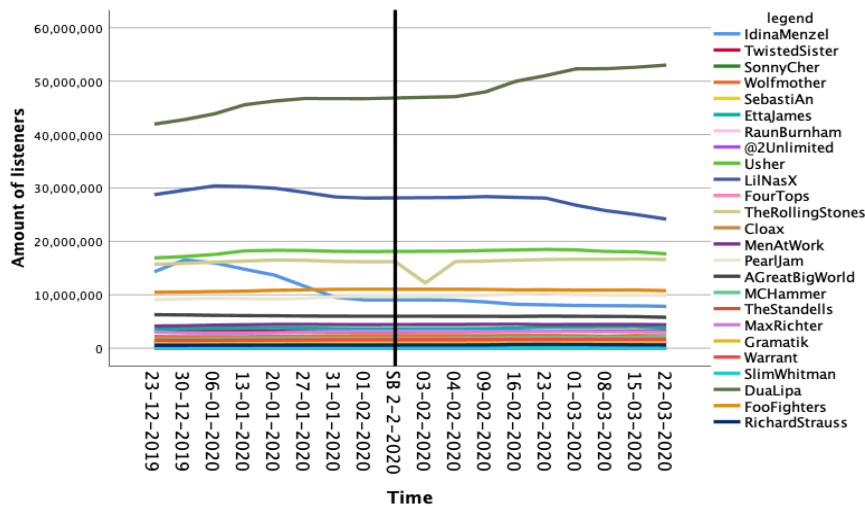
**Graph 1**: Raw time series data with breaking point at date of intervention. Legend shows all artist whose songs were featured in a Super Bowl commercial

## Super Bowl Indexation

By indexing the data, all data observations were calculated relatively to the day of intervention, $t + n/T * 100$ where T is day of treatment and t+n the pre or post observation day. Once this procedure was repeated for all other variables, the results were plotted in a new graph to inspect whether the data has been normalized. In other words, it was inspected whether all observations follow a common scale to make it suitable for statistical analysis. Graph 2a shows the time series for the indexed data. While in general, the data was normalized and the outliers were minimized there appeared to be a serious outlier in the pre-intervention period. The particular song is "Let it go" by Idina Menzel which is featured as a soundtrack in the Disney Frozen movie. The extreme popularity of the song is circumstantial and the most likely explanation is that: (1) the release of Frozen 2 at the beginning of December sparked the attention for the song and; (2) is apparent that the peak in popularity of the song is during the Christmas period which resonates with the cold and icy character of the movie. It was decided to keep the outlier in the sample and the analysis as an extreme popularity in pre-period does not mean that it cannot gain in attention after the song is featured in a commercial. It could even be the fact that advertisers deliberately want to use that are extremely popular in the period before the advertisement, to generate an extra buzz surrounding the brand. However, there will be a check for robustness of the sample by running the statistical analysis without this particular song.

The next step was to transform the indexed data, into proper variables for the statistical analysis. This was done by summing up each the indexed data point and divining it by the sample size creating an average indexed variable for each observed data point in time. The results of the total average indexation are shown in Table 3 and Graph 2b shows the average indexed data over time. Preliminary visual analysis assumes an upwards trend in attention yet an obvious pattern is absent. Statistical analysis in the results section will provide clarity on this issue.
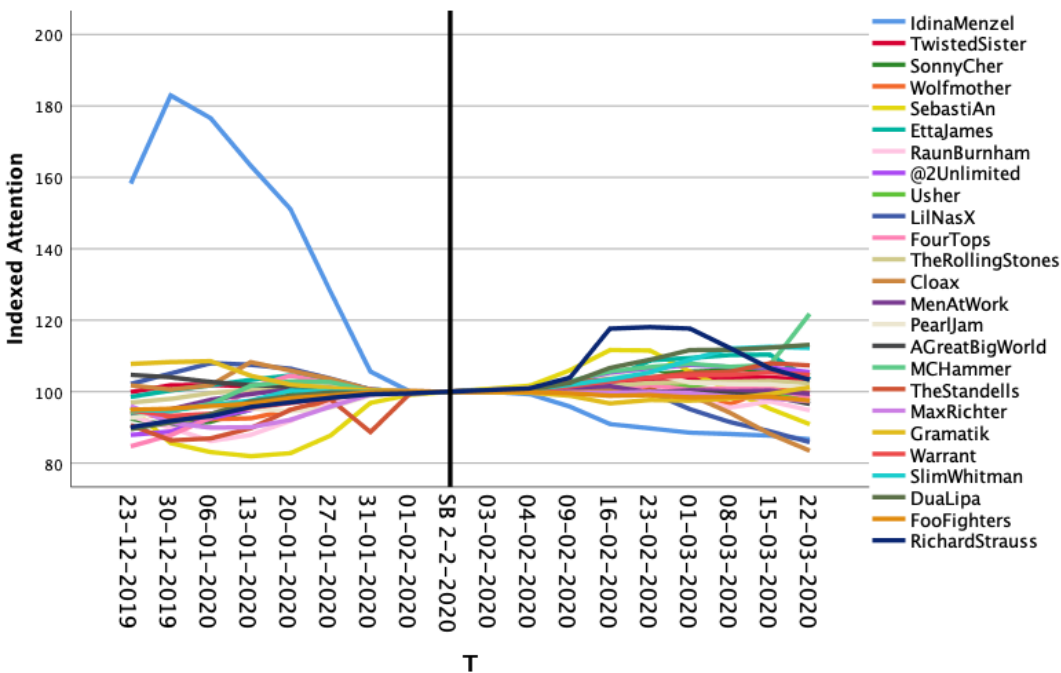


**Graph 2a: Indexed time series data with breaking point at date of intervention. Legend shows all artist whose songs were featured in a Super Bowl commercial**

| Table 3: Total and average indexed data Super bowl | | | |
|---|---|---|---|
| | T | Total Index | Average Index |
| Pre | -8 | 2442.59 | 97.70 |
| | -7 | 2459.34 | 98.37 |
| | -6 | 2476.13 | 99.04 |
| | -5 | 2503.73 | 100.15 |
| | -4 | 2524.05 | 100.96 |
| | -3 | 2515.64 | 100.63 |
| | -2 | 2488.84 | 99.55 |
| | -1 | 2495.09 | 99.80 |
| Post | 0 | 2500 | 100 |
| | 1 | 2504.61 | 100.19 |
| | 2 | 2508.48 | 100.34 |
| | 3 | 2528.45 | 101.14 |
| | 4 | 2560.76 | 102.43 |
| | 5 | 2582.89 | 103.32 |
| | 6 | 2572.17 | 102.89 |
| | 7 | 2547.03 | 101.88 |
| | 8 | 2538.63 | 101.55 |
| | 9 | 2512.30 | 100.49 |
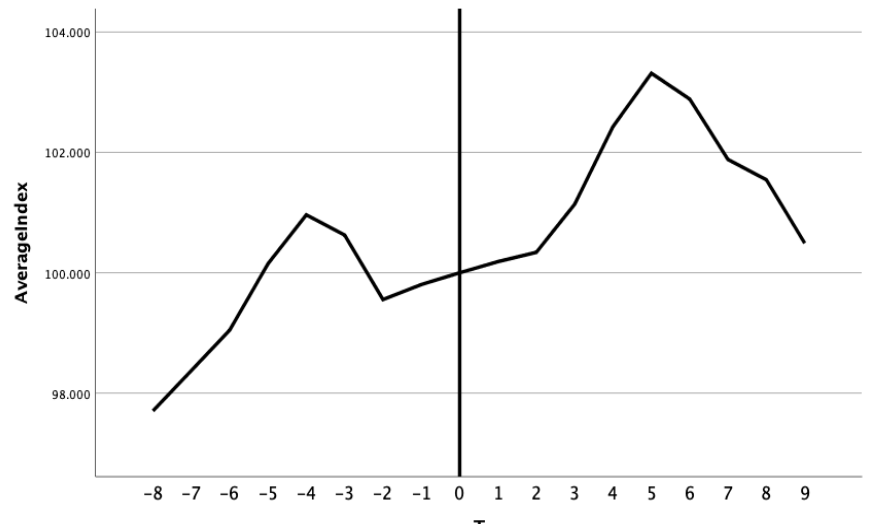


**Graph 2b  Average indexed data over time where T=0 is day of treatment**

## Methodology Most Valuable Brands

The criteria for selecting the commercials were slightly different in comparison to the Super bowl data set. The data on daily evolution of Spotify monthly listeners could only be traced up to 12 months in the past hence the first criteria became that the commercial must contain a commercially available song and that it was released between June 2019 and April 2020. Another important criterion was to identify the date the commercial is released and on which platform. As it was impossible to retrieve the official date the commercial aired on TV, it was necessary to look at the date the commercial was uploaded on the official YouTube channel of the brands assuming that most likely this would be the same date as it would have released on TV. If the commercial was not released on the official channel of the

brands, but fitted in specific time frame, it was not included in the sample as the release date would be unreliable. To summarize the criteria for this sample: (1) the commercial must be released between June 2019 and April 2020, (2) it must contain a song that is available on Spotify and (3) the commercial must be released on the official YouTube channel of the brand. Once this was checked for all 100 brands on the list I ended up with a sample of 59 commercials and 58 songs (N = 58 as 1 commercial contained 2 songs). As with the Super Bowl data set, first the monthly listeners on the day the advertisement released were obtained. Then 5 additional observations, that listed the monthly listeners 5 weeks before and 5 weeks after the treatment date were created. Since every commercial had different release date, the time variable was recoded into T being the treatment day and T-n, with n being the week. See Table 3 and graph 4 for an overview all songs and artists in the Most Valuable Brands sample.
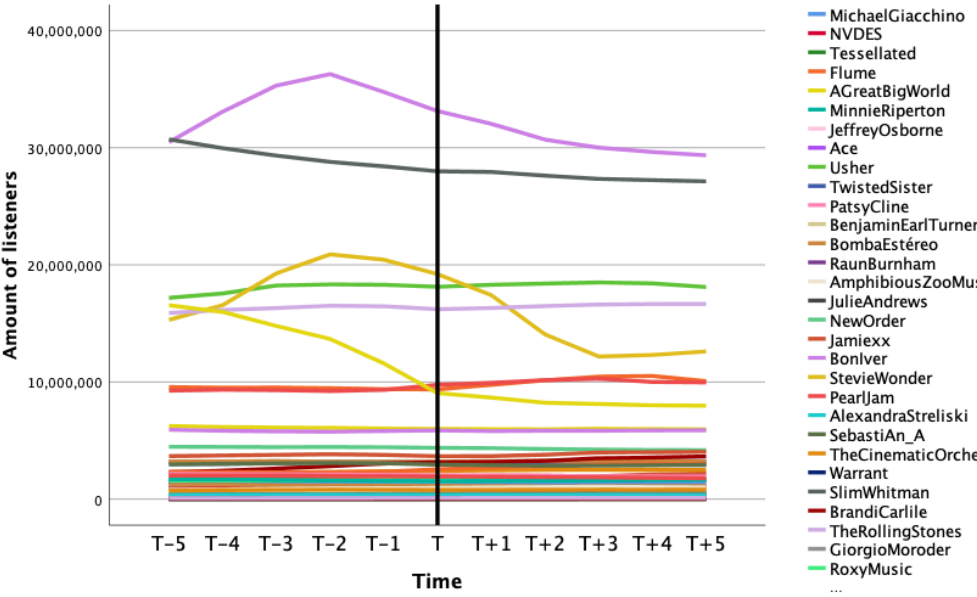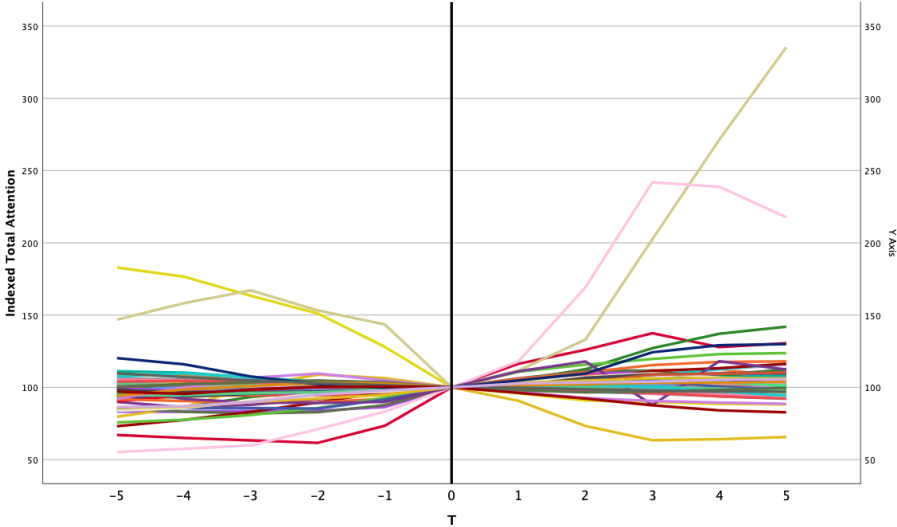


**Graph 4: Raw time series data with breaking point at date of intervention.**

**Table 3: Overview all songs and artists in the Most Valuable sample. T=0 is day of intervention**

| Artist | Song | Pop | T=0 | T-5 | T-4 | T-3 | T-2 | T-1 | T =0 | T+1 | T+2 | T+3 | T+4 | T+5 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Michael Giacchino | Married Life | 64 | 25-11-19 | 2997714 | 3002268 | 3068780 | 3142246 | 3151018 | 3149605 | 3124319 | 3052322 | 3010488 | 2955238 | 2900197 |
| NVDES | Brazooka | 36 | 10-09-19 | 185179 | 179450 | 174796 | 170123 | 202699 | 276278 | 321319 | 347990 | 379768 | 353095 | 360667 |
| Tessellated | I Learnt Some Jazz Today | 50 | 27-06-19 | 226194 | 232647 | 251621 | 262735 | 265465 | 269658 | 282099 | 303576 | 342712 | 369642 | 382765 |
| Flume | The Difference | 76 | 11-03-20 | 9566240 | 9508639 | 9519897 | 9473936 | 9384432 | 9362165 | 9760084 | 10140427 | 10455580 | 10511244 | 10076673 |
| A Great Big World | Say Something | 78 | 2-02-20 | 6236876 | 6157485 | 6106360 | 6080345 | 6024609 | 5995370 | 5972474 | 5955896 | 6005477 | 5979245 | 5961099 |
| Minnie Riperton | Les Fleurs | 57 | 2-10-19 | 839598 | 845879 | 850429 | 854283 | 854358 | 852910 | 862153 | 875011 | 880241 | 882165 | 875717 |
| Jeffrey Osborne | On The Wings Of Love | 58 | 3-09-19 | 238006 | 235448 | 235157 | 237314 | 238760 | 241015 | 247033 | 254902 | 262221 | 270179 | 278093 |
| Ace | How Long | 59 | 2-03-20 | 157563 | 157455 | 158538 | 158798 | 163622 | 189547 | 201422 | 208704 | 209260 | 205736 | 201116 |
| Usher | Yeah! (feat. Lil Jon & Ludacris) | 80 | 29-01-20 | 17177327 | 17557938 | 18237089 | 18328026 | 18299573 | 18123933 | 18293013 | 18397730 | 18498356 | 18409816 | 18109337 |
| Twisted Sister | I Wanna Rock | 70 | 2-02-20 | 3177287 | 3180261 | 3167271 | 3172371 | 3140104 | 3120651 | 3159474 | 3176733 | 3216301 | 3238666 | 3242182 |
| Patsy Cline | Back In Baby's Arms | 47 | 16-09-19 | 1150446 | 1137222 | 1136034 | 1130525 | 1128983 | 1118391 | 1126818 | 1156390 | 1173352 | 1203455 | 1230017 |
| Benjamin Earl Turne | Yadada | 30 | 4-10-19 | 6439 | 6294 | 6215 | 6245 | 6478 | 6584 | 7352 | 8761 | 13331 | 17869 | 22079 |
| Bomba Estéreo | Soy Yo | 64 | 13-02-20 | 3220689 | 3210744 | 3251189 | 3191969 | 3191050 | 3207811 | 3232302 | 3263650 | 3270474 | 3267244 | 3218549 |
| Raun Burnham | Love Is The Reason A | 2 | 2-02-20 | 364 | 349 | 356 | 372 | 392 | 405 | 415 | 405 | 414 | 398 | 387 |
| Amphibious Zoo Mu: | To The Stars and Back | 0 | 6-01-20 | 6529 | 6562 | 6681 | 6651 | 6587 | 6613 | 6558 | 6668 | 6778 | 6911 | 6958 |
| Julie Andrews | Getting To Know You | 27 | 15-07-19 | 1555114 | 1588011 | 1598816 | 1590948 | 1587153 | 1596362 | 1606519 | 1623325 | 1646291 | 1649397 | 1635327 |
| New Order | Ceremony | 57 | 12-09-19 | 4466919 | 4456415 | 4439359 | 4447390 | 4427303 | 4378092 | 4350570 | 4277914 | 4224018 | 4196529 | 4184571 |
| Jamie xx | Loud Places (feat. Romy) | 65 | 17-11-19 | 1840783 | 1851388 | 1851011 | 1860807 | 1957616 | 1963403 | 1991728 | 1997307 | 1941724 | 2113867 | 2192820 |
| Bon Iver | Naeem | 62 | 19-12-19 | 5919376 | 5833232 | 5788873 | 5754738 | 5813655 | 5859586 | 5807202 | 5837043 | 5839492 | 5863230 | 5879008 |
| Stevie Wonder | My Girl | 31 | 15-01-20 | 15301871 | 16558458 | 19274002 | 20894076 | 20435088 | 19205539 | 17413052 | 14065901 | 12171799 | 12307516 | 12603349 |
| Pearl Jam | River Cross | 61 | 2-02-20 | 9257855 | 9343634 | 9296683 | 9224489 | 9324924 | 9759780 | 9923776 | 10156502 | 10277361 | 10007025 | 9966941 |
| Alexandra Streliski | Plus tôt | 56 | 3-09-19 | 924452 | 930922 | 917252 | 898976 | 892700 | 890874 | 918261 | 938565 | 967598 | 1002021 | 1034579 |
| SebastiAn | Crescendo - Final | 26 | 23-01-20 | 275987 | 267953 | 264252 | 266965 | 282798 | 322449 | 341865 | 360042 | 359661 | 340688 | 323843 |
| The Cinematic Orch | To Build A Home | 73 | 25-03-20 | 2194126 | 2229138 | 2271627 | 2327173 | 2368215 | 2387081 | 2465243 | 2493229 | 2496533 | 2502922 | 2504872 |
| Warrant | Sure Feels Good to Me | 29 | 29-01-20 | 1483858 | 1492651 | 1520185 | 1540969 | 1564497 | 1591295 | 1614247 | 1639242 | 1654226 | 1663432 | 1665950 |
| Slim Whitman | I'm Casting My Lasso Towards The Sky | 25 | | 70508 | 71760 | 72635 | 74735 | 74554 | 74505 | 75940 | 77072 | 78522 | 81167 | 83492 |
| Brandi Carlile | The Joke | 61 | 26-08-19 | 2293319 | 2429804 | 2606410 | 2810237 | 3037658 | 3137937 | 3180280 | 3266167 | 3492175 | 3552861 | 3651339 |
| The Rolling Stones | Paint It, Black | 78 | 29-01-20 | 15888510 | 16147345 | 16312751 | 16507321 | 16459565 | 16213666 | 16312622 | 16482669 | 16609126 | 16654836 | 16661719 |
| Giorgio Moroder | Chase | 52 | 1-10-19 | 1018442 | 1008677 | 989795 | 971252 | 962769 | 957836 | 956706 | 953903 | 945989 | 939562 | 938605 |
| Roxy Music | In Every Dream Home A Heartache | 53 | 1-08-19 | 1577755 | 1579033 | 1568956 | 1579946 | 1603726 | 1637484 | 1679152 | 1698742 | 1687681 | 1696001 | 1655185 |
| Harry Nilsson | Everybody's Talkin | 66 | 9-01-20 | 1239235 | 1232330 | 1217814 | 1205836 | 1218037 | 1233996 | 1250462 | 1257531 | 1245491 | 1282860 | 1389546 |
| Wang Chung | Dance Hall Days | 50 | 4-03-20 | 914094 | 959797 | 993853 | 1015004 | 1018659 | 1013053 | 1006357 | 990712 | 980503 | 983978 | 980076 |
| Il Est Vilaine | Une petite satu | 10 | 17-09-19 | 9000 | 9311 | 9536 | 9484 | 9312 | 9091 | 9002 | 9176 | 9507 | 9750 | 10247 |
| The Knocks | Classic (feat. POWERS) | 56 | 30-01-20 | 2336974 | 2307273 | 2279151 | 2283052 | 2349968 | 2549028 | 2698966 | 2812199 | 2941648 | 2997772 | 3007090 |
| Idina Menzel | Let It Go | 65 | 29-01-20 | 16552087 | 15975241 | 14778969 | 13671017 | 11585410 | 9048001 | 8669090 | 8226855 | 8120926 | 8010049 | 7975459 |
| Franz Schubert | Piano Trio No. 2 in E-Flat Major, | 23 | 25-07-19 | 1699096 | 1684053 | 1635458 | 1588723 | 1543019 | 1528885 | 1548828 | 1573651 | 1609466 | 1632918 | 1651649 |
| Screamin' Jay Hawk | I Put a Spell On You | 48 | 21-10-19 | 198410 | 206055 | 215115 | 254940 | 298573 | 359034 | 423928 | 607537 | 868551 | 857496 | 781485 |
| Nikka Costa | Everybody Got Their Something | 41 | 16-01-20 | 69913 | 68683 | 67873 | 67239 | 68724 | 70381 | 73400 | 75216 | 76410 | 76958 | 77552 |
| Black Pumas | Colors | 66 | 28-11-19 | 306364 | 313751 | 327043 | 346636 | 375988 | 404594 | 447886 | 468123 | 483892 | 497667 | 500366 |
| Mapei | Sensory Overload | 26 | 11-09-19 | 400954 | 407961 | 409051 | 407299 | 437172 | 477479 | 495468 | 508911 | 499075 | 479385 | 470164 |
| Kaiser Chiefs | I Predict A Riot | 63 | 4-11-19 | 2154313 | 2135781 | 2116849 | 2099604 | 2070971 | 2044596 | 2026230 | 1995590 | 1950975 | 1940328 | 1927789 |
| Liberace | Love Is Blue (L'amour est bleu) | 35 | 27-01-20 | 37210 | 40109 | 42335 | 38830 | 36377 | 25342 | 24662 | 24555 | 24594 | 24763 | 24439 |
| Gramatik | Aymo | 30 | 25-02-20 | 1220533 | 1223498 | 1177693 | 1149335 | 1138324 | 1127094 | 1113977 | 1090072 | 1101209 | 1098693 | 1119823 |
| SebastiAn | Crescendo - Final | 26 | 29-01-20 | 296188 | 273467 | 266219 | 265286 | 267393 | 297561 | 330676 | 350751 | 261257 | 351231 | 334352 |
| Jóhann Jóhannsson | The Theory of Everything | 58 | 18-02-20 | 802753 | 820258 | 869619 | 916893 | 928608 | 958306 | 994468 | 1027121 | 1051915 | 1022457 | 1003457 |
| Gene Wilder | Pure Imagination | 51 | 6-02-20 | 77103 | 76048 | 75906 | 76314 | 77245 | 78566 | 79625 | 83777 | 85615 | 86124 | 86190 |
| Kings Kaleidoscope | Sticks & Stones | 53 | 4-10-19 | 354964 | 355719 | 362070 | 363753 | 372140 | 376865 | 379062 | 379115 | 377788 | 373553 | 368957 |
| Etta James | Tell Mama | 47 | 1-02-20 | 3673825 | 3727079 | 3782112 | 3828195 | 3775539 | 3661154 | 3673291 | 3783984 | 3982355 | 4005873 | 4038025 |
| Beyoncé | Halo | 74 | 28-08-19 | 30465944 | 33073931 | 35304791 | 36277182 | 34751972 | 33128223 | 32039749 | 30689854 | 30001528 | 29633655 | 29346736 |
| Flash and the Pan | Waiting For A Train | 48 | 7-11-19 | 121705 | 122716 | 127279 | 130850 | 134402 | 141842 | 146099 | 148491 | 150723 | 150785 | 150579 |
| Spoon | I Turn My Camera On | 47 | 20-09-19 | 2008341 | 2016735 | 2009893 | 1980872 | 1953344 | 1932243 | 1907392 | 1878738 | 1857058 | 1810216 | 1780670 |
| Andreya Triana | Gold | 20 | 4-09-19 | 344761 | 351904 | 343031 | 330778 | 323992 | 320945 | 323986 | 325922 | 321763 | 312221 | 302102 |
| Eric Carmen | All By Myself | 65 | 13-09-19 | 2961395 | 3005251 | 3051464 | 3083760 | 3051797 | 2946420 | 2889756 | 2843856 | 2858440 | 2892823 | 2935456 |
| Lesley Gore | You Don't Own Me | 62 | 6-02-20 | 726628 | 762226 | 780189 | 797807 | 794104 | 773343 | 783275 | 789742 | 797788 | 797203 | 802658 |
| David Arnold | The Name's Bond... James Bond | 44 | 15-01-20 | 26825 | 25874 | 23990 | 22821 | 22258 | 22316 | 23376 | 24433 | 27728 | 28824 | 28992 |
| Sia | Unstoppable | 64 | 26-08-19 | 30708150 | 29954561 | 29324425 | 28789202 | 28404080 | 27983835 | 27925130 | 27612768 | 27338220 | 27230408 | 27130184 |
| Cook Classics | The Real Thing | 35 | 2-01-20 | 19811 | 19510 | 20131 | 20493 | 20537 | 20436 | 19650 | 18850 | 17889 | 17171 | 16900 |
| The Standells | Dirty Water | 49 | 27-01-20 | 81999 | 82523 | 85207 | 90149 | 92917 | 94939 | 97425 | 98158 | 98685 | 99925 | 100216 |

## Operationalization and preliminary analysis

The methodological approach for the most valuable brands data set was quite similar to the Super Bowl Data set. The next part will therefore be less detailed. First it is was necessary to visualize the raw data which is seen in graph 4. The data shows a similar representation as with the Super Bowl data set and it is characterized with high density in the lower regions of the number of listeners and a couple clearly visible outliers in the higher regions. After indexation the data appeared to be normalised and the results of this process can be seen in table 4. Graph 5a and 5b show the total indexed attention and average total index respectively. After normalizing the data, it became apparent that there are still some potential outliers visible in the pre and post intervention, yet not as obvious as with the super bowl sample. The two outliers in post period I could very possibly be caused by the effect of an advertisement amplified by informational cascades and therefore interesting to keep in the sample. The two outliers in the pre-period are not extreme and are interesting to keep in the sample as advertisers may want to use songs that are popular in the period before the advertisement, in the same way as with the Idina Menzel example. Visual analysis of graph 6 indicate that there an upwards trend, that intensifies in the treatment period. Prior to the statistical analysis it can be cautiously interpreted form this graph that there is positive effect of the intervention



***Graph 5a****: Indexed time series data of most valuable brands dataset with breaking point at date of intervention*

| | T | Total Sum Index | Average Index |
|---|---|---|---|
| | | **Table 4: Total and average index** | |
| | | **Most Valuable Brands** | |
| Pre | -5 | 5653.55 | 97.48 |
| | -4 | 5679.53 | 97.92 |
| | -3 | 5720.74 | 98.63 |
| | -2 | 5740.37 | 98.97 |
| | -1 | 5767.12 | 99.43 |
| Post | 0 | 5800 | 100 |
| | 1 | 5917.85 | 102.03 |
| | 2 | 6047.52 | 104.27 |
| | 3 | 6229.90 | 107.41 |
| | 4 | 6340.95 | 109.32 |
| | 5 | 6391.05 | 110.19 |
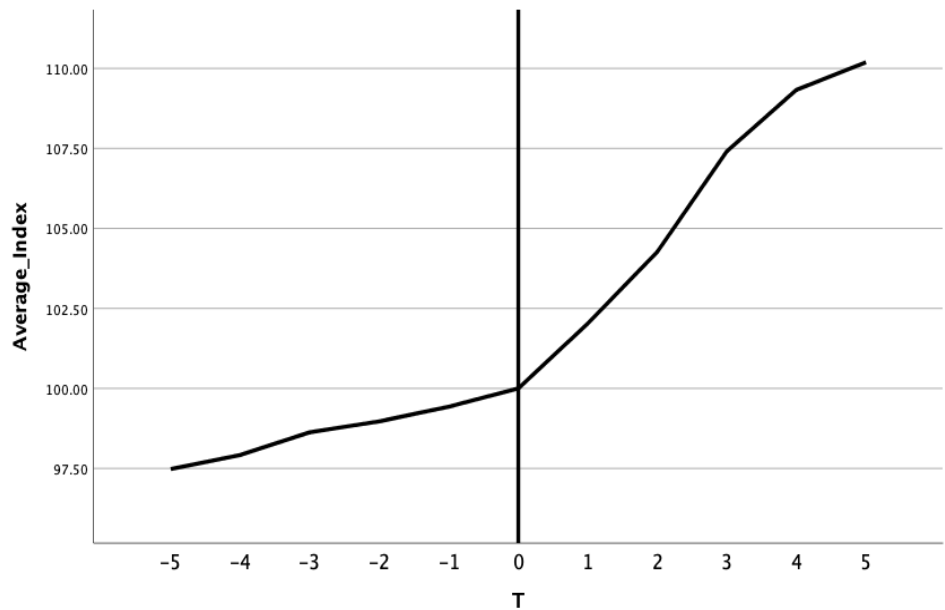


**Graph 5b:** Average indexed data most valuable brands data over time where T=0 is day of treatment

## Popularity Data

In addition for both datasets I have used the Spotify Sort Your Music application (Spotify, n.d.) to identify the value of popularity for each song. I have created 2 playlists for each respective dataset and the application automatically extracts several song characteristics among which popularity is the most useful for this research. The index ranges from 0 to 100 and the higher the number the more popular the song is. While the monthly listeners are measured in relation to the artist in general, the popularity is measured for the specific song. The Sort Your Music application does not provide the overall artist popularity, which is again unfortunate, but not crucial as it fairly logical to assume that if a song is very popular, it cascades to the artist being popular as well.

As mentioned before hypotheses 2 aims to test whether less popular artist who licenced their music for commercials, benefit relatively more in attention, in comparison to more popular artists. To test this with proposed statistical methods the data of both data sets had to be reorganized based on the popularity values. Once this was done similar statistical methods were applied to obtain the results.

### Super Bowl Popularity Indexation.

As the sample size of this data is set is rather small (N=25) I decided to divide it in 2 segments consisting of popular artists $= \geq 60$ (N=12) and less popular artist $= \leq 55$ (N=13). A limitation of this approach is that is creates rather small samples to be part of regression analysis, which could affect the validity the of the results. The highly popular list contains artists such as Usher, The Rolling stones and Dua Lipa who fit well in the description of superstars defined by Rosen (1981) and Adler (1985). Such artists have dominated and are dominating the market for a long time period and I expect that the appearance of a 'superstar' song will not have a significant effect on their attention. Superstars already enjoy a following of millions of fans and I expect that the Superbowl will not make them even more popular. Conversely, less popular artist could profit significantly from exposure to such a great audience which has been proved to be a success (Klein, 2009; Taylor, 2012). Unlike superstars they still have something to gain in terms of attention. It is therefore expected that the results on the less popular artist, will hold more positive effects in terms of attention in the post period.

### Most Valuable Brands Popularity Indexation

The most valuable brands data set has a larger sample (N=58) which I have divided as well in 2 segments: The high popularity $= \geq 51$ ( N = 32) and the low popularity $= \leq 50$ (N=27). The reason why did not create more smaller samples is because it would have consequences on the validity of the results. In addition, the samples represent the popularity quite well due to the clear separation at 50. This data set follows the same 'superstar argument and statistical analysis will show whether lower popularity artist profit more in terms of attention.

# Results

## Super Bowl Results

### Super Bowl Analysis based on Differenced Time Series

Graph 8 shows the 1st differences plotted over time and Table 6 shows an overview of the total process. It is apparent that the mean of the pre-period is lower than the mean in the post period. While this suggest higher gain in the post intervention period and therefore an increase in attention after the advertisement, it has proven to be an unreliable method to conclude causality as it does not accurately represents the variance in the pre and post period (Dimitrov & Rumrill, 2003).

Table 7 shows the results of linear regression. There appears to be a strong evidence that no significant trend is present in the pre period differenced values indicating that the data in the pre period is stationary, Time =T , B = -.131, p = .257 and C =constant, B = 316, p = .572. Takin this into account, the visual inspection of graph 8 suggests a couple of interesting things. First of all, the post period is characterized with no immediate change directly after the intervention. Yet at T=2 there is a short leap upwards, followed by a visually strong indication of a trend downwards. This could indicate that around two weeks after the Super Bowl as possible effect of informational cascades created a trend in attention, yet the effects were of short duration and extremely wore off in the weeks after. Regression analysis of the 1st differences in post period indicates that there is no significant trend, meaning the post intervention data is stationary as well, Time =T , B =,150 p =.080 and C =constant, B = ,744, p = ,100. As both periods are stationary, there is no indication that the intervention had no effect on attention. In other words, this statistical test shows that having the music feature in a super Bowl Commercial does not seem to increase attention towards the artist.

However, it appears that there is a negative effect in having music featured in a super bowl ad as T= -.150. While the effect is not strong p = 0,08 it suggest that after the treatment, over time the attention decreases. In addition, although it is not significant the constant in the post period (.744) is notably higher than in the pre period (-.316) which is a possible explanation the quick leap upwards in the graph at T=2. Taken all together there is no

evidence that overall the attention increases after the music has been featured in an ad, yet it can be cautiously interpreted that although there is a minor increase at the beginning it considerably wears off over time.

**Table 6: Overview of indexed Super Bowl time series data: based on first difference**

| T | Sum Index =Y | Y/25 | 1st Difference $\Delta_{y1}$ | Pre Intervention Period | Post Intervention Period | Total |
|---|---|---|---|---|---|---|
| -8 | 2442.59 | 97.70 | 0.11 | Mean = 99,53 | Mean = 10.,42 | |
| -7 | 2459.34 | 98.37 | 0.67 | | | |
| -6 | 2476.13 | 99.05 | 0.67 | Mean$\Delta_{y1}$= 0.01 | Mean $\Delta_{y1}$= --0.15 | Mean$\Delta_{y1}$= $-0.07$ |
| -5 | 2503.73 | 100.15 | 1.10 | - | | |
| -4 | 2524.05 | 100.96 | 0.81 | | | |
| -3 | 2515.64 | 100.63 | -0.34 | | | |
| -2 | 2488.84 | 99.55 | -1.07 | | | |
| -1 | 2495.09 | 99.80 | 0.25 | | | |
| 0 | 2500.00 | 100.00 | 0.20 | | | |
| 1 | 2504.61 | 100.18 | 0.18 | | | |
| 2 | 2508.48 | 100.34 | 0.15 | | | |
| 3 | 2528.45 | 101.14 | 0.80 | | | |
| 4 | 2560.76 | 102.43 | 1.29 | | | |
| 5 | 2582.89 | 103.32 | 0.89 | | | |
| 6 | 2572.17 | 102.89 | -0.43 | | | |
| 7 | 2547.03 | 101.88 | -1.01 | | | |
| 8 | 2538.63 | 101.55 | -0.34 | | | |
| 9 | 2512.30 | 100.49 | -1.05 | | | |

*Note: T= -8 Is differenced from T= -9 which is 94.69,*

**Table 7: Regression results for differencing method. Attention = dependent variable**

| Pre intervention period | | | Post intervention period | | |
|---|---|---|---|---|---|
| | *B* | *Sig.* | | *B* | *Sig.* |
| Constant | -.315 | .572 | Constant | .744 | .100 |
| T | -.131 | .258 | T= | -.150 | .080 |
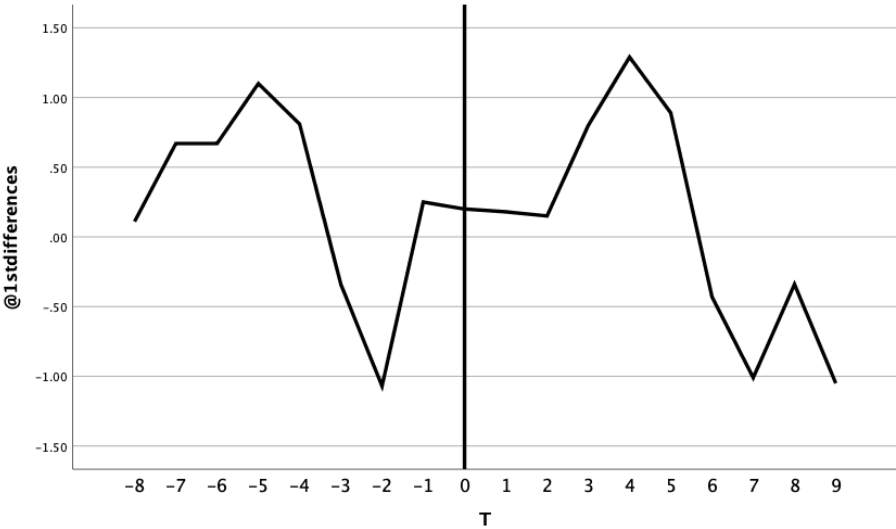


**Graph6: Super Bowl 1st differences over time**

## Super Bowl Analysis of Residuals

Table 7a and 7b summarize the results of this procedure and graph 7 plots the results of the predicted values. The mean scores of the residuals in the pre-intervention period are larger (.842) than the mean scores in the post intervention period (-.130) which suggest a negative effect of the intervention. Analysis of the residuals in the post period shows that over time there is no significant trend T = -.014 p= .286. Therefore, there is no statistically significant indication that the intervention had effect on the attention. However, the most surprising aspect of the data is the negative coefficient for time (-.014) in the post intervention period. Although it is relative to the visually apparent trend in pre-period and therefore should be interpreted with caution, it suggests that that in licencing music to appear in a super bowl commercial could have negative effects on attention over time.  Taken all together the results of both statistical methods, seem to indicate that in general there is no significant evidence that an advertisement in Super Bowl will have an effect on the attention and yet if there is an effect it would most likely be very minimal and severely were off over time.

*Table 7a:  Overview of results analysis of residuals Super Bowl*

| T | Sum Y | Y/25 | Predicted e | $\varepsilon = Y_t - e_t$ | |
|---|---|---|---|---|---|
| -8 | 2442.59 | 97.70 | 98.44 | -0.73 | |
| -7 | 2459.34 | 98.37 | 98.75 | -0.38 | |
| -6 | 2476.13 | 99.05 | 99.06 | -0.01 | |
| -5 | 2503.73 | 100.15 | 99.37 | 0.78 | Mean pre $\varepsilon$ |
| -4 | 2524.05 | 100.96 | 99.68 | 1.28 | |
| -3 | 2515.64 | 100.63 | 99.99 | 0.63 | =.842 |
| -2 | 2488.84 | 99.55 | 100.31 | -0.75 | Mean |
| -1 | 2495.09 | 99.80 | 100.62 | -0.81 | post $\varepsilon$= .130 |
| 0 | 2500 | 100.00 | 100.93 | -0.93 | |
| 1 | 2504.61 | 100.18 | 101.24 | -1.06 | |
| 2 | 2508.48 | 100.34 | 101.55 | -1.21 | |
| 3 | 2528.45 | 101.14 | 101.86 | -0.72 | |
| 4 | 2560.76 | 102.43 | 102.17 | 0.26 | |
| 5 | 2582.89 | 103.32 | 102.49 | 0.83 | |
| 6 | 2572.17 | 102.89 | 102.80 | 0.09 | |
| 7 | 2547.03 | 101.88 | 103.11 | -1.23 | |
| 8 | 2538.63 | 101.55 | 103.42 | -1.87 | |
| 9 | 2512.30 | 100.49 | 103.73 | -3.24 | |

*Note : The OLS regression formula for the pre intervention period is  Y = 100.928 + 0,311T*

**Table 7b: Regression results of residual analysis. Attention = dependent variable**

| Pre intervention period (Y/25) | | | Post ε | | |
|---|---|---|---|---|---|
| | *B* | *Sig.* | | *B* | *Sig.* |
| Constant | 100,928 | .000 | Constant | -.26 | .701 |
| T | .311 | .060 | T | -.014 | .286 |
| R² | 0.47 | | | | |
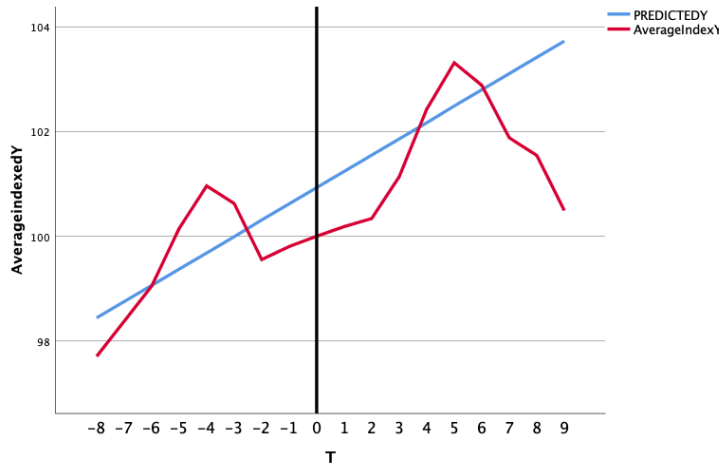


**Graph 7: predicted values and actual values over time**

## Robustness check

 Table 9 shows an overview of the results, excluding the observed outlier in the previous section. Graph 8 shows the 1st differences over time excluding the outlier. The only notable distinction seems to be apparent in the pre period where there is a slightly longer upwards trend towards the peak at T-5.  Table 10 shows the results of the regression analysis.  It appears that there is no significant trend over time in the pre period as, Time =T , B = 0.1, p = .49 and C =constant, B = .93, p = 023 indicating that the pre-period data is stationary. After regressing the post observation there appears to be no significant trend as well, which means that with the exclusion of the observed outlier there is no significant evidence that the intervention had an effect on the attention.
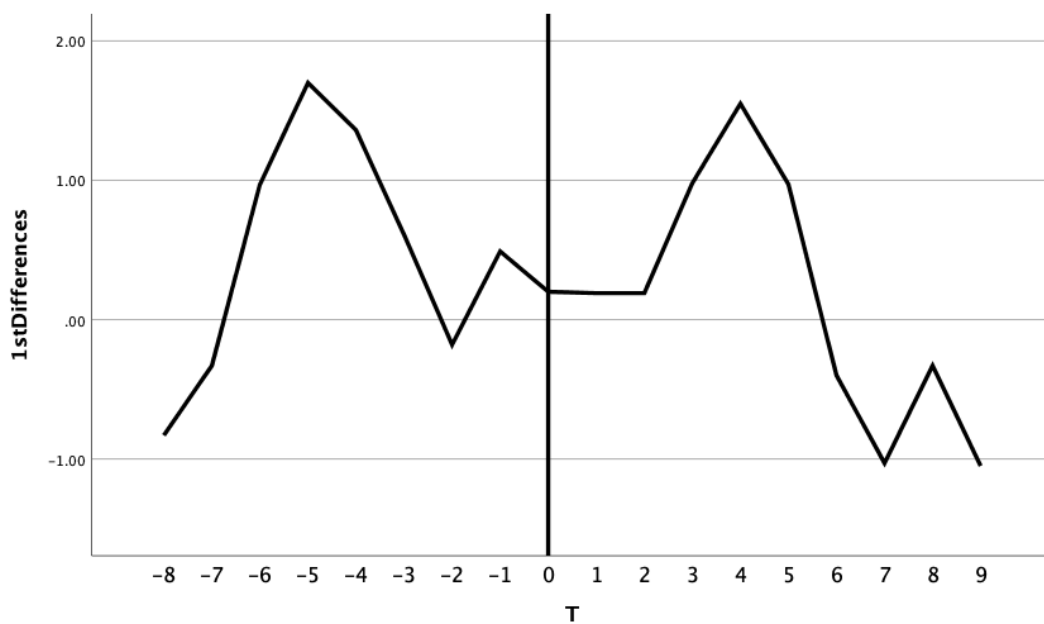
**Table 10: Regression results for differencing method with removed outlier. Attention = dependent variable**

| Pre intervention period | | | Post intervention period | | |
|---|---|---|---|---|---|
| | *B* | *Sig.* | | *B* | *Sig.* |
| Constant | 0,93 | 0,23 | Constant | 0,83 | 0,10 |
| T | 0,10 | 0,49 | T= | -0,16 | 0,10 |

**Table 9: overview of the results with removed outlier**

| T | Sum Y | Y/24 | 1st differences | Predicted e | $\varepsilon = Y_t - e_t$ |
|---|-------|------|-----------------|-------------|---------------------------|
| -8 | 2284.33 | 95.18 | -0.83 | 94.81 | 0.37 |
| -7 | 2276.40 | 94.85 | -0.33 | 95.61 | -0.76 |
| -6 | 2299.57 | 95.82 | 0.97 | 96.41 | -0.59 |
| -5 | 2340.39 | 97.52 | 1.70 | 97.20 | 0.31 |
| -4 | 2372.96 | 98.87 | 1.36 | 98.00 | 0.87 |
| -3 | 2387.59 | 99.48 | 0.61 | 98.80 | 0.69 |
| -2 | 2383.24 | 99.30 | -0.18 | 99.59 | -0.29 |
| -1 | 2395.09 | 99.80 | 0.49 | 100.39 | -0.59 |
| 0 | 2400.00 | 100.00 | 0.20 | 101.19 | -1.19 |
| 1 | 2404.61 | 100.19 | 0.19 | 101.98 | -1.79 |
| 2 | 2409.21 | 100.38 | 0.19 | 102.78 | -2.40 |
| 3 | 2432.64 | 101.36 | 0.98 | 103.58 | -2.22 |
| 4 | 2469.83 | 102.91 | 1.55 | 104.37 | -1.46 |
| 5 | 2493.14 | 103.88 | 0.97 | 105.17 | -1.29 |
| 6 | 2483.65 | 103.49 | -0.40 | 105.97 | -2.48 |
| 7 | 2458.88 | 102.45 | -1.03 | 106.76 | -4.31 |
| 8 | 2450.92 | 102.12 | -0.33 | 107.56 | -5.44 |
| 9 | 2425.63 | 101.07 | -1.05 | 108.36 | -7.29 |

**Note:** T-8 is differenced from T-9 which is 96.01. The regression formula for the predicted values is Y = 101.19 + 0.8T
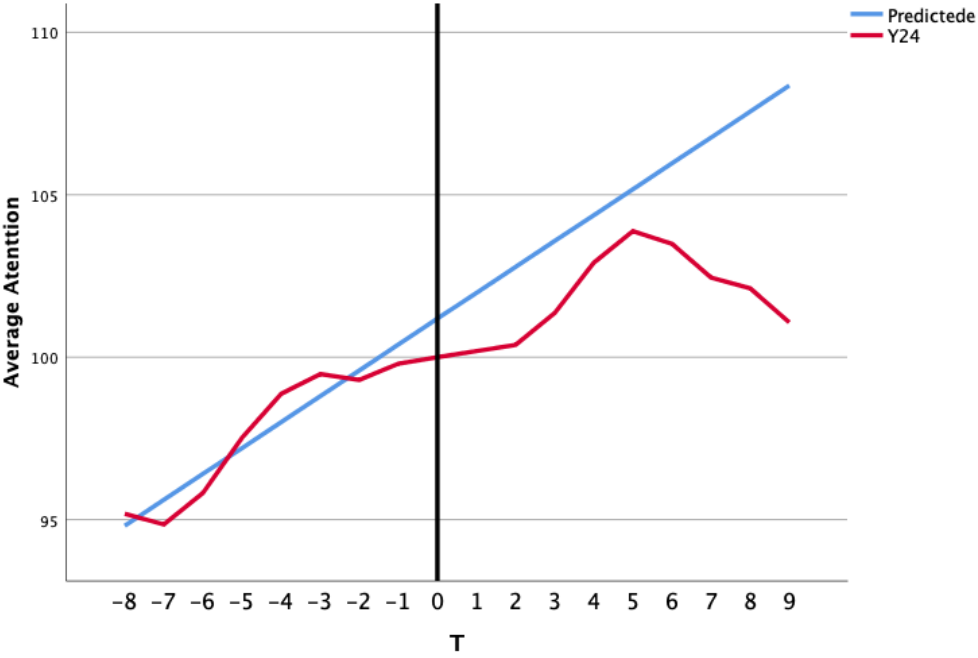


**Graph 8: 1st differences over time excluding outlier**

Table 11 shows the regression results concerning the predicted values. Visual inspection of graph 9 indicates a clearly visible difference in the post period between the actual and the predicted values, with the actual values being much lower than the predicted. Interestingly there appears a to be a significant negative trend of the residuals in the post period which cautiously indicates that in theory the intervention had effect on the attention, yet in a negative way. Taken together these results provide and interesting additional interpretation and are to some extent in harmony with the previous conclusion that there is no significant evidence that an advertisement in Super Bowl will have an effect on the attention. The additional evidence these results provide is that they seem to magnify the negative effects over time in the post period.

**Table 11: Regression results of predicted values with removed outlier  Attention = dependent variable**

| Pre intervention period (Y/24) | | | Post $\varepsilon$ | | |
|---|---|---|---|---|---|
| | B | Sig. | | B | Sig. |
| Constant | 101.19 | .000 | Constant | -0.51 | 0.50 |
| T | 0.80 | .000 | T | -0.55 | 0.00 |
| $R^2$ | 0.90 | | | | |



**Graph 9: Predicted values and actual values over time excluding outlier**

## Super Bowl Popularity analysis

## Analysis based on Differenced Time Series

Table 12 shows an overview of the results for both low and high popularity sub samples. Visual inspection of the graph 10 indicates that less popular songs increase in more attention after they appeared in a Super Bowl commercial following an upwards trend in attention in the pre-period, while highly popular songs see acquire less attention. After regressing the 1st differences of the pre-period for both the popular and less popular data, it appeared to be non-stationary as a significant trend over time was present. Therefore, it was necessary to 2nd difference the data and regressing the pre-period observations which removed the pre period trend. The results of the linear regression are summarized in table 13 and graph 11 plot the 2nd differences for the high and low subsamples. Regression analysis of the 2nd differences in in post period shows no significant results for either low or high popularity which supports the previous results that the advertisement did not have any significant effect on the attention.

**Table 12 overview results high and low popularity samples**

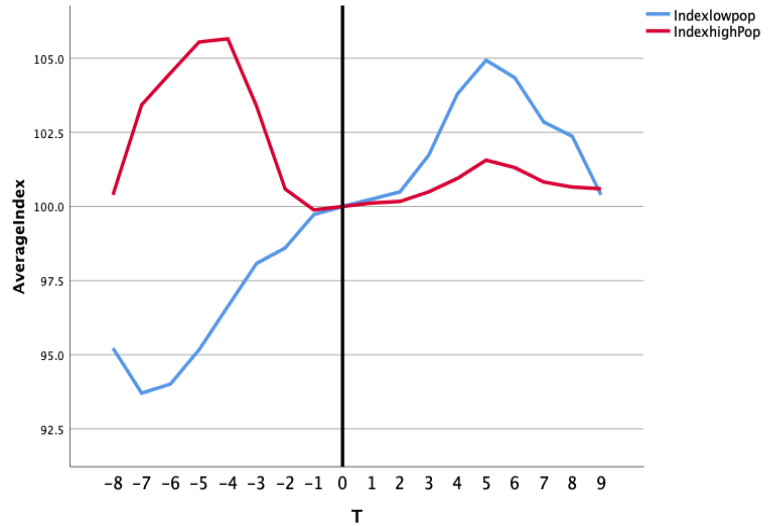| | Low Popularity | | | | | High Popularity | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| T | Index | 1st Dif | 2nd dif | Predicted Low | Rsd Low | Index | 1st Dif | 2nd Dif | Predicted Low | Rsd High |
| -8 | 95.22 | -1.71 | | 93.49 | 1.73 | 100.39 | 2.07 | | 103.80 | -3.41 |
| -7 | 93.70 | -1.52 | 0.19 | 94.32 | -0.61 | 103.43 | 3.04 | 0.97 | 103.55 | -0.12 |
| -6 | 94.01 | 0.31 | 1.82 | 95.15 | -1.14 | 104.50 | 1.07 | -1.97 | 103.30 | 1.20 |
| -5 | 95.17 | 1.16 | 0.85 | 95.98 | -0.81 | 105.55 | 1.05 | -0.02 | 103.05 | 2.50 |
| -4 | 96.63 | 1.46 | 0.31 | 96.81 | -0.18 | 105.66 | 0.11 | -0.94 | 102.80 | 2.86 |
| -3 | 98.08 | 1.45 | -0.01 | 97.64 | 0.44 | 103.39 | -2.27 | -2.38 | 102.55 | 0.84 |
| -2 | 98.60 | 0.52 | -0.92 | 98.47 | 0.13 | 100.58 | -2.80 | -0.53 | 102.30 | -1.71 |
| -1 | 99.73 | 1.13 | 0.60 | 99.30 | 0.43 | 99.88 | -0.70 | 2.10 | 102.05 | -2.16 |
| 0 | 100.00 | 0.27 | -0.86 | 100.13 | -0.13 | 100.00 | 0.12 | 0.82 | 101.80 | -1.80 |
| 1 | 100.25 | 0.25 | -0.02 | 100.96 | -0.71 | 100.12 | 0.12 | 0.00 | 101.55 | -1.43 |
| 2 | 100.49 | 0.25 | 0.00 | 101.79 | -1.29 | 100.17 | 0.05 | -0.06 | 101.30 | -1.12 |
| 3 | 101.73 | 1.24 | 0.99 | 102.62 | -0.88 | 100.49 | 0.32 | 0.27 | 101.04 | -0.55 |
| 4 | 103.80 | 2.07 | 0.83 | 103.45 | 0.35 | 100.95 | 0.45 | 0.13 | 100.79 | 0.15 |
| 5 | 104.93 | 1.13 | -0.93 | 104.28 | 0.66 | 101.56 | 0.62 | 0.16 | 100.54 | 1.02 |
| 6 | 104.34 | -0.59 | -1.72 | 105.11 | -0.76 | 101.31 | -0.25 | -0.87 | 100.29 | 1.02 |
| 7 | 102.85 | -1.49 | -0.90 | 105.94 | -3.08 | 100.83 | -0.48 | -0.23 | 100.04 | 0.78 |
| 8 | 102.37 | -0.49 | 1.00 | 106.77 | -4.40 | 100.66 | -0.17 | 0.31 | 99.79 | 0.86 |
| 9 | 100.39 | -1.97 | -1.48 | 107.60 | -7.20 | 100.60 | -0.06 | 0.11 | 99.54 | 1.06 |

**Note:** *Rsd = residuals. Dif = difference and T-8 is differenced from T-9 which is 96.93 low and 98.32 for high. The OLS regression formula for the low popularity pre intervention period is Y = 100.13 + 0.83T. The OLS regression formula for the high popularity pre intervention period is Y = 101.80 -0.25T.*

**Table 13a: Regression results 1st difference**

| Low Popularity | | | High Popularity | | |
|---|---|---|---|---|---|
| | *B* | *Sig.* | | *B* | *Sig.* |
| Constant | 2.16 | 0.02 | Constant | -3 | 0.015 |
| Time | 0.402 | 0.03 | Time | -0.709 | 0.007 |

**Table 13b: Regression results 2nd Difference**

| | | Low popularity | | High Popularity | |
|---|---|---|---|---|---|
| | | *B* | *Sig.* | *B* | *Sig* |
| **Pre** | Constant | -0.326 | 0.655 | 0.164 | 0.913 |
| | Time | -0.183 | 0.288 | 0.140 | 0.680 |
| **Post** | Constant | -0.974 | 0.467 | 0.358 | 0.168 |
| | Time | 0.260 | 0.261 | -0.072 | 0.106 |



**Graph 10: Indexed low and high popularity over time**
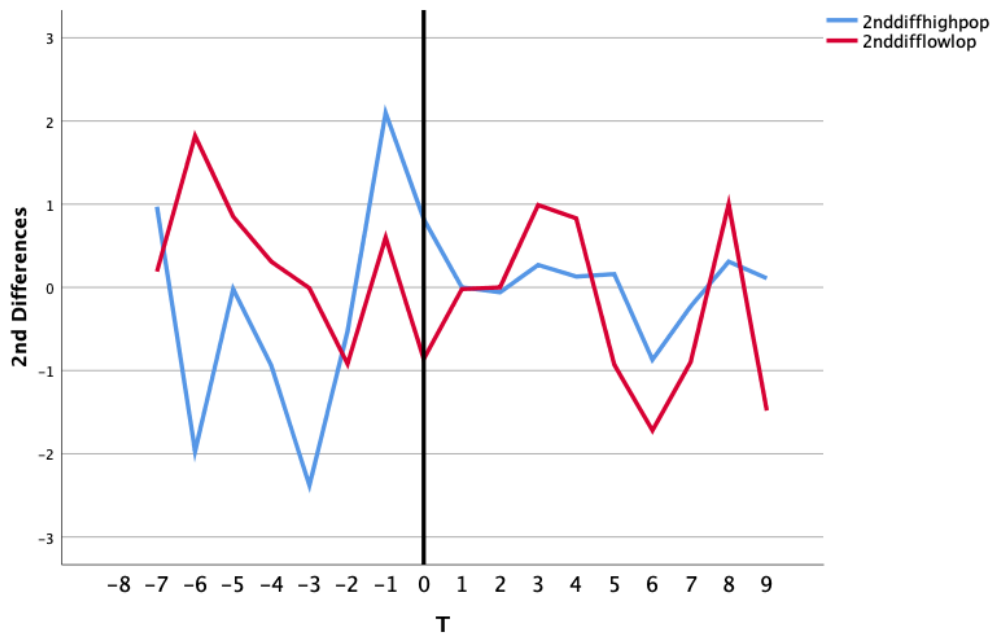


*Graph 11: 2nd differences over time high and low popularity Super Bowl*

Graph 12a and 12b show the plotted results of predicted and actual values of the low and high popularity data sets and table 14 shows the results of the popularity analysis based on the residuals. Visual inspection of graph 12a and 12b indicates that for highly popular songs there is a very clear downward trend visible with a stabilisation and minor increase after the intervention, while for the less popular it seems that there is no indication that the intervention clearly affected the attention as it continues the upwards trend of the pre-period.

Regression analysis of the residuals shows that both the low popular and highly popular songs have a significant trend in the post period. Yet it appears that the coefficients for lower popular songs are lower (-0,52) than the coefficients for the high popular songs (0,28). This means that while both popular and less popular songs are affected by the super bowl the less popular songs would over time get less attention than the more popular songs.

 Therefore, the hypothesis that less popular artist who licenced their music for commercials, benefit relatively more in attention, in comparison to more popular artists is rejected. This however should be interpreted with caution as the results of the post period are relative to the pre-period. For highly popular songs there is a very clear downward trend is visible in the pre-period, which suggest that advertisers deliberately chose these songs to sort of reignite the attention and deviate it towards the brand which could be interpreted from graph 12a, as there Is a stabilization at T =0 followed by a slight upwards trend in the post period. The slight increase in attention in the post period of the less popular songs should be interpreted with caution as well as there is already an upwards trend in the pre-period and it does not seem that the intervention amplified the effect.

**Table 14: Regression results analysis of residuals.**

|  |  | Low popularity | | High Popularity | |
|---|---|---|---|---|---|
|  |  | B | Sig. | B | Sig |
| **Pre** | Constant | 100.13 | 0.00 | 101.80 | 0.00 |
|  | Time | 0.83 | 0.00 | -0.25 | 0.53 |
| **Post ε** | Constant | 0.69 | 0.50 | -1.37 | 0.00 |
|  | Time | -0.52 | 0.01 | 0.28 | 0.00 |
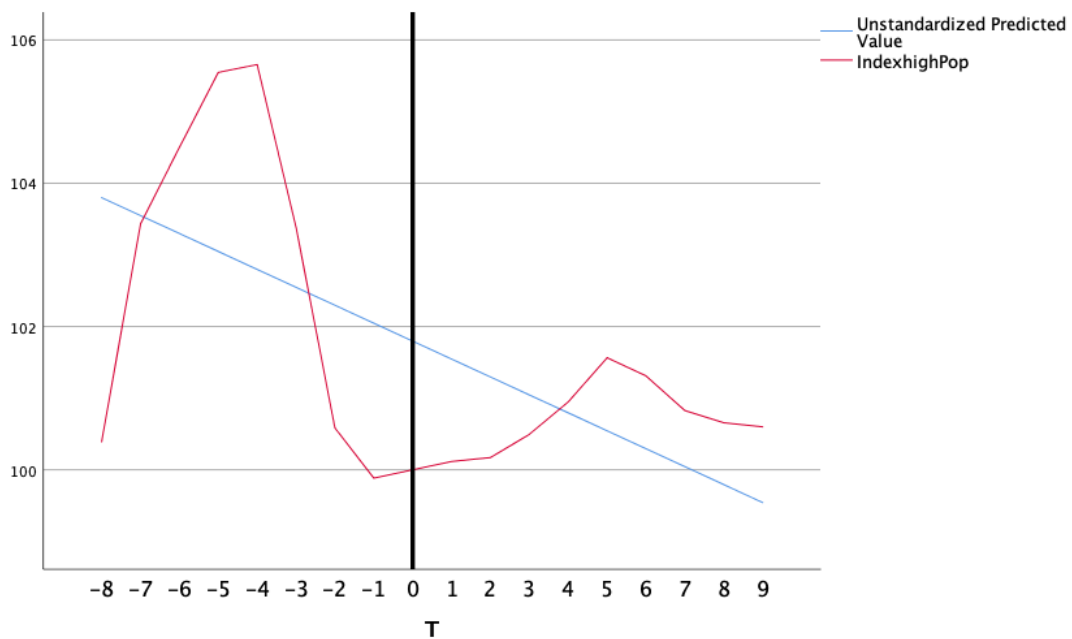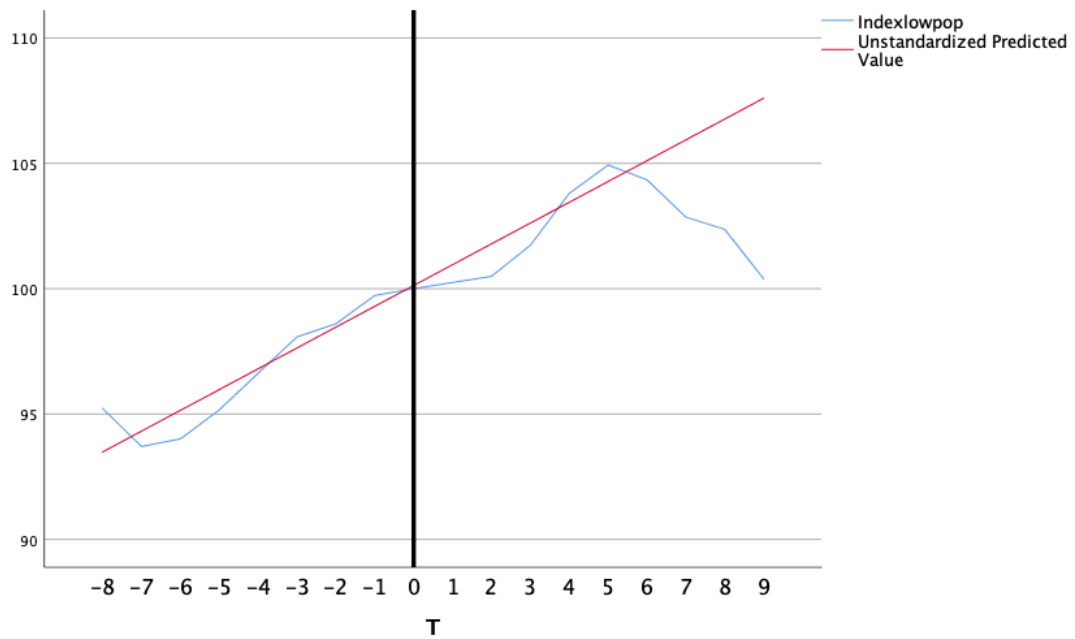




**Graph 12a and 12b: Actual and predicted values low popularity and high popularity**

## Summary of Results Super Bowl

With regards to Super Bowl we can reject H1 and H2. The results seem to indicate that artist do not profit in attention from featuring their music in a Super Bowl commercial, if measure in Spotify listeners and when divided in popular and less popular artist is seems that highly popular artist benefit more than less popular artist.

## Most Valuable Brands Results

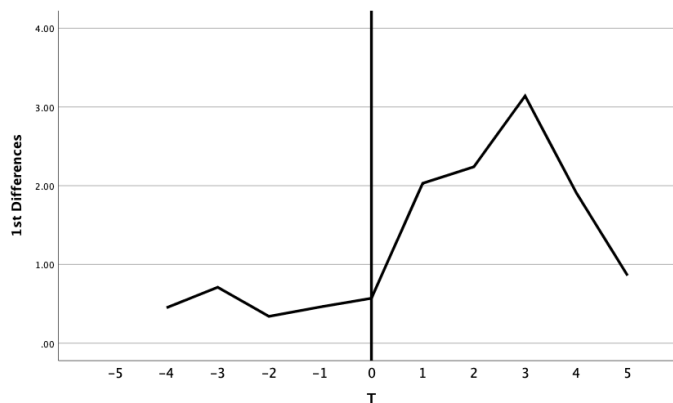### Most Valuable Brands Analysis based on Differenced Time Series

Table 15 shows the results of the analysis based on 1st differences for the Most Valuable Brands Data set. The mean in in the post period is higher than the mean in the pre-period which suggest an increase of attention in post period. Table 16 provides the results of the linear regression performed on the 1$^{st}$ differences. The data in the pre-period shows no significant trend, p = ,72 which indicates that the data is stationary. Visual inspection of the 1st differences over time in Graph 13 indicates a clear upwards trend in post period, relative to a rather stable sequence in the pre-period. This suggests that the intervention had an effect on the attention. After regressing the post period 1$^{st}$ differences, the results seem to correspond partly with the expectations from the visual analysis as on the one hand there is no significant trend over time in the post period, the constant in the post period is significantly higher B= 1.64 , p = 0.01. This result is quite revealing as it indicates that after the intervention there is a quick and significant increase in attention, yet the effect wears of over time as there is no significant trend. In addition, the attention indicator for the pre-period is lower than in the post period which although it is not significant, does tentatively indicate that the in attention in post period increases more than in the pre-period. These results must therefore be interpreted with caution as they suggest that while the intervention had an initial strong and positive effect on the attention towards an artist, the effect is not consistent over the entire post period as the there is no trend apparent.

**Table 15: analysis based on 1st difference**

| T | Sum Index = Y | Sumy/25 | 1st Difference $\Delta_{y1}$ | Mean Pre | Mean Post |
|---|---|---|---|---|---|
| -5 | 5653.55 | 97.48 | | 98.94 | 105.54 |
| -4 | 5679.53 | 97.92 | 0.45 | | |
| -3 | 5720.74 | 98.63 | 0.71 | | |
| -2 | 5740.37 | 98.97 | 0.34 | | |
| -1 | 5767.12 | 99.43 | 0.46 | | |
| 0 | 5800.00 | 100.00 | 0.57 | | |
| 1 | 5917.85 | 102.03 | 2.03 | | |
| 2 | 6047.52 | 104.27 | 2.24 | | |
| 3 | 6229.90 | 107.41 | 3.14 | | |
| 4 | 6340.95 | 109.33 | 1.91 | | |
| 5 | 6391.05 | 110.19 | 0.86 | | |

**Table 16:  Regression results for differencing method Most Valuable brands sample.  Attention = dependent variable**

| Pre intervention period | | | Post intervention period | | |
|---|---|---|---|---|---|
| | B | Sig. | | B | Sig. |
| Constant | 0.407 | 0.215 | Constant | 1.65 | 0.01 |
| T | -0.03 | .728 | T= | 0.06 | 0.83 |



**Graph 13: 1st differences most valuable brands over time**

## Most Valuable Brands Analysis of Residuals

 Table 17 shows an overview of the results. The mean score of the residuals in the post period is higher (4,24) than in the pre-period (0) which suggest that the intervention had effect on the attention. Graph 14 shows the predicted values and the actual values of y, and visual inspection supports the assumption that intervention had an effect as a clear upwards trend is present after the intervention. Table 18 shows the results of the regression analysis.

It is apparent that the residuals in the post period show a significant positive trend over time B, 1,67, p = 0,00 which indicates that the effect of the intervention is stronger than what is predicted by the regression model indicating that the intervention had a positive effect on the attention over time, Therefore, the hypothesis that artists who had their music featured in  commercials of brands that appeared Forbes Most Valuable Brands of 2019, have profited in terms of attention is accepted.

**Table 17: overview of regression analysis Most Valuable Brands sample**

| T | Sum Y | Y/58 | Predicted e | $\varepsilon = Y_t - e_t$ | |
|---|-------|------|-------------|---------------------------|---|
| -5 | 5653.55 | 97.48 | 97.49 | -0.02 | Mean pre $\varepsilon = 0$ |
| -4 | 5679.53 | 97.92 | 97.99 | -0.07 | Mean post $\varepsilon = 4.24$ |
| -3 | 5720.74 | 98.63 | 98.49 | 0.15 | |
| -2 | 5740.37 | 98.97 | 98.98 | -0.01 | |
| -1 | 5767.12 | 99.43 | 99.48 | -0.05 | |
| 0 | 5800.00 | 100.00 | 99.98 | 0.02 | |
| 1 | 5917.85 | 102.03 | 100.47 | 1.56 | |
| 2 | 6047.52 | 104.27 | 100.97 | 3.30 | |
| 3 | 6229.90 | 107.41 | 101.47 | 5.95 | |
| 4 | 6340.95 | 109.33 | 101.96 | 7.36 | |
| 5 | 6391.05 | 110.19 | 102.46 | 7.73 | |

*Note : The OLS regression formula for the pre intervention period is  Y = 99.98 + 0.5T*

**Table 18 : Regression results for analysis of residuals Most Valuable. Attention = dependent variable**

| *Pre intervention period (Y/58)* | | | *Post $\varepsilon$* | | |
|---|---|---|---|---|---|
| | *B* | *Sig.* | | *B* | *Sig.* |
| Constant | 99.98 | .000 | Constant | 0.13 | .79 |
| T | 0.50 | .000 | T | 1.67 | .000 |
| $R^2$ | 0.99 | | | | |
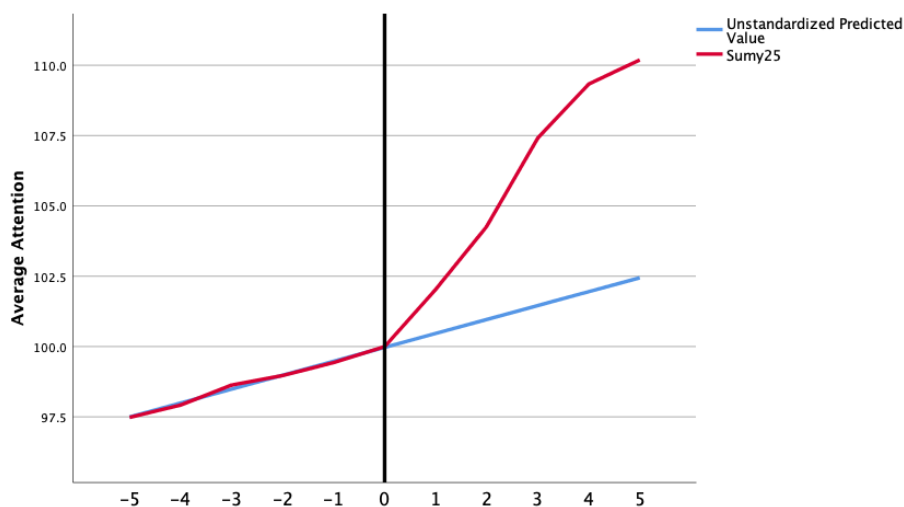


**Graph 14: Predicted vs Actual data Most Valuable Brands**

Graph 15 shows the plotted results of the indexed data on popularity. Similarly, as with the super bowl data set it is visible that less popular songs seem to gain more attention after the treatment than highly popular songs. For less popular songs both the pre and post period is characterised with an upwards trend, yet It seems that after the intervention the trend is substantially amplified which suggests a strong effect of the intervention.  The more popular songs seem to have a relatively small increase after the intervention relative to a rather stable sequence in the pre period. Table 19 shows an overview of the high and low popularity samples and table 20 presents the results of the differencing method. The pre-intervention period of both low and high popularity data is characterized with no significant trend over time, indicating that the data is stationary. Interestingly there is no significant trend apparent in the post observations of neither the low or high popularity data which indicates stationarity as well and implies that that the intervention had no effect on the attention.

Visual inspection graph 16 which shows the first differences over time indicates that a very steep trend upwards with a high peak at T= 3 followed by strong decrease in attention. Although it is not significant and therefore should be interpreted with caution the constant in the post period (2.64) is noteworthy higher than in the pre period (0.96) which explains the quick increase in post period. The higher popular songs also have an increased constant yet not as noteworthy as with the lower popular songs and the negative coefficient for time in post period also seems to indicate that that the attention towards higher popular songs seems to decrease over time.

Taken all together the regression results are not in perfect harmony with the visual indication of the graphs. On the one hand the graphs indicate a clear increase after the intervention, in general it seems that the differencing method did not find any significant evidence that lower popular songs profit more in attention in comparison to more popular songs after appearing in a commercial.

**Table 19: Overview of high and low popularity sub samples**

| | Low Popularity | | | | High Popularity | | | |
|---|---|---|---|---|---|---|---|---|
| T | Index | 1st dif | Predicted e | Rsd | Index | 1st dif | Predicted e | Rsd |
| -5 | 95.75 | | 95.69 | 0.07 | 98.97 | | 99.07 | -0.10 |
| -4 | 96.29 | 0.54 | 96.45 | -0.15 | 99.34 | 0.37 | 99.33 | 0.01 |
| -3 | 97.39 | 1.10 | 97.21 | 0.18 | 99.71 | 0.37 | 99.60 | 0.11 |
| -2 | 97.79 | 0.39 | 97.97 | -0.18 | 100.00 | 0.29 | 99.86 | 0.14 |
| -1 | 98.82 | 1.03 | 98.74 | 0.08 | 99.97 | -0.03 | 100.13 | -0.16 |
| 0 | 100.00 | 1.18 | 99.50 | 0.50 | 100.00 | 0.03 | 100.40 | -0.40 |
| 1 | 102.79 | 2.79 | 100.26 | 2.53 | 101.37 | 1.37 | 100.66 | 0.71 |
| 2 | 106.54 | 3.75 | 101.02 | 5.52 | 102.29 | 0.92 | 100.93 | 1.36 |
| 3 | 112.42 | 5.88 | 101.79 | 10.63 | 103.05 | 0.76 | 101.19 | 1.86 |
| 4 | 115.97 | 3.55 | 102.55 | 13.43 | 103.54 | 0.49 | 101.46 | 2.08 |
| 5 | 117.66 | 1.68 | 103.31 | 14.34 | 103.69 | 0.15 | 101.73 | 1.96 |

**Table 20: Regression results 1st difference**

| | | Low popularity | | High Popularity | |
|---|---|---|---|---|---|
| | | B | Sig. | B | Sig |
| **Pre** | Constant | 0.96 | 0.199 | -0.07 | 0.671 |
| | Time | 0.08 | 0.718 | -0.13 | 0.132 |
| **Post** | Constant | 2.65 | 0.117 | 0.78 | 0.12 |
| | Time | 0.20 | 0.675 | -0.06 | 0.655 |
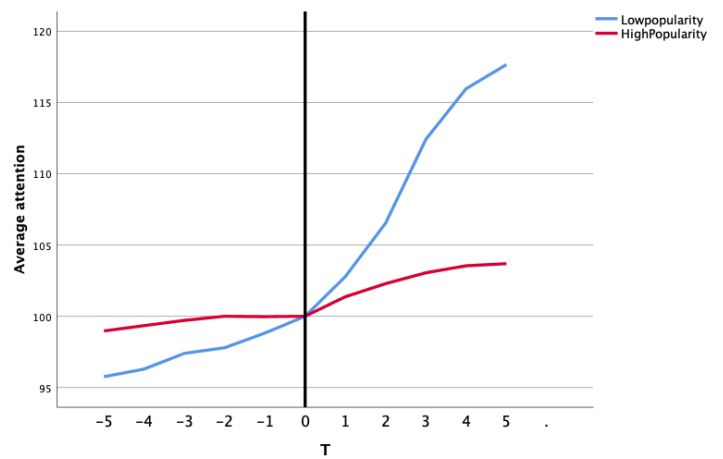


**Graph 15: indexed data high/low popularity**
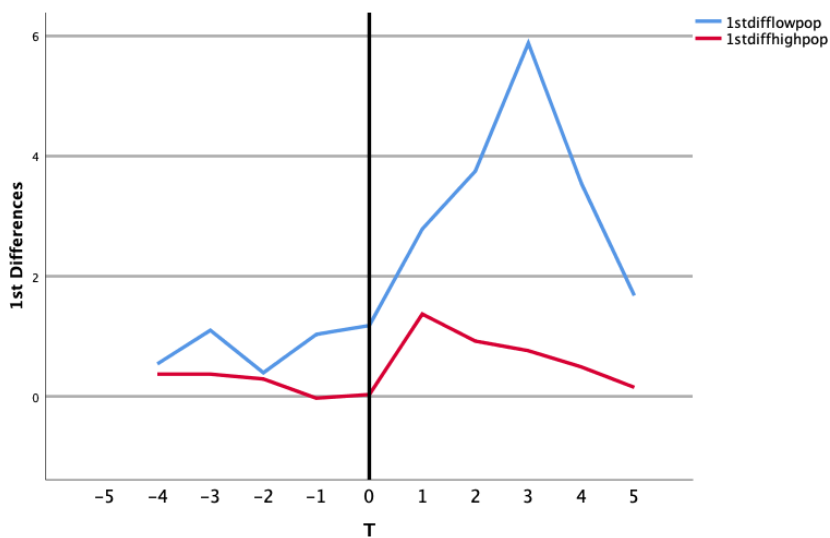


**Graph 16: 1st differences high and low popularity Most Valuable brands**

Graph 17 shows the plotted results of the actual and predicted data of both the low and high popularity data sets. Interestingly for both high and low popularity data the pre period is very similar whereas the post period is characterized with an increase. Table 21 shows the results of the predicted values and residuals of the low and high popularity data sets. The regression analysis for the residuals indicates that there is a significant positive trend in the post period which means that there is an indication that the intervention affected the attention for both popular and less popular songs as the predicted values are lower than the actual values. Looking at the coefficients for time of the residuals in the post period it appears that the effect on less popular artists is higher (B=3,06) than with highly popular artists ( B = 0,47). Therefore for the Most Valuable Brands data set we can accept the hypothesis that less popular artist who licenced their music for commercials, benefit relatively more in attention, in comparison to more popular artists.

**Table 21: Regression results analysis of residuals Most valuable Brands**

|  |  | Low popularity | | High Popularity | |
|---|---|---|---|---|---|
|  |  | B | Sig. | B | Sig |
| **Pre** | Constant | 99.50 | 0,00 | 100.40 | 0,00 |
|  | Time | 0.76 | 0,00 | 0.27 | 0.01 |
| **Post ε** | Constant | 0.18 | 0.84 | 0.09 | 0.79 |
|  | Time | 3.06 | 0.00 | 0.47 | 0.01 |
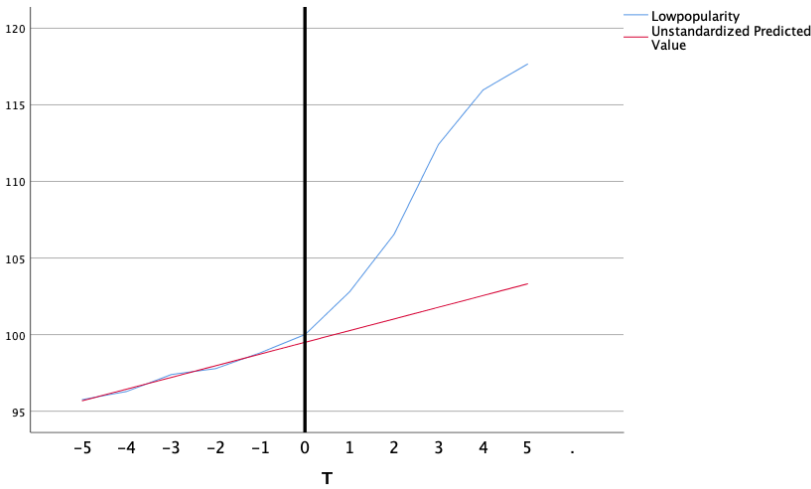


**Graph 17a Predicted vs actual values low popularioty**
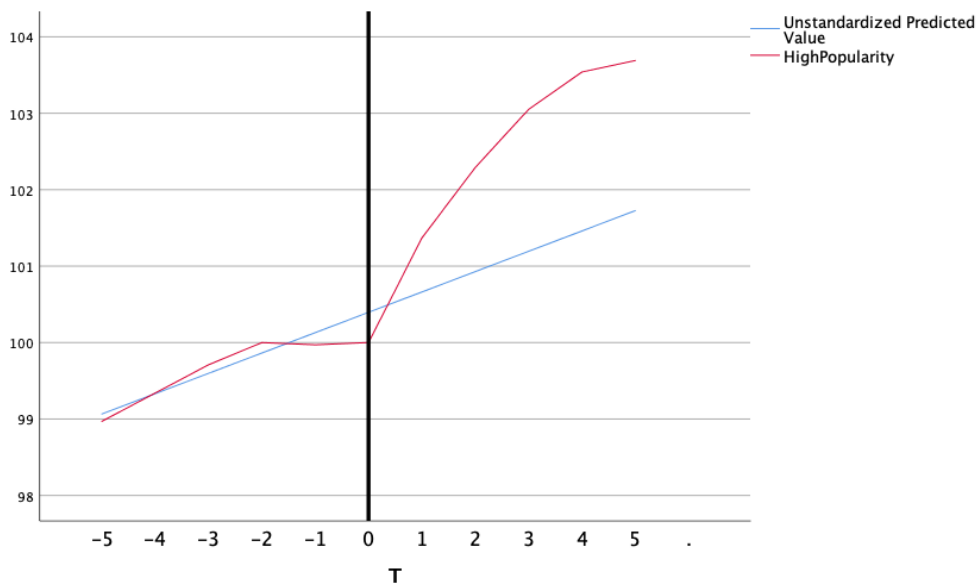
**Graph 17b: Predicted vs actual values high popularity**

## Summary of Results Most Valuable Brands

Taken all together the results indicated that in general we do not reject H3 and H4. Although it must be interpreted with caution there is an indication that if measured in Spotify listeners ,artist benefit in attention from featuring their music in a commercial of a Most Valuable brand. Moreover if divided in popular and less popular artist is seems that less popular artist benefit more.

# Discussion

The main goal of this study was to answer the question whether artist profit from having their music featured in an advertisement. The project was undertaken by analysing (1) all Super Bowl 2020 TV Commercials which contained a commercially available song; and (2) All TV commercials from brands that appeared on the Forbes Most Valuable Brands of 2019 list, which also contained a commercially available song.

To create a clear overview, there are several key findings from this study.

(1) With regards to the Super Bowl the study finds no significant evidence that over time, artists who have their music featured in a Super Bowl commercial have profited in terms of attention, hence H1 is rejected

(2) After the Super Bowl it appears that highly popular artists benefit more in terms of attention than less popular artists, Hence H2 is rejected.

(3) Concerning Most Valuable brands, there is an indication that artist benefit in attention from featuring their music in a commercial, hence H3 is not rejected

(4) It appears that less popular artists benefit relatively more in attention, than highly popular artists from featuring their music in a commercial of a Most Valuable Brand, hence H4 is not rejected

## Super Bowl Advertising and Music

It is interesting to note that concerning the Super Bowl, both H1 and H2 are rejected. It would seem that, with millions of people watching at the same time and the additional strong focus on advertising, the effects on the artist would be bigger. Even if a small percentage of the million people watching, started to listen to the artist after the event, informational cascades would develop an increase in attention over time, yet there is no significant indication that this occurred.

This rather contradictory result could be explained by the fact that all Super Bowl commercials air on the same day and around the same time. There is some form of mystique

that surrounds the commercial as advertisers tease very small samples of the advertisement, on the days leading to the main event. Yet it the end it all comes down the +- 30 seconds that are reserved during the commercial break. It seems possible that the high number of commercials during the Super Bowl could water down the effects severely and burden the possibility to draw the attention of the consumer towards the artist, rather than the brand.

In addition, the fact that the commercials on the Super Bowl are all released on the same day and do not follow a conventional advertising campaign afterwards,  is related to the fragility in the informational cascade (Bikhchandani et al., 1992). The fact that the 'information' which in this case is the advertisement is only released once, implies that any other significant information in the future may cause a change in the behaviour and break up the cascade (Bikhchandani et al., 1992). If the Super Bowl commercials would be consequently aired on TV after the Super Bowl, then there would be more chance to either continue or reignite the informational cascade.

The observed results that directly after the Super Bowl there is a minimal increase in attention which severely wears off over time corroborates well with this logic.  It is highly likely that the intensity of the event started a minor informational cascade directly after the event and severely decreased over time.

*Super Bowl and Superstars*

The results showed that highly popular artist benefit more in terms of attention than less popular artist after the event was surprising, but not totally unexpected.
Although, these results differ from some published studies (Klein, 2009; Taylor, 2012) who observed that there is a trend regarding unknown or less popular artist gaining fame due to advertising, they are consistent with Superstar effects in general

The results indicated that if there is any attention, it would most likely be concentrated on well-established or highly popular artist following the 'superstar' principle (Adler, 1985; Rosen, 1981). Even though it is clear that the popularity of highly popular songs in the Super Bowl is decreasing in the pre-intervention period, it proves that the superstar identity is

invulnerable to some extent. To put it more clearly, even if the popularity is decreasing, a superstar remains a superstar which in theory mirrors the research of Ohanian(1991) that advertisers will most likely license the songs of well established artists rather than smaller bands. Hence the chances for less popular artist, to gain in attention are watered down due the presence of Superstars.

## Most Valuable Brands Advertising and Music

For this sample both H3 and H4 were accepted and the results showed that in general it can be suggested that featuring music in a 'regular' advertisement could have more effect on the amount of attention the artist receives in comparison to highly popularized and big budget advertisements that appear in the Super Bowl.

I deliberately use the word regular as even tough advertisements of most valuable brands most likely have a large budget as well, they follow the conventional manner of advertising. All commercials are launched separately from each other at a specific date and are bound to a certain time frame that they run on television. Unlike with the Super Bowl the effect on attention is more gradual as the advertisements over a longer period of time. There are more possibilities for hearing to song, more potential to remember the song and therefore greater chance the attention will be driven by informational cascades.

What is surprising is that the results both statistical methods seem to have indicated that intervention had an effect on the attention yet in different ways. Whereas the differencing method suggested that there is an initial very strong effect of the intervention, which wears off over time, the analysis of residuals showed a significant trend in the post period over time indicating an increase in attention.

In theory the results to some extent correspond with the results of the Super Bowl. They show that after the release of a commercial there is an initial effect on the attention towards an artist, which was also present after the Super Bowl. The difference in whether these effects increase or decrease relates to the framework the advertisement is released in which is either a one-time mass popularized event or a traditional advertising campaign.

*Most Valuable Brands Advertising and Popularity*

In addition, the results indicate that low popularity artists profit significantly more in attention in comparison to high popularity artists when featured in a 'regular' Most Valuable Brand commercial. These results are quite surprising as they cautiously indicate that mass events are more beneficial for superstars, and individual 'regular' commercials seem to have an advantage for less popular artists. This finding is in agreement with the idea that 'regular' advertising holds more career enhancing possibilities for lesser known or upcoming artists (Klein, 2009; Taylor, 2012) and ads additional evidence that this most likely happens because they are not overshadowed by Superstars in big events.

## Limitations

Several limitations in this study must be acknowledged. First of all, the study was limited by analysing two rather small and very different samples which was a result of certain data restrictions and therefore the results should interpret with a fair amount of caution.

With regards to the statistical methods used a natural limitation of the differencing method is that data is clipped which could been why the results regarding the Most Valuable Brands differed. In addition, the predicted values after the regression analysis were based on a rather short time frame in the pre-intervention period, making it difficult to assume a linear relationship between time and attention.

Another weakness in the study was that the attention towards an artist was measured exclusively from the number of listeners on Spotify. The logic behind using Spotify was generally build around the assumption that considering Spotify is the biggest and most widely spread streaming platform, it would most likely be a suitable platform to measure artist attention. Yet it does not take away that people after seeing the commercial, could start listening to the artist on another platform as obviously not everyone has subscription on Spotify. Moreover, the popularity of the artists was defined with the use of Spotify's own method of popularity indexation, contributing to a rather biased definition of popularity.

## Avenues for Future Research

Taken all together a number of possible future studies using the same experimental set up could be considered. First of all, to enhance the possibility for more generalized results future research should include other music listening platforms such as Tidal, Deezer and YouTube, and also analyse the position of the song in charts relatively to the day the commercial was released. In addition, the issue concerning the association between mass (advertising) events and artists popularity is quite intriguing which could be usefully explored in future research. It would be interesting to include other mass broadcasted events that include advertising, such as the Champions League, the European/World Football Championship and the Olympic Games, to see whether there is a same association with popular and less popular artists. By including several mass events it would also be possible to assess more thoroughly whether mass advertising burdens the possibility to draw the attention of the consumer towards the artist, rather than the brand.

Another possible avenue for further research would be to focus on a specific industry in advertising to create more detailed results. Advertisements of for example the beer and automotive industries, often include commercial music in their advertisements and if it possible to retrieve enough data, it would be interesting to assess whether specific industries hold more beneficial effects for the artists.

## Conclusion

The main goal of this study was to answer the question whether artists profit from having their music featured in an advertisement. This study has found that, in general featuring music in a commercial that is related to a Most Valuable Brand, classified as 'regular', has a more positive outcome on the attention towards an artist, than featuring music in a mass advertising event such as the Super Bowl. Furthermore, this study shows that with regards to popularity, less popular artists benefit more in terms of attention if the advertisement is released in an independent way and more popular artist profit from mass promoted events

The findings enhance our knowledge of the relationship between advertising and music, and the study has thrown up many questions in need of further investigation. The insights provided may be useful for both artists and the advertisers, not only from the creative point of view but also the more economic and business side. At the start of this study I mentioned that if an advertisement is the cake, then the music used in it, is the cherry on top. Right now, it is fair to say that whether you remember the cherry, really depends on the taste of the cake.

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