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Does popularity and proximity to a solo exhibition have an impact on online attention?

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Simone Stunz
Student Number: 417317
Email: 417317ss@eur.nl
Master: Cultural Economics and Entrepreneurship

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1. Abstract

Online based research inherits opportunities for visual artists and exhibition spaces that have not yet been extensively explored. Specifically, the primary art market is usually avoided in research, related to issues such as uncertainty and non-transparency. Platforms such as Artfacts.Net and Google Trends offer research opportunities that can be applied for contemporary research. For this master thesis, the impact of 208 exhibitions on online attention in the Netherlands has been explored. Within the framework of the quasi-experimental design the time-series analyses have been used to define both popularity and proximity impacts on online attention before and after the exhibition. While the results show a significant impact of popularity on online attention, the trend has rather a short-term impact. The proximity of an exhibition has been explored for the province of the Dutch capital; North Holland in comparison to the other provinces in the Netherlands. Although this analysis shows a relation of the online attention to the proximity, due to a small sample size it is deemed non-significant. In other words, scaled online attention is on average higher in closer proximity to North Holland, but the results should further be confirmed by a larger sample of observations.

2. Introduction

The interest in online based research combined with the curiosity for market behaviours in relation to visual artists have motivated me to build the research around these topics. The specific interest lies in the reputation of artists and how it can be measured. Quasi-Experimental research design is selected for this thesis due to the fact that it allows for the analysis on a time scale. The interest in the theoretical side is also linked to the reputation, especially with regards to the Artfact.Net reputation based index. The lack of understanding of the valuation mechanisms on the primary art market influenced the platform to develop their own reputation based ranking for artists and institutions. By building a reputation based index Artfacts.Net manages to define the value of an artist not accounting for the actual sales numbers. Schoenfeld and Reinfelder (2006) describe the value of art as a social construct, which is based on the indicators such as exposure in form of exhibitions and the location where the exhibition is held. Therefore, it is not only sales which matter for the career of an artists[1]. Artfacts.Net is listing some of their indicators publicly. These are explained in the description for the variable of the artist ranking. This ranking can, moreover, still be used as a variable to analyse the correlation of such ranking to the sources which do not originate from the ranking but might have an impact on it.

The interest in the reputation of artists and the impact of awards on online attention is what motivated me to write the Bachelor thesis. The research was focused on photography awards and the panel data was retrieved from google trends. The panel included a short period prior to the announcement and after the announcement of the award. Subsequently, the results concluded an increase in online attention for the artist. Moreover, in my bachelor thesis I have linked the event defined by increased attention to the ceremony of the award in comparison to the press announcement of the winner. When the ceremony and the announcement peaks, the level of online attention changes. Thereby, based on the previous research on the awards this project has the aim to look at another type of cultural event with the expectancy to further contribute to the theory.

The research question that is aimed to be answered in this thesis is: *What impact does a solo exhibition have on online attention?* Since the impact of events on the reputation of the artist has been explored by myself but also by researchers, the exhibition is analysed with regards

[1] Unfortunately, Artfacts.Net is not communicating their complete algorithm that includes the reputation variables so that an analysis of the ranking including the most influential variables would be possible.

to its impact on online attention considering the period before in relation to the period after the exhibition.

Events in the cultural sector are meant to increase the attention for the exhibitions the institutions organise. The phenomenon of *Eventification* has evolved into the commoditization of exhibitions and spread towards an increase in fairs, awards and festivals. The Vernissage is a part of the treatment of the exhibition as the first day of the exhibition period. As the conglomeration of visitors with the aim to increase visibility in the form of attracting more visitors and positive reviews for the exhibition itself (Jakob, 2013) the Vernissage presumably has an impact at the time of the exhibition. At the same time, this trend might decrease during the period of the exhibition which would lead to a lower average scaled mean in the post-period after the exhibition. The impact is, therefore, analysed with regards to the pre- and post-period before and after the exhibition.

The first part of the research is meant to show that the online attention increases shortly before the exhibition and drops shortly after the exhibition followed by the analysis of the regional impact on online attention. The event in this research is the solo exhibition from the top 300 ranked artists on Artfacts.Net. What makes the research different from the prior research is the analysis of the three distinct influence aspects on online attention. These are the impacts of the artist's reputation related to the top 300 artists, the regional impact and the proximity of online attention in the Netherlands, and the weekly and daily comparison for both aspects of the research. The theoretical framework behind this research is, furthermore, based on the three topics: the artist's reputation, the reputation of the institution he or she is linked to, and the literature related to the economics of attention. Additionally, the valuation mechanisms are derived from hedonic methods (Lancaster 1966) of analysing the value of art, the theory of demand explains the notion of uncertainty on the primary art market and the regional aspect is linked to the literature on economic geography. The methods are informed by the research on Quasi-Experiments and Interrupted Time-Series analysis (Meyer, 1995; Cook, Campbell, 1979).

3. Scientific and social relevance

Valuation instruments for artists have been analyzed extensively. The literature covers how the valuation of art has shifted towards the person as a unit of analysis with new opportunities for research. The website Artfacts.Net is of a major importance for new forms of research that allows the reputation to be analyzed and combined with other types of research. Consequently, the reputation of an artist can be combined with another form of online based research that focusses on Google Trends data to analyze attention for artists. Since the primary art market is regarded as non-transparent, the research is trying to disentangle parts of the dilemma of such. While parts of the reputation mechanisms have been explored by, for example, Bongard and the founders of Artfacts.Net, the regional extension towards analyzing popularity in relation to time and distance towards the exhibition in specific locations is different from what has been explored before. It is aimed to explore how exhibitions can have a contribution to the popularity of artists and to influence their proceeding online attention as part of the research of the usually avoided primary art market in scientific contexts. The scientific relevance is also linked to the popularity of the artists and its relation to exhibitions which can be explored with the help of the ranking of Artfacts.Net. The regional aspect is further explored to formulate generalizations about the impact of the exhibition in a larger scale since it is not only highlighting the cluster for exhibitions but also how attention evolves in a regional sense. Google Trends can be thereby fully explored in its capacity for scientific research since it allows the distinction between regions. Google Trends has been used in other prediction orientated analysis such as the analysis of flu seasons on a time scale, giving it the reliability that is needed. Flu seasons have been predicted with Google searches retrieved from Google Trends data to suggest an increase in searches related to flu symptoms and treatment in the flu season (Carneiro, Mylonakis, 2009). The application of Google Trends data and the use of the analysis of variables over time is applicable to the cultural sector since it allows the prediction of trends in the cultural sphere which can be used more extensively in research.

Artfacts.Net is an important platform for the research on the primary art market. Future cooperation with scientific research could help to make the primary art market more transparent and thereby eliminate parts of the specifics to this market uncertainty.

4. Theoretical Framework

The theoretical framework is divided into three parts. The first part is dedicated to the valuation mechanisms for artists that refers to an extension to the hedonic economic model (Lancaster, 1966). The hedonic economic model was developed to estimate the value of an artwork by ignoring the factor of prices on the auction market and rather integrating qualitative measurements into the analysis. The non-transparency of the primary art market has evolved from the transition from the valuation instruments based on the importance of size, method, colour and other quantitatively measurable artistic factors to the more divers factors that influence the evaluation of an artist.

The second part of the theoretical framework, the economics of attention, therefore, can aid in formulating an approach that does not include the valuation of art in monetary terms. In that sense, the theory of demand is used to addresses the economic background of the influence of reputation on the demand.

Last but not least, the economic geography literature offers the opportunity to integrate the theoretical background for the proximity argument in this thesis which assumes higher concentration of online attention in proximity to the exhibition. The literature further refers to the regional aspect of defining the importance of metropolitan areas for the cluster of artists and institutions. It is meant to explain the relevance of looking at the cultural cluster aspect in order understand its impact on online attention.

4.1. Valuation instruments in the art market

The valuation methods in the field of arts are difficult to define because of arts heterogeneous attributes that are attached to its value. In the history of art, the practical attributes such as size, material, colour and provenance defined the value of an artwork. An exhibition by the famous curator Harald Szeeman *When Attitudes became form* in the seventies is defined as the changing point of valuation of art (Velthuis and Curioni, 2005). The criteria mentioned above where replaced by a new valuation method that incorporates the shift from modern art to contemporary art. Nowadays the value is rather defined by the popularity of the artist. The shift from the valuation of the object towards the valuation of a person is linked to the value of the artwork. Since conceptual art redefined the valuation procedures in contemporary art it must be distinguished between different forms of valuation. The aesthetic and the monetary value of art is distinguished by Grampp (1989) in the valuation process. The aesthetic value for Grampp (1989) is measuring how much the artwork is desired by someone. In economics, the value is linked to the theory of demand where the value is established by the goods which inherit marginal utility. Utility in the sense of satisfaction of the buyer. The utility is difficult to pinpoint into categories since it depends on the opinion of the buyer. It might either be the beauty or the judgement of an individual that defines the aesthetic value (Grampp, 1989). The judgement, moreover, seems to be dependent on a certain herd behaviour that Grampp (1989) relates to the example of the Mona Lisa as commonly certified in its judgement to be of aesthetic value. The monetary value can be related to the aesthetic, however it does not necessitate the values to be proportional towards each other.

4.1.1. Valuation instruments in the art market

The vague formulation of what the value, especially for the primary art market, is what Grampp (1989) refers to as the historical, beauty and price of art. Only briefly he defines a statistically significant correlation between the recognition of an artists and the price of the artwork (Grampp, 1989). The composition of the economic value of art has been evaluated further in terms of the credibility of an artist in the public domain by Bonus and Ronte (1997). The credibility or reputation represents the shift from the evaluation of the value of the object towards the value of the person (the artist). The judgement of the credibility of the artist must be performed by a third party: the expert. The example for the

value of the artwork that is dependent on the authorship of the artist is mentioned by Grampp (1989) and Bonus and Ronte (1997) referring to the *Man with the Golden Helmet (De man met de gouden helm)* by Rembrandt which was believed to be a Rembrandt but lost its value after the painting turned out to be not an original. The economic theory contention that value is composed by its aesthetic value can be debunked with this example. The observation by Schoenfeld and Reinfelder (2006) that evaluates the value of art as a social construct is further related to Grampp's (1989) and Bonus and Ronte' (1997) observations. Art historians have the knowledge to identify originals from copies and at the same time are capable to judge the importance of an artwork based on their expertise. Unfortunately, the judgement is subjective which makes it difficult to objectively evaluate the economic value of art (Bonus, Ronte, 1997).

4.1.2. Valuation instruments in the art market

The valuation of art is based on trust in the certifiers. For an established artist such as Rembrandt the value of his work is dependent on the originality or fakes but the same kind of analysis is less clear if an artist is not yet established. The artist cannot be objectively certified since it is related to a conglomerate of opinions and different forms of certification. The role of the certifiers such as collectors, critics and curators in valuation of art which furthermore influences the reputation and indirectly the value of the artist and its artworks, considered to be the common ground between scientists (Bonus & Ronte, 1997; Grampp, 1989; Schoenfeld & Reinfelder, 2006; Claassen, 2001; Caves, 2002). Richard Caves (2002) identified the role of experts further as a form of gatekeeper that provides access to reputation. Bonus and Ronte (1997) explained that stardom is not related to talent but rather to search costs since it is cheaper or easier to follow the heard. This behaviour is not only visible for the general audience but also for experts since the 'hypes' are generated not necessarily by quality but by luck, since someone with equal talent to another might not reach the same level of popularity. The superstar effect (Anderson, 2004) suggests a similar result in respect that the stars receives all the attention and the long tail is not profiting from the selection of a few talents. This thesis is not dedicated to evaluating the discovery of talents based on experts but rather the evaluation of how the stars differentiate from each other in terms of reputation and what factors influence their popularity, specifically online.

The practical application to establishing a popularity index based on reputation is the Kunstkompass that Willy Bongard introduced in the seventies to understand the value of an

artist without using the price of an artwork (Bonus & Ronte, 1997). The application is the basic form of the algorithm that Artfacts.Net uses. In Bongards Kunstkompass the number of collections the artists are included in is counted. The distinction between solo exhibitions and group exhibitions are integrated and the coverage of the artist in publications and television are analysed (Bonus & Ronte, 1997).

Frey and Pommerehne (1993) analysed the Kunstkompass ranking to correspond the artist's capital value by including the years that have passed since their first exhibition. Furthermore, the factors such as number of exhibitions and awards the artist received, the different medias an artist uses, and the price the artist has achieved in the past are compared statistically with the use of factors of attention as independent variable and the evaluation of the ranking of Kunstkompass as comparison (Bonus & Ronte, 1997). The results had similar outcomes in comparison to the Kunstkompass. It is not surprising that there is a correspondence between ranking and the variables that have been used in the regression in the study of Bonus and Ronte (1997) since the rankings rely on similar variables. Frey and Pommerehne (1993) also explain the artist ranking with the same measurements that the Kunstkompass is using. For this study, however, a different approach is used by integrating the independent measurement indicator of Google Trends data and the regional data analysis attached to it. This allows an extension of the analysis of the ranking. The research is taking a step further but rely on the findings of Frey and Pommerehne (1993) that predict popularity of an artist in correlation to price using the Kunstkompass ranking as an indicator to predict popularity.

Artfacts.Net is using similar indicators in comparison to Kunstkompass to predict the ranking for artists. With the exception that the predictors are more complex compared to the ones Willy Bongard introduced by himself. The algorithm is constantly updated based on new exhibitions that have been included which changes the ranking of the artist and their institution. Further the predictors are assessed in terms of relevance as a predictor. Artfacts.Net was introduced in 2001 and is a leading platform for analysing the contemporary art market without the usage of prices. The idea is linked to reputation as a valuation instrument and was inspired by the economy of attention (Franck, 1998). The following part is meant to introduce the economics of attention (Franck, 1998).

4.2. Economics of Attention

Franck (1998) compares the cultural industries to economic behaviours by treating attention as a scarce good. Attention for Franck is a currency that is handled by the media. The investors in cultural organizations are the experts such as curators, critics and art collectors. They invest in the artist they believe to get returns from in form of success of the artist they show, write about or collect (Artfacts.Net, 2005). The return includes a higher reputation and the consequent potential monetary gain for the artist but also for the institution as well as symbolic capital for the critic or the collector (Bourdieu, 1986).

The attention economy is an effect from the digital developments that increased the number of artists, articles and exhibitions accessible for the public, since distribution and production have become easier. The competition in terms of attention is based on the scarcity of the attention since humans can only pay attention for a limited number of artists and exhibitions (Sommerer & Mignonneau, 2015). Franck (1998) mentions the digitalization of the good itself by referring to the publicity of brands which also inherits value. Like companies that establish brand equity of a non-physical good the attention economy is valuing the artists brand equity in rankings such as Artfacts.Net and Kunstkompass.

The analysis of this thesis is not dedicated to the aesthetic value of the artwork since it seems to be outdated according to the literature. It also does not strive to establish the economic value of an artwork based on its reputation referring to Grampps (1989) argumentation that the value of art and its price are significantly correlated. Moreover, it is hard to define what other factors might influence the price of an artwork. Furthermore, the price of an artwork can only be evaluated from auction results but prices are hardly available on the primary art market. This leads to the interest of this thesis in using the reputation-based approach for evaluating the value of an artist to understand the attention the artist receives online and correlate it to the amount of reputation he or she gets. The reputation has been indexed in the ranking of Artfacts.Net and is therefore used as an indicator to understand its impact on online attention. The economics of attention are important for this study because of its strong influence on the appraisal of the value of an artist by treating the reputation or attention as a currency. As such something uncountable is transferred into measurable variables such as the online attention on Google Trends which besides the ranking of Artfacts.Net is used to measure the attention value of the artist.

4.3. The economic geography

The economic geography is an important aspect in this thesis since it uses the full potential of the data available on Google Trends. The analysis of online attention is extended towards the regional distribution of online attention in the 12 provinces of the Netherlands differentiating this research from the previous studies. The main interest is based on the relation of the artist, their popularity and the spatial proximity to the location. What if a famous artist such as Van Gogh would do an exhibition in the Sahara, for example? Who would pay attention? Attention might be lower in areas outside of the Sahara since only a few people would take the way from Amsterdam to the Sahara only to see an exhibition. As a metaphor for the Netherlands the idea of distance in relation to interests applies for exhibitions here. Do cultural centres such as Amsterdam, Rotterdam, den Haag and Eindhoven attract more online attention and do people from Eindhoven pay less attention for exhibitions in Amsterdam? Meaning does the distance towards the exhibition matter?

Cultural centres have evolved from rural areas as the migration contributed to the increase in density of inhabitants in cities. However, the literature describes that the clustering of cultural products has advanced in only a few major cities (Lorenzen & Frederiksen, 2008). None of the cities of the Netherlands is included in the major cities for cultural clusters such as London, Paris, Los Angeles and Tokyo (Scott, 2008) among others.

Amsterdam is especially known in the cluster for denim and the fashion industry but also inherits museums of great interest. In relation to the density of inhabitants in the rest of the Netherlands the cultural epicentres can be still identified as Amsterdam, Rotterdam, Den Haag, Utrecht and Eindhoven. Amsterdam, for example, might represent a miniature version of other cities like Tokyo or New York since the distinction between rural and densified cities also applies to Amsterdam.

Clustering benefits from the colocation which lowers the interaction costs and makes interaction more efficient. Transaction costs decline based on distances between institutions (Lorenzen & Frederiksen, 2008). Besides creative industries, the clustering concept can be applied to other industries, particularly with regards to the industrial cluster. The distinction from industrial clusters is related to the attraction for diversified offers in cultural cluster, which is linked to the global knowledge that can inform the cluster, the attractiveness of living in a divers city and the cultural activities a city can offer (Lorenzen & Frederiksen, 2008). These positive externalities make cities more attractive for organizations but also for inhabitants. The orientation towards the attractiveness of cities for companies and employees

is directly intertwined. Florida (2005) has realized that creative people drive the development of cities which above that is linked to the industrial clusters. The diversified cultural offers attract creative people toward metropolitan areas (Florida, 2005). The effect on the cities is that they benefit from the increased creative activity and therefore attract businesses to settle in the cities since workers like to settle in the places with the rich cultural offer. The argument goes both ways since Scott (2008) argues that jobs attract workers to cities and as a result workers come to cities which promise jobs.

No matter who is attracting whom, the impact for cultural centres with thriving cultural scene is of a great importance, but does not explain the participation in it. It can be assumed that participation is locally bound due to developments of scenes that stimulate the participation in neighbouring areas (Stern, Seifert, 2010). The aspect of tourist activities especially in Amsterdam probably also has an impact on a participation in cultural activities but for this purpose the regional aspect of participation is of a higher relevance. The literature seems to barely cover these aspects and rather define participation bound to distinctions in social classes. The rural versus metropolitan aspect is mentioned in an article about cultural participation which differs in various social classes. As the geographical aspect is analysed in dependency towards distance, the findings suggest that locations matter less than social economic status (James, 2001). The article can be hardly compared with the Netherlands where distances are smaller than in Australia where the research has been conducted, but it explains the dilemma of analysing the participation in cultural activities from a geographical point of view. The literature seems to suggest that cultural participation is happening in metropolitan areas but as soon as we leave the cities the influence of why people are participating relies on divers reasons such as education which is beyond the limits of this thesis. This might be regarded as obvious that local exhibitions receive more attention in the local area but it is important regarding the operationalization of the variable proximity since the distance, as James (2001) describes, is dependent on attention in terms of participation but maybe also in terms of online attention.

This thesis is focused solely on the analysis of the attention for visual art exhibitions in relation to geographical distance toward such. Furthermore, the characteristics of the people who are searching for the exhibition are not relevant in this research. The background of the people who might visit the exhibition is also open and not analysed since the data does not provide information about these aspects.

5. Methods and Data

The following section aims to provide an overview of the data collected. Firstly, Google Trends and Artfacts.Net as the main sources for data and the derived variables are explained. Secondly, this section is used to describe the remaining variables and the intention behind their use in the data collection. Furthermore, correlations between variables are used to identify the most appropriate factors where no causal relations can be drawn from the simple correlation analysis. Worth to mention is that the aim of this operation is solely to define the importance of the variables. Last but not least, the data limitations are also discussed in the section regarding construct validity and measurement validity.

5.1. Google trends

Google Trends is a database provided by Google. The data that Google Trends covers is available from 2004 until today. The data is measured in Google searches scaled in percentages depending on the two categories time and area. The Google searches have been scaled from the minimum of 0 points until a maximum of 100 points. Searches are divided by the number of searches, region and time (Google Trends, 2016). Google Trends can be used to analyse changes in the scale of 0 until 100 and the comparison of the same, but the absolute number of searches cannot be compared. Further it is used to analyse the difference in average scaled Google searches in the periods pre- and post- the exhibition.

5.2. Artfacts.Net

Artfacts.Net is a website that is based on the valuation mechanisms of art. Since the value of art is hard to determine based on product uncertainty on the primary art market. Artfacts.Net generates a valuation mechanism that avoids the price of an artwork and rather generates a ranking system for artist, galleries, institutions and fairs where attention is measured to determine alternative market value (Marek Claassen, 2015). Attention refers to the terminology of Georg Franck and the attention economy (*Ökonomie der Aufmerksamkeit)* (Georg Franck, 1998). Franck (1998) defines attention as a currency which inherits the value of reputation. Artfacts.Net is thereby ranking the popularity of artists. The equation below (Equation 1) defines that mechanism the website is based on. The difference between the primary and secondary market is explained by developing a system of reputation that is

defined by the evaluation processes an artist. An artist must undergo several certification processes with the participation in exhibition to be able to enter the discourse. Curators and experts function as certifiers of artists (Claassen, 2012). In most cases, the secondary market is a closed system that can only be entered if the certification process has already been taken place.

Equation 1 The standard artist career of an successful artist

$$\left(\frac{production \rightarrow gallery\ exhibition \rightarrow discourse}{primary\ art\ market}\right) \Rightarrow \left(\frac{auction/dealer\ sale}{secondary\ art\ market}\right)$$

(Claessen, 2012)

The artist ranking is established from the 1st spot currently held by Andy Warhol until 100.000. Every other artist above 100.000 does not have enough points to be integrated in the ranking. The algorithm for the ranking of the artist is not publicly available (Marek Claassen, 2015). The variables that define the ranking of Artfacts.Net are partly accessible. The number and types of exhibitions such as a solo or group exhibition, the duration of an exhibition and the place and institution of an exhibition are visible on Artfacts.Net. A few basic rules are known from the algorithm that the website uses. For example, gallery exhibitions are evaluated as less impactful in comparison to museum exhibitions et cetera. The internationality is explored including such factors as the artist exhibiting abroad or mentioned in news articles overseas. Further, the network of the artist is explored by analysing the exhibitions and the artists they are exhibiting with. The distinction between more popular artists or less popular artist are analysed to retrieve meaning from the analysis. Finally, demographics are explored such as the status of being alive or dead (Marek Claassen, 2015). These are, however, just a few variables as the complete list of variables is not accessible for the public.

Galleries are evaluated based on their location, the number of artists the gallery discovered which developed towards success and the ranking of the artists which are represented in the galleries. The conglomerate equals a star system on the new beta website. The exhibitions and involvement in Biennales is further evaluated by Artfacts.Net. These institutions are therefore ranked based on yearly visitor numbers in another variable. The ranking that determines the fame of the Biennale is defined by the ranking of the artist and influence the ranking of the galleries indirectly by generating points if the artists was

participating in a Biennale plus other factors that are not publicly explained (Marek Claassen, 2015). In a presentation of the founder of Artfacts.Net Marek Claassen (2015), Claessen mentions the example of points that Biennales receive. Such as, 400 points for the participation at the Venice Biennale, 300 points at the Sao Paolo Biennale, Documenta and Paris Biennale, 200 points for the participation at the Sydney Biennale and Istanbul Biennale and 100 Points for the participation at the Biennale in Lyon. The participation in a Biennale influences the spot in the ranking more than the participation in a regular exhibition and therefore tops the exhibition in a museum or gallery.

For this research Artfacts.Net is used to draw data from the website for two variables. The artist ranking is used to define the popularity of an artist in a variable. 120 artists and 208 exhibitions are extracted from Artfacts.Net. The beta version of the website has integrated a ranking of the galleries based on a star system that ranges from 1 star to 5 stars which allows the ranking of the galleries in another variable to define the popularity of the galleries. Unfortunately, publicly funded institutions are not ranked on Artfacts.Net. The aim to integrate the data from Artfact.Net is to build a model for reputation, based on the source of Artfact.Net and Google Trends.

5.3. Sample

The research consists of a sample that includes 208 solo exhibitions in the Netherlands from the top ranked artists on artfacts.Net. The data collected from Artfacts.Net consists of the solo exhibitions in the time frame of 2004 until today. The data is based on Dutch institutions that have subscribed to the listing on Artfacts.Net. Since Artfacts.Net is recalculating the ranking of artists regularly depending on new exhibitions that are added to Artfacts.Net it is important to mention that the sample has been drawn on the 3rd of March 2017.

The second variable is online attention which is measured by Google Trends data. The timeframe is based on the limitations of the Google Trends database which collects data since 2004. The daily Google Trends data is collected for the time frame of the solo exhibitions including regional data. Google Trends allows the distinction between regions to define the Google searches for artists geographically. Further, the data is collected for three weeks before and after the exhibition to distinguish between pre- and post-treatment. A second round of data collection allows the collection of weekly data for half a year before and after the exhibition (24 weeks prior and post the exhibition and the week of the

Vernissage). The weekly comparison consists of a smaller sample of 52 exhibitions. The data for the 12 regions of the Netherlands plus the national data have been included. In total an amount of 2704 cases including regional data has been collected for the solo exhibitions of artists in 49 exhibitions in the Netherlands (The list of exhibition spaces can be found in the appendix, Table 9).

The variables that can be identified from the sample are the dependent variable of online attention that is derived from Google searches. The independent variable is the time frame before and after the exhibition. Control variables and demographic information has been collected such as artists being alive or death, ranking of artists, the ranking of exhibition spaces and their Facebook likes, news articles referring to the exhibition and other news articles unrelated to the exhibition, yearly visitor numbers of the public institutions and a gallery ranking of the private galleries. These control variables cannot be included mainly due to the method of the research.

Consequently, online attention is aimed to be analysed. Attention itself can be measured in various ways. For this particular purpose, attention is defined as online attention. Online attention is based on indexed Google searches that are collected from Google Trends data.

5.4. Variables

Table 1: Overview of Variables

Number	Name of the Variable	Kind of Variable	Level of Measurement	Operationalization	Number of cases	use
1	Artist ranking	Independent variable	Ratio	Rank 1-300 of the artists ranked on artfacts.Net	208	to measure the popularity of the artist
2	Date of Birth	Independent variable	Ordinal	Date	208	to measure the popularity of the artist
3	Date of Death	Independent variable	Ordinal	Date	208	to measure the popularity of the artist
4	Age	Independent variable	Ratio	In years	208	to measure the popularity of the artist
5	Country of Origin	Independent variable	Nominal	Dutch or other origin	208	to measure the popularity of the artist
6	Facebook Likes (Exhibition Space	Independent Variable	Ratio	Ranked in amount of likes	208	to measure the popularity of the institution
7	Museum of Gallery	Independent Variable	Ordinal	1 or 2	208	to measure the popularity of the institution

8	Visitor Numbers for Galleries	Independent Variable	Ratio	annual report number	208	to measure the popularity of the institution
9	Stars for Galleries	Independent Variable	Interval	1-5 stars, ranking on artfacts.net beta version	208	to measure the popularity of the institution
10	Inhabitants (linked to were the exhibition is held in)	Independent Variable	Ratio	Amount of people retrieved from Wikipedia.com	208	to measure the regional impact on online attention
11	Provinces the exhibition is held in	Independent Variable	Ordinal (linked to the Inhabitant numbers= rating	12 provinces of the Netherlands (see below)	208	to measure the regional impact on online attention
11	Daily Regional google trends data for the exhibitions	Independent Variable	Interval	Google trends data on a time scale	208	to measure the regional impact on online attention
11	Weekly Regional google trends data for the exhibitions	Independent Variable	Interval	Google trends data on a time scale	208	to measure the regional impact on online attention
12	Distance from exhibition space to neighbouring regions in km.	Independent Variable	Interval	distance from exhibition city towards regional boarders	208	to measure the regional impact on online attention
13	Distance from exhibition space to neighbouring provinces	Independent Variable	Ratio	boarder from city to region in rings	208	to measure the regional impact on online attention
14	News related to the exhibition	Independent Variable	Ratio	Article related to the exhibition from google news searches	208	to measure the popularity of the exhibition
14	News unrelated to the exhibition	independent Variable	Ratio	Article about the artist in the Netherlands unrelated to the exhibition	208	to measure popularity of the artist
15	Duration of the exhibition	Independent Variable	Ratio	in days/ weeks	208	to measure online attention dependent on different time frames
16	Daily data for the Vernissage of the Exhibition	Dependent Variable	Ordinal	Daily Google trends data on a time scale	208	To measure online attention
17	minus 21 days before Vernissage	Dependent Variable	Ordinal	Daily Google trends data on a time scale	208	To measure online attention
18	Plus 21 days after the exhibition	Dependent Variable	Ordinal	Daily Google trends data on a time scale	208	To measure online attention
19	Top ranked 26 exhibitions for the period before the exhibition (weekly)	Dependent Variable	Ordinal	Weekly Google trends data on a time scale	26	To measure online attention

20	Lowest ranked 26 exhibitions for the period after the exhibition (weekly)	Dependent Variable	Ordinal	Weekly Google trends data on a time scale	26	To measure online attention
21	Weekly data for the Vernissage of the Exhibition	Dependent Variable	Ordinal	Weekly Google trends data on a time scale	26	To measure online attention

The variables that are included in the table above have been collected for this thesis with the ambitious aim to include the independent variables into a multiple regression. The time-series analysis, however, does not allow the inclusion of control variables. Therefore and, unfortunately, most of the variables must be neglected in the analysis. To explore the importance of the variables, the literature-based correlation research is performed to explore the variables that can be used as dummy variables in the analysis. The variables have been collected for 208 exhibitions besides the small sample of 52 exhibitions for the weekly data that has been additionally collected for the period before and after the exhibition to compare the daily analysis to a longer time frame. The top ranked 26 exhibitions have been collected in comparison to the lowest ranked 26 exhibitions of the Netherlands to distinguish between the popularity of the artists.

Online attention for the exhibitions in expected to be correlated to the promotion efforts of the institutions. The promotion efforts are contextualized in the following. Since information about advertisement spending is hardly available in scientific research, the study from the Smithonian Institution is the reference for the promotion efforts (Smithonian Institution, 2002). The Smithonian Institution is one of the leading independent organizations for research on museum studies. Museums and other exhibiting spaces have different time frames for promotion efforts related to the advertisement budget the institutions can spend. Top-level institutions have a longer time frame for advertisement efforts than other institutions. Therefore, the strategies include large-scale paid advertisement opportunities (Smithonian Institution, 2002). This refers to large scale institution such as the Rijksmuseum and the Stedelijk in Amsterdam. The middle segment is rather orientated towards moderate spending on advertisement including free advertisement such as social media. The third distinction is made towards the lowest level of advertisement efforts. These institutions are defined as non-profit or cannot afford paid advertisement (Smithonian Institution, 2002). It is an obvious variable to include the different advertisement budgets of the organizations. Unfortunately, the advertisement budget is only partly available for public institutions whereas private organizations such as galleries do not publish their budgets. The variable

advertisement budget to define the popularity of an institution has been neglected. The solution to show the impact of the advertisement budget is a logical variable that is chosen instead. News for the exhibition can be treated as such.

Disregarding the different budgets that can be spend on visual analogue advertisement such as billboards there are similarities for digitally distribution of promotion such as invitations and news about the exhibition between one day and one week before and after the Vernissage. The time frame for increased online attention can therefore be specified to one week surrounding the event of the Vernissage. Viewings for press are usually held when the exhibition is almost ready for the public either on the day of the opening or maximum two days before. The preliminary conclusion that can be drawn is that online attention might experience an impact surrounding the opening. The opening as an event that draws more public attention than any other regular day is therefore analysed in terms of the buzz that it creates that leads to Google searches for the term of the artist in the area that includes the exhibition space and the regional attention in the Netherlands.

Another aspect that influence the searches for the exhibition are news coverage that promotes the Vernissage of the exhibition. There is a significant low correlation between the news and the Vernissage which could suggest a slight impact of News coverage on the treatment of the Vernissage ($r = .18$, $p .01 < p .01$). A study that analysed news coverage in relation to Google searches concluded that the number of news that is covered predicts positively the aggregate searches and shows peaks that occur as spikes surrounding the news coverage. (Weeks, Southwell, 2010). Therefore, it would be appropriate for a multiple regression, which is not performed in this context, and based on the theory that promotion by articles can positively predict searches. The variable that would be tested is the news coverage in terms of the amount of news that can be found on Google news related to the Vernissage/ exhibition. The news coverage results have been collected by looking at news in the Netherlands in the time frame of the exhibition. In general terms the notion of "news" has been distinguished by news related to the exhibition and unrelated to the exhibition.

A variable to determine the size and popularity of the institution are Facebook likes. Facebook likes can indicate the attention online but also might correlate to the duration of the exhibition since large-scale institutions might have longer exhibition periods therefore the relation between duration of the exhibition and the Facebook likes as an indication for the size of the institution are analysed in a simple correlation.

Facebook is a common tool for visitors to connect to the institution during a visit. Facebook is used by visitors of museums and shows accordance to visitor numbers which

makes Facebook a tool to generate a ranking of museums in the Netherlands. (Drotner, Schrøder, 2014). Facebook likes are an indicator of popularity which could explain the importance of the variable in comparison to the length of the exhibition as an indicator for popularity since the duration is less likely to explain popularity. The popularity of an institution is obviously constructed by diverse factors and cannot be narrowed down to the Facebook likes of an institution. Conventional measurements of marketing success for cultural institutions are based on several indicators such as number of visitors on the institutions website, number of clicks on related blogs, RSS feeds, tags that are related to the institution and sharing of content, comments and other indicators (Ohridska-Olson, 2011). For this thesis, the purpose is not to analyse the success of the marketing strategy of an institution but rather to find indicators that can explain success of an artists and an institution. Since there is not one way of measuring the success the indicator is compared to the length of the exhibition and the visitor numbers for public institutions are included as another indicator to compare the relevance of the measurement statistically. There is a significant positive correlation between the duration of the exhibition in comparison to the Facebook likes of the exhibition ($r = .31$, $p .00 < p .01$).

The length of an exhibition is further related to the popularity of the institution since bigger institutions usually have longer exhibitions which could correlate with online attention. Even though it can be expected that the attention for exhibitions will fade after a certain number of weeks. Therefore, the duration variable is included to test the relation towards online attention. It is expected that the duration of the exhibition does not correlate with the attention for the exhibition. Facebook likes are therefore an indicator to predict online attention. Since attention and duration are only slightly non-significantly correlated the duration variable does not explain the influence on attention ($r= .16$, $p .22$, $p >.01$). The regression function that includes the average of online attention during the treatment in comparison to the duration would only explain a small part of the model. The duration of the treatment as a variable is therefore neglected from the analysis because of its missing correlation and other problems that are explained in the following.

The duration of an exhibition further inherits several problems for analysis purposes. The lengths of the exhibitions are varied with a range between 2 days and 365 days. The treatment period with different lengths therefore has missing values since a treatment can only be tested if the time frame of each unit of analysis has the same length. Several strategies where analysed to fit the research design such, for example, multiple imputation which does not follow logic because the length of the exhibition should not be artificially

prolonged since the distinction between different lengths is important to understand the impact of the attention. Another strategy is to fill the missing variables of the longer duration exhibitions with zeros. Even though the average is minimized with the strategy, it also inherits the same problem as multiple imputation since the 0's is artificially adjusted to the same length. It is therefore also neglected. Yet another statistical procedure is to average the points in time to intervals which compromises the data. Since long exhibitions get narrowed down to the average of a few data points and short exhibitions might need the imputation with artificial data points. Both of these ways, therefore, compromise the original distribution of attention. The strategy is neglected as well. The strategy that is applied is to exclude the period of the exhibition towards a time-series model with a period before the exhibition and after exhibition.

5.4.1. Location

The location of the exhibition is further an important aspect for this study. The searches are analysed in correspondence to the distance to the exhibition in a regional differentiation. The idea that metropolitan areas attract increased attention for exhibitions is related to the location based research for cultural economics in domains of urban-geography and economics of clusters. Cluster, as described in the theoretical framework above, stimulate the co-location in the creative industries (Keane, Potts, 2011). The cluster in dense areas is expected in the areas of the bigger cities in the Netherlands such as Amsterdam, Rotterdam and den Haag. The importance of cultural hotspots such as the cities above is expected to impact online attention since the cluster of cultural activities is linked to metropolitan areas (Scott, 2008).

The regional importance of where the exhibition is held in, could be analysed in further research by looking at the inhabitants of the location where the exhibition is held in and a comparison to the online attention the city achieved. Since the time-series allows to generate dummies for the different provinces, the comparison between the online attention for different provinces and how much attention is left in distant regions can be analysed. The online attention for the 12 regions of the Netherlands has been gathered and will be included in the analysis, furthermore, the variable for the national data from the Netherlands has been collected.

The control variables of Facebook likes, promotion efforts and the duration of the exhibition had to excluded due to the constrains of the time-series analysis. However, since

the correlations support the construct the variables were not made redundant in the scope of this thesis. The variable duration which does not correlate with popularity of the institution the variable, nevertheless, has been neglected.

The period of the promotion efforts is of importance for the time-series analysis since the period of promotion efforts might be associated with the development of the time-series trend.

5.5. Validity and data limitation

Due to the fact that this research based on the time-series analysis design which does not include control variables there is a risk of validity problems. The absence of controls makes it impossible to draw causal conclusions from the research. While promotion for the exhibition is expected to influence the attention before the Vernissage it might not be the only influence of the level change in attention. Other factors such as another exhibition in the same province might interfere the results (Campbell & Stanley, 1963). Assurance about excluding interfering variables is not possible. The sample is, therefore, orientated to the regionally dependent research design that narrows the online attention regionally to the provinces in the Netherlands. This excludes the chance to a certain degree that in a small country like the Netherlands a top artist like Andy Warhol has two exhibitions in the same time frame.

The problem above is just one of the endogeneity problems that occur in this research design. The sample size of 208 artists which equals 208 exhibitions is a small sample especially when it is divided into the exhibitions in the different regions to analyse regional aspects. Statistically significant results might not occur due to this reason. In relation to the daily cases around 2600 cases including the distinctions between regions have been collected manually and additional 676 weekly cases have been extracted from Google Trends meaning that a larger sample would have been beyond the feasibility for this project.

The daily coverage of 21 days before and after the exhibition is further a problem of limited reliability since long term developments are not visible in the time frame. The extension of the data towards half a year before and after the exhibition is used to evaluate the long-term impact of the exhibition.

Since Google trends suggests the data for the artist, photographer or painter, the popularity of the top 300 artists allows the data to refer to the artists and not the other persons

with the same name. That is in comparison to the general data that includes also other persons with the same name.

The limitations are also linked to the issue of the relation of the time that has not been measured and the impact on another variable. Such as the impact of variable Y on t1 might not relate to the impact of X to t2 (Berrington, Smith & Sturgis, 2006).

Another aspect of endogeneity problems is related to the sampling method since selection problems might occur, especially regarding the small sample of the top 26 and lowest ranked 26 exhibitions of the sample of the top 300 exhibitions on Artfacts.Net. Such selection of data is counterproductive in terms of not being suitable to make generalizing conclusions. Hence, this research cannot prove any causality due to the missing control variables.

Artfacts.Net is a subscription service that includes institutions that have made the decision to use the service to publish information about their exhibitions based on the conscious decision to pay for the account, monthly or yearly. Even though Artfacts.Net is a common tool that most exhibition spaces use today it might not include institutions that were not willing to pay the subscription fee. Artfacts.Net further must be treated carefully in scientific contexts since the methodology of the ranking is not fully transparent (Velthuis, 2013).

6. Research design

What impact does a solo exhibition have on online attention?

The research question is aimed to be answered in context of exhibition and the Vernissage itself. The exhibition opening is one of the popular events to attract an audience to an exhibition. Artist talks, the Finissage[2] or performances might also influence the attention for the artist. The Vernissage of the exhibition is usually one day before the regular opening of the exhibition and is thereby consistently defined among the exhibitions in the data. As mentioned above the inclusion of the different lengths of the exhibition period would have been compromised in the analysis and has been therefore excluded. Since the exhibition is excluded, the post-period refers to the period after the exhibition so that there is a reference to the exhibition itself.

The valuation of the artist as a contemporary way to define the value of art is further implemented in this research by analysing online attention for the artist rather than artworks. The operationalisation of the variable online attention includes the transference of the concept of online attention that is treated as a currency to measure the popularity of the artist. The research question is aimed to be answered in the framework of a quasi-experimentation that is developed in a panel study design (Cook & Campbell, 1979). The panel includes several observations on multiple cases over time. (Cook & Campbell, 1979). As initially the panel study design was meant to be used, is worth to mention that there was a difference in the implementation of the analysis which was finally performed in a time-series analysis including the averages of this panel data. The reason why the design is chosen is related to the impact of the Vernissage (the treatment) in relation to its impact on the period before and after the solo[3] exhibition. The impact is expected to be visible in the comparison between the period prior the opening and after the opening (Cook & Campbell, 1979). There is further a difference in level and a difference in trend expected due to the treatment. The time–series analysis has been operationalized based on the two main factors which define a time-series. The data has a longitudinal structure along a time line and includes the treatment between the pre- and post-period (McDowall, McCleary, Meidinger & Hay, 2011).

The research is further informed by the results of the Bachelor thesis that predicted a short-term impact based on the treatment that resulted in a level and trend change around the

[2] A Vernissage is defined as the opening ceremony of the exhibition while the Finissage defines the closing ceremony of an exhibition.
[3] A solo exhibition is in comparison to a group show dedicated to the artworks of one artist.

treatment (Stunz, 2016). The research included the impact of awards on online attention with a positive level change building up in the period before receiving an award. The slight trend change in the comparison between post- and pre-period indicated a slight increase in the intersect of the y-axis after the treatment. Even though, the positive level change quickly disappeared after one week past the award. This short-time impact is also expected in this research. Therefore, the period before and after the treatment are based on data of 21 days surrounding the exhibition.

Since the control over the treatment can only be explained with dummy variables the time-series analysis lacks full control over the experiment (Shadish, Cook & Campbell, 2002). Counterfactual interference can provide alternative explanations for the occurrence of the effect which are ruled out in this thesis by trying to collect the important variables based on the literature that was explained above to explain the effect on the treatment (Shadish, Cook & Campbell, 2002). Even though the scope of this thesis does not allow to include the control variables into the time-series design. Counterfactual interference would be of importance if the control variables would have been included. The effect of a level change on online attention that is based on more than news, the artist reputation, the attention in the region, advertisement and visitor numbers might have been rather based on a large-scale art related event. For example, if there would be two simultaneous exhibitions happening which attracted a lot of public to the region of the exhibition and a large amount of people was searching for the exhibitions in the area this could led to a skewed outcome of online attention (Shadish, Cook & Campbell, 2002). To eliminate the risk of the influence of variables that have not been included into the model the research relies on literature to understand the relation between such variables.

In the scope of this research, the time series analysis as a simplified method was used in place of the more advanced multiple regression analysis. In comparison to the multiple regression the time-series is using the average of the points in time. The time-series analysis as opposed to a multilevel regression further ignores the hierarchical structure of the variables. Multiple regressions for panel data require the distinction between cases. Since cases can vary in the sample (i.e. a high school performance of children can be easier assessed in the same class in comparison to another class since the other factors such as, for example, a different teacher might influence the performance) it can be difficult to compare. For exhibition spaces, since the exhibitions are from different artists, in different exhibition spaces and in different cities in the Netherlands, this can lead to a complicated advanced analysis with several hierarchies for the analysis and control variables. The decision of

choosing the time-series over the multiple panel regression, therefore, is based on a feasibility for this project. In the time-series, the specifics of the cases assume homogeneity between cases in terms of differences between exhibitions.

The second part of the research is informed by the geographical influence of the attention of the exhibition. That data is collected for the Netherlands at large and additionally for the provinces of the Netherlands. The operationalisation of the variable region is based on on the argument of James (2001) that distance matters in terms of participation, which might be applicable to the influence on online attention. The provinces are analysed within the regions by looking at the impact on the exhibition related to distance to the province the exhibition is held in. Is there a more pronounced impact in average scaled attention in proximity that fades with distance? The analysis is performed with the weekly data that is collected to assure that the impact can be measured along a larger time frame.

Further, the research explores the relation between popularity of the artists and the magnitude of the impact of the exhibition. The popularity of the artists is defined by the ranking on Artfacts.Net which is divided for the research into two groups of the top ranked artists and the lowest ranked artists on Artfacts.Net. The groups equal the top 26 and the lowest 26 of the ranking of the sample of the top 300 artists on Artfacts.Net.

The interrupted time-series analysis is based on a longitudinal design with several points in time with equal distant intervals towards each other including daily and weekly results. The method analyses the impact of the exhibition on the following days/ weeks in time (Campbell & Stanley, 2015). To analyse the impact on the following days/ weeks, previous points in time must be considered to analyse the difference between pre- and post-exhibition. Moreover, the number of days are adjusted to a short impact of the exhibition on Google Trends data. The comparison towards a longer period of 24 weeks prior and post the exhibition and the week of the Vernissage are chosen as a comparison towards the short-term impact of the daily measurement.

The interrupted time-series diagram is constructed as found in (Campbell & Stanley, 2015) shows the indication of T for the factor time and X for the intervention which is in this case the treatment or the Vernissage of the exhibition:

T -21, T -20, (...), T -2, T -1, X , T 1, T 2, (...), T 20, T 21

The data that is collected from Google Trends ranges from 21 days before the exhibition marked as “T-21, T -20, (…), T -2, T -01” as the indication for the period before

the event and “T1, T2, (…), T20, T 21” which indicates the 21 days after the exhibition. X refers to the Vernissage and the exhibition period. The time series have the aim to explore the difference between the period before the exhibition and after the exhibition related to the treatment of the exhibition and are linked to the Hypothesis that the treatment has no impact on the time dimension. As discussed by McDowall, McCleary, Meidinger and Hay (2011) the Null Hypothesis is aimed to be rejected since the impact is expected. The assumption is tested in this research as a necessity to extend the research on the general effect. The main aspect of the research is to analyse the magnitude of the impact. Next to that, to discuss the relation between online attention and proximity to the exhibition. And lastly, to explore the relation between popularity of the artists and the magnitude of the impact of the exhibition.

7. Descriptive Analysis

Time-series analyses contain multiple observations on a variable in equal intervals. In this research, the observations are collected daily (21 days before and after the Vernissage) and weekly (24 weeks/ half a year before and the week of the Vernissage). The aim for the comparison of daily and weekly data is to control for the daily observations by comparing the influence of the online attention with a period where there is no online attention expected (Field, 2012). The purpose of a forecast is to predict the future. Prediction techniques can be found in several economic applications such as sales predictions for companies, weather predictions based on previous conditions or menstrual cycle manager that predict the cycle based on previous data. For this purpose, the forecast based on time-series data is used to evaluate the impact of the exhibition opening. Before the predictions are constructed the data is explored in a descriptive manner to give an overview of the data.

The dataset consists of 208 exhibitions including the data collected from Google Trends for the Netherlands and the 12 regions of the Netherlands (Drenthe, Friesland, Gelderland, Groningen, Limburg, North Brabant, North Holland, Flevoland, Overijssel, Zeeland, South Holland and Utrecht). The descriptive analysis includes the binary analysis of the different provinces and the variables that have been included.

7.1. Daily stepwise analysis of means

The first part of the analysis is dedicated to the Google Trends data of the Netherlands. The chart below (Figure 1) shows the distribution of means in the pre-period and post-period of the Vernissage. The confidence intervals are highlighted to show the distribution of observations among the exhibitions in the Netherlands. The average is visibly rising which results in an upward trend in the pre-period. The peak of the average online attention is reached shortly before the opening. Therefore, the treatment defined as the opening of the exhibition might not be the main influence on the rise of online attention. Promotion efforts as discussed above might be the reason for the rise of online attention shortly before the opening. Online promotion and news coverage usually appear around one week before the opening which would fit the visible interpretation of the averages in the chart. There is even a more noticeable downward trend proceeding the treatment that refers to the period after the exhibition. In the comparison of means the average of attention does not

seem to differ prior and post the exhibition. The distribution of the means on different points in time is visible in the chart below (excluding the decimals behind the comma). The comparison between the day -21 where the average was at 6,86 (SD= 18,16) to the online attention 7 days before the opening 14,56 (SD= 24,46) shows that the average online attention has doubled. Only 2 days before the opening the online attention reaches its peak at 20,87 (SD=30,01). After the peak the online attention decreases significantly 2 days after the exhibition to already 13,22 (SD= 22,20). It is important to mention that the treatment is defined as the opening day of the exhibition while ignoring the duration of the exhibitions. Therefore, the period after the exhibition is compared with the period before the exhibition to draw conclusions about the impact of the promotion efforts before the exhibition in comparison to after the exhibition. Seven days after the period of the exhibition the attention has fallen to an average of 9,98 (SD= 19,23).

The analysis of the difference between the means is performed and described in a stepwise comparison of means in the inferential part of this thesis.

Figure 1 Online attention for the Netherlands including the average daily attention for the exhibitions

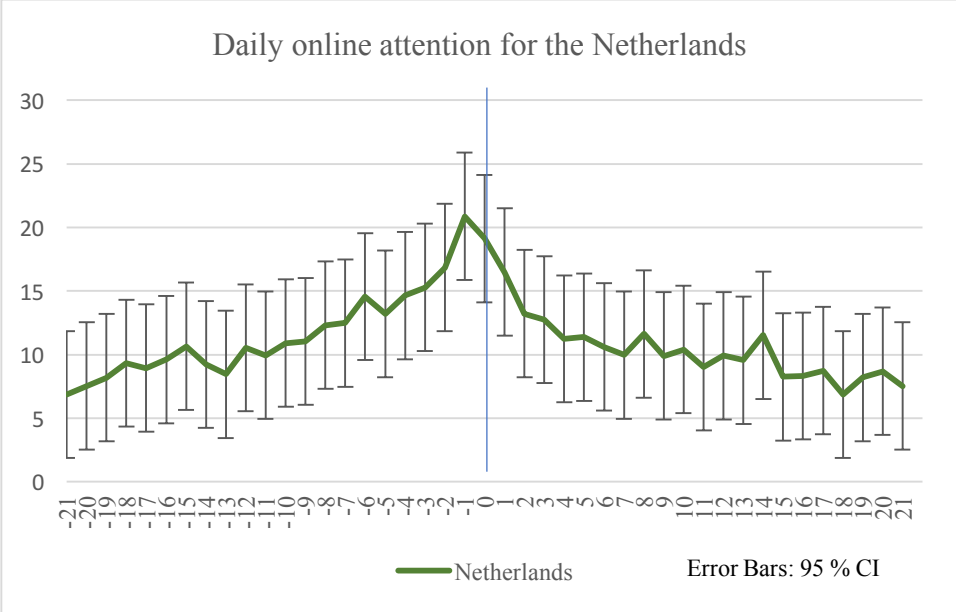


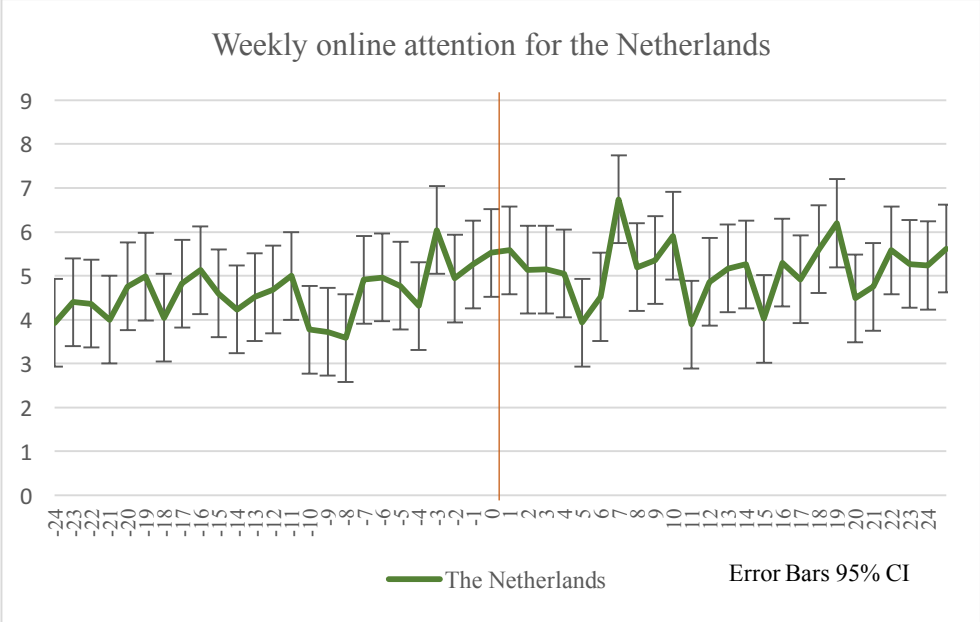
Table 2 Descriptive Results of the paired sample t-test (n=208):

Mean			SD		Std. Error Mean	
	PRE	POST	PRE	POST	PRE	POST
T-21/ +21	6.861	7.058	174.466	181.578	12.097	12.590
T-20/ +20	7.538	7.543	182.841	172.791	12.678	11.981
T-19/ +19	8.192	8.697	182.288	172.417	12.639	11.955
T-18/ +18	9.327	8.216	180.281	184.796	12.500	12.813
T-17 +17	8.952	6.865	146.832	167.960	10.181	11.646
T-16/ +16	9.615	8.740	177.767	199.392	12.326	13.825
T-15/ +15	10.663	8.327	168.118	202.678	11.657	14.053
T-14/ +14	9.240	8.255	179.478	186.205	12.445	12.911
T-13/ +13	8.462	11.529	231.398	171.450	16.045	11.888
T-12/ +12	10.543	9.567	183.431	197.823	12.719	13.717
T-11/ +11	9.952	9.913	195.661	185.820	13.567	12.884
T-10/ +10	10.909	9.024	185.051	197.598	12.831	13.701
T-09/ +09	11.038	10.404	203.646	204.171	14.120	14.157
T-08/ +08	12.317	9.909	191.053	214.083	13.247	14.844
T-07/ +07	12.495	11.635	225.873	228.697	15.661	15.857
T-06+ 06	14.577	9.976	192.312	244.612	13.334	16.961
T-05/ +05	13.202	10.615	201.788	206.725	13.991	14.334
T-04/ +04	14.649	11.380	214.128	228.428	14.847	15.839
T-03/ +03	15.288	11.250	177.703	252.580	12.321	17.513
T-02/ +02	16.846	12.755	209.204	251.474	14.506	17.437
T-01+01	20.870	13.221	222.013	300.808	15.394	20.857
T-00	19.139		266.469		18.476	20.079

7.2. Weekly Stepwise analysis of means for the whole Netherlands (all exhibitions from the sample)

The weekly attention levels include a less pronounced effect. The attention for the artist is rather distributed diversely around the treatment of the exhibition Vernissage. The attention levels peak after the exhibition around 7 weeks after the exhibition which is hardly showing any relations (Figure 2). Presumable other exhibitions or other forms of attention can explain the effect but that extends the purpose of this thesis. The short time impact as seen in the daily data distribution seems to be more pronounced then the weekly distribution. The inferential analysis is used to compare the pre- and post-period and find difference in the two periods.

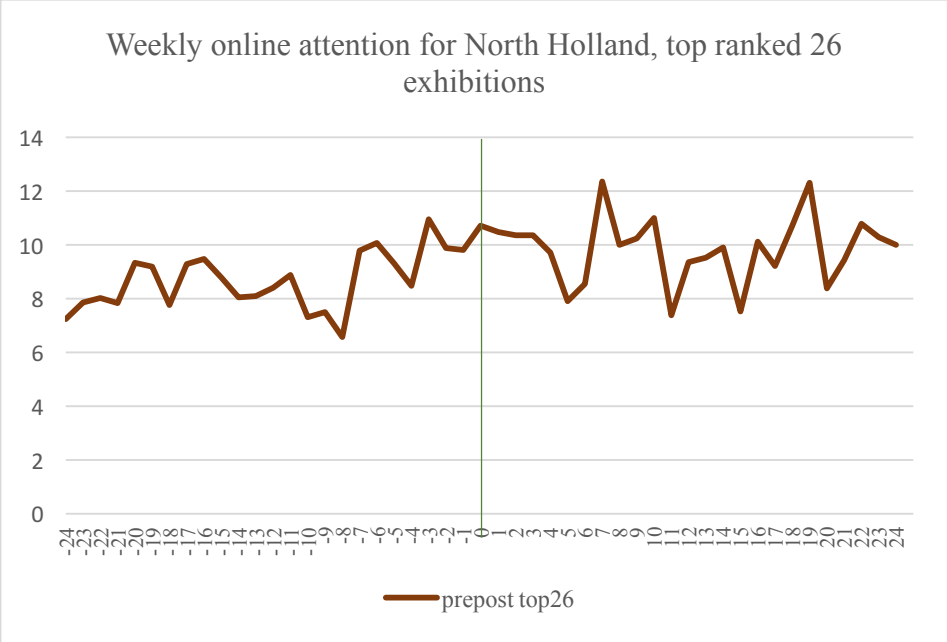
Figure 1 Online attention for the Netherlands including the average weekly attention for the exhibitions



7.3. Weekly analysis for North Holland Top ranked 26 Exhibitions

The data as presented in the (Figure 3) in comparison to the chart above represent a higher average in between 7,25 and 12,37. While the chart above shows an average between 3,65 and 6,87. Further there is a visible upward trend showing that the attention increases steadily before the exhibition and continues to rise after the exhibition. Visibly an impact of the treatment could be expected but is relies on bivariate statistical tests to prove significant results. The chart shows partly random variation but also follows as said before additive changes. The peak of the exhibition is not located around the opening which in this case might be interpreted as a long-term impact that develops before and after the exhibitions. If the bivariate analysis concludes a significant results the conclusions would be that the top 26 artists benefit from exhibiting in North Holland in terms of their attention online proceeding the exhibition. The analysis of the regional impact and the popularity at the same time is important because simultaneously performed it generates results that apply for both factors at the same time.

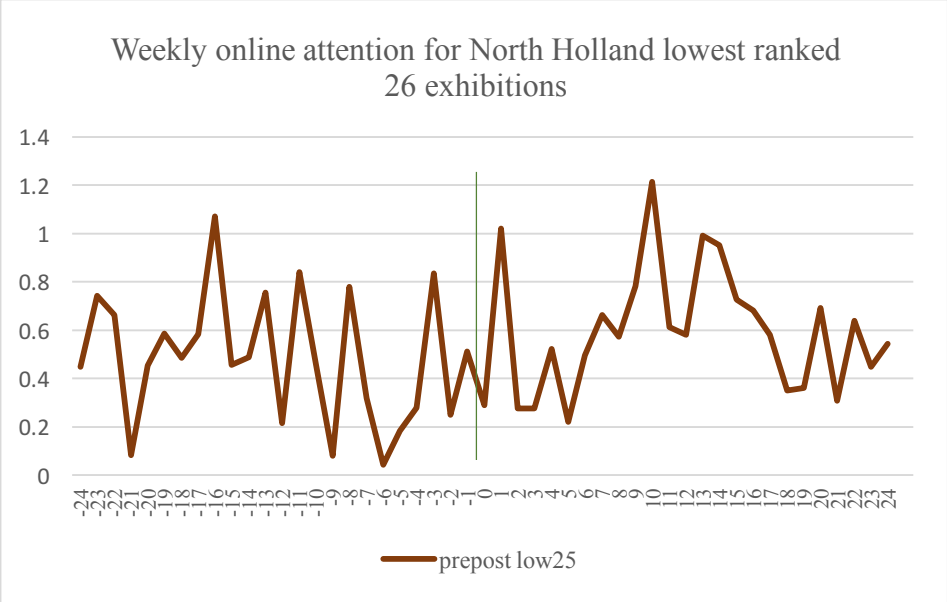
Figure 2 Online attention for North Holland including the average weekly attention for the top ranked 26 exhibitions on Artfacts.net



7.4. Weekly analysis for North Holland lowest ranked 26 Exhibitions

The lowest ranked 26 exhibitions as shown on the chart below (Figure 4) show a high standard deviation from the mean with indications towards random distribution which is unclear to be either a seasonal trend or random. The general upward trend that is seen in the chart above disappears in the chart below (Figure 4). The distribution of means is very low between 0,04 and 1,21. The highest peak is reached ten weeks after the exhibition. While the third highest peak is shortly after the exhibition at one week after the exhibition (M= 1,02). The mean for the period before the exhibition in comparison to after the exhibition does not differ visibly. It takes further bivariate analysis to draw conclusions from the chart.

Figure 3 Online attention for North Holland including the average weekly attention for the lowest ranked 26 exhibitions on Artfacts.net



The tests for North Holland and the highest and lowest ranked exhibitions are exemplary analyses for the descriptive analysis of means. The comparison of North Holland towards other regions to define regional proximity effects are investigated in the bivariate analysis of this research.

8. Inferential Analysis

8.1. Daily stepwise comparison of means (T-Test) for the Netherlands

The daily online attention is tested to analyse the significant difference in means for the Netherlands. The values of the pre-period including individual variables for each point in time are compared to the point in time in the post-period. To compare -21 days before the opening with 21 days after the exhibition, -20 days before the opening with 21 days after the exhibition and so on.

The Null Hypothesis for the comparison of the 21 pairs of days is that the means for the pairs do not differ. The following analysis tries to reject the Null Hypothesis for the individual comparisons of means. Since the descriptive part of the analysis is formulated in the univariate part of the thesis the bivariate part is rather focussed on the correlation and the differences in means. The paired sample t-test is used to compare the differences in means of the 21 days before the opening and 21 days after the exhibition. The pairs are correlated significantly with each other even though there are differences in the strength of the correlation. The first pair 21 days before and 21 days after the exhibition correlates only weakly at $r (207) = .27 < .01$. While only four days later the correlation increases towards a moderate correlation at $r (207) = .52 < .01$. The pre-period as also visible in Figure 4 shows a fluctuation 10 days before the opening and after the exhibition where the correlation drops to a weak correlation again $r (207) = .26 < .01$. Only one day after the correlation at 9 days before and after the reaches its highest value with a moderate correlation at $r (207) = .52 < .01$. The positive correlations do not go beyond weak and moderate correlations meaning that there are no perfect correlations between the pre- and the post-period.

The differences in means in the daily comparison of the period before and after the exhibition result only in a few significant differences between the pre- and the post-period is not given at all points in time. The significant difference between the pre- and post-period occurs at a few points in time first at 17 days before the opening and after the opening (M= 2,09, SD= 15,57, sig. ,055). Followed by the next paired difference around one week before and after the exhibition at 6 days (M= 4,60, SD= 25,14, sig. ,009). In addition, four significant results occur shortly before and after the opening at 4 days, 3 days, 2 days and 1 days before and after the opening (-4, +4, M= 3,27, SD= 26,70, sig. ,079), (-3, +3, M= 4,04, SD= 24,15, sig. ,017), (-2, +2, M= 4,09, SD= 25,02, sig. ,019), (-1, +1, M= 7,65, SD= 30,31, sig. ,00). The distribution of significant difference around the exhibition show a short-term

difference between the pre- and post-period in means which represent the significant increase before the opening in comparison to the decrease of the mean after the opening. The attention rises here quickly and drops quickly in the post-period.

The table (Table 3) shows the distribution of means and their significant and non-significant results.

Table 2 Daily paired sample t-test correlations for the Netherlands

	Correlation	Sig.
T-21/ +21	.274	.000
T-20/ +20	.332	.000
T-19/ +19	.294	.000
T-18/ +18	.342	.000
T-17 +17	.517	.000
T-16/ +16	.408	.000
T-15/ +15	.372	.000
T-14/ +14	.450	.000
T-13/ +13	.318	.000
T-12/ +12	.215	.002
T-11/ +11	.349	.000
T-10/ +10	.261	.000
T-09/ +09	.529	.000
T-08/ +08	.487	.000
T-07/ +07	.234	.001
T-06+ 06	.357	.000
T-05/ +05	.252	.000
T-04/ +04	.274	.000
T-03/ +03	.413	.000
T-02/ +02	.422	.000
T-01/ +01	.359	.000

Table 3 Daily paired sample t-test for the Netherlands

	Mean Differences	SD	Sig. (2-tailed)
T-21/ +21	-.1971	14.874	.895
T-20/ +20	-.0048	14.265	.997
T-19/ +19	-.5048	14.623	.730
T-18/ +18	11.106	14.517	.445
T-17 +17	20.865	10.797	.055
T-16/ +16	.8750	14.289	.541
T-15/ +15	23.365	14.544	.110

T-14/ +14	.9856	13.306	.460
T-13/ +13	-30.673	16.662	.067
T-12/ +12	.9760	16.575	.557
T-11/ +11	.0385	15.100	.980
T-10/ +10	18.846	16.147	.244
T-09/ +09	.6346	13.720	.644
T-08/ +08	24.087	14.297	.094
T-07/ +07	.8606	19.512	.660
T-06+ 06	46.010	17.434	.009
T-05/ +05	25.865	17.330	.137
T-04/ +04	32.692	18.511	.079
T-03/ +03	40.385	16.743	.017
T-02/ +02	40.913	17.346	.019
T-01/ +01	76.490	21.013	.000

* $p < .05$.

8.2. Time-series analysis for daily data in the Netherlands

The t-test has shown that there are partly significant differences among the means for the period before and after the exhibition, especially clustered around the treatment of the exhibition. The time-series analysis has the aim to analyse the difference between the period before the exhibition and after the exhibition especially regarding the analysis of the impact of the treatment. The analysis refers to the Hypothesis that the treatment has an impact on the time-series.

The Null Hypothesis is defined as:

H0= Regression on residuals yields no significant constant of coefficient for time.

Indicating that the treatment has no effect of the pre-period in comparison to the post-period. In the following section the assumption of the null hypothesis is tested (McDowall, McCleary, Meidinger & Hay, 2011).

The time-series analysis consists of a linear regression that uses the average of the 208 exhibitions in the Netherlands. The same analysis will be performed on the 12 other provinces of the Netherlands to determine the proximity of online attention based on the distance in relation to attention.

The linear regression is performed on the sum of all points in time divided by 208 which equals the average of the individual 21 points prior and post the exhibition opening. The days are treated as the independent variable and the averaged online attention as dependent variable. The linear regression is performed at the 21 days prior the opening to use

the regression equation for the prediction of the post-period as an extrapolation of the post-period based on the results of the pre-period. The regression coefficients are used to the predict each day of the post-period related to the regression equation y = 5,712 + 0,529 x days. The result of the linear regression shows a significant result (R^2 = .855 ß = .00; p < .05). In the pre-period the online attention increases positively with a factor of 0,529. The regression for the post-period includes the comparison between the 21 days and the original data with the result of a negative relationship of online attention and the time after the exhibition. The regression equation equals: y = 13.452 - 0,229 x days (R^2 = .746; ß = .00; p < .05). The regression chart results in a negative trend that indicates the drop of attention after the exhibition.

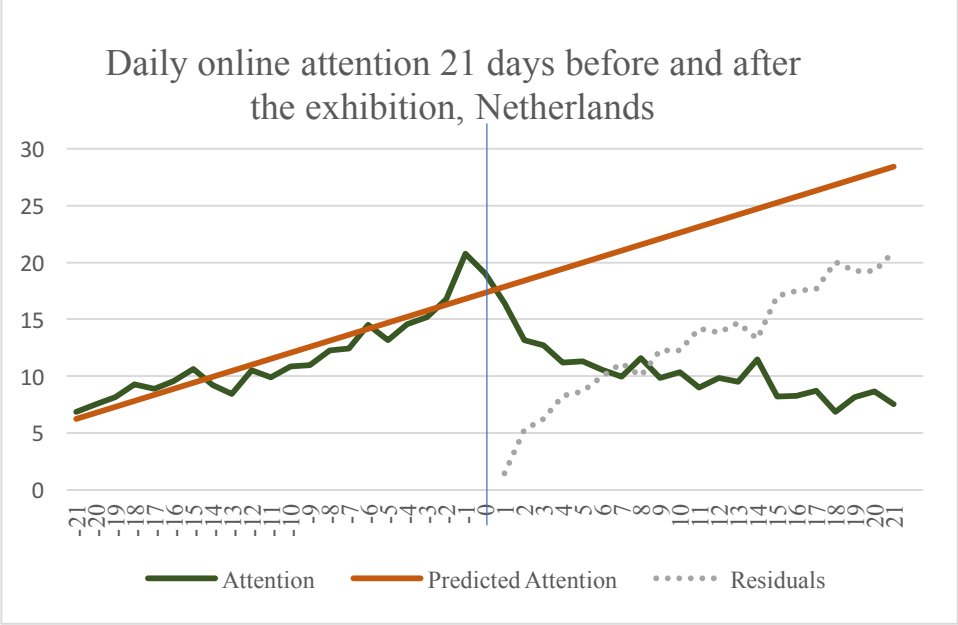
The regression equation for the pre-period is used to build a prediction graph that assumes how attention would rise if the treatment would not have occurred. The forecast is supposed to be compared to the original data to prove that the treatment influences the post-period. To understand the difference between the forecast and the observed data points the time points of the forecast are deducted from the post-period. The following analysis of the residuals includes the Hypothesis that the residuals yield no significant constant of coefficient for time. The results show a significant almost perfectly linear trend (r^2 = 0,95) while the regression results for the constant (y) and the days post the exhibition have a significant outcome which leads to the rejection of the Null hypothesis meaning there is a significantly constant level change over time which indicates that the treatment does have an influence on the post-period.

The paired sample t-test is further performed to understand the difference between the predicted and the observed values to show that the two variables differ in their attention. The paired sample t-test is performed twice to not only prove the difference between the observed and the predicted values but also to show the difference between the pre-and the post-period. In comparison to the previously performed stepwise comparison of means the t-test compares the pre-period to the post-period in general instead of the stepwise comparison of the individual points in time. Further the difference between the residual analysis and the t-test is to compare the means for significant differences while the residual analysis tests for the linearity and the impact of the treatment on the post-period.

The chart below (Figure 5) shows the pre- and the post-period and the difference between predicted and observed data. The chart shows the steadily increasing prediction trend, the original data from Google Trends with the average online attention, and the

residuals of the post-period that show a difference between the predicted and the observed data.

Figure 4 Online attention for the Netherlands including the average daily online attention, predicted attention and residuals



The Null Hypothesis for the paired sample t-test is that the means between groups are equal. The first paired sample t-test shows the difference between the observed and the predicted value with the result that there is a significant difference between the average of the observed and the predicted values for the post-period ($t= -11.46$; $df= 21$; $p < .05$). The indication of the correlation is observed in the paired sample t-test which indicates a strong negative correlation between the observed and the predicted data (Correlation: $- .87$; $p < .05$). In this t-test the Hypothesis can be rejected since the means are not equal.

The second paired sample t-test is performed for the period prior and post the exhibition to compare the average of the 21 points in time prior to the opening and after the exhibition. The results show a significant negative correlation between the pre-period and the post-period. Further the results for the paired sample t-test indicate no significant differences between the means of the period before the treatment and after the treatment. The Hypothesis that the means differ cannot be rejected and must be retained. The result is indicating that even though the residuals show an impact of the treatment in the post-period the second paired sample t-test proves that the mean do not differ which leads to the conclusion that the level of attention does not differ significantly at a 0.05 confidence level from the pre-period. If the level is extended to the confidence level 0,10 the difference gets significant (sig. 2-

tailed, 0,10 > 0.155 but has to be treated carefully due to the extension of the confidence level.

8.3. Weekly analysis

The collected data for the weekly trend of the Netherlands is used to test the short-term impact in comparison to the long-term effects to determine if the popularity of exhibitions is to be associated with the promotion efforts of the institution. Related to the literature that claims that online attention could be linked to promotion effort (Smithonian Institution, 2002) in comparison to the idea that online attention is related to the already existing popularity of the artists. To determine the effect two independent sequences of tests are performed. The first analyses the sample of 52 exhibitions including the 26 top ranked artists and their exhibitions and the lowest ranked 26 artists of the top 300. The aim is to inform the research towards the comparison of the daily and weekly data and thereby understand if the attention is related to promotional efforts or to the existing popularity of the artists. The test is further informed by the literature on the economics of attention since it questions the role of institutions as investors for attention and thereby clarifies if the curator functions as investor for talent and success in terms of online exposure or if the effect is non-significant because the artists does not need the help of experts anymore. The independence of artists relies on the already established popularity of the artist.

The tests include the analysis of the weekly distribution of attention 24 weeks before and the week of the Vernissage. The analysis is performed for the weekly data that includes 24 weeks prior and post the opening week to compare the two samples and prove the influence of the exhibition on online attention in a longer time frame. The weekly analysis includes the data from the Netherlands and is comparable to the daily data analysis since the prediction of the post-period is based on the analysis of the residuals and compared to the period before and after the exhibition. The purpose of the analysis is to define if promotion is associated with attention.

The more specific analysis includes the regional distribution of attention. The regional comparison explores the exhibitions in a regional comparison such as North Holland compared to other regions to define the influence of the treatment in proximity towards the exhibition. The analysis is further extended towards the inclusion of other regions to compare the attention towards distance to the exhibition and thereby question the Hypothesis that attention is based on proximity. Meaning that exhibitions receive more attention in the region

the exhibition is held in. The analysis includes dummy variables to tests for the deviation of the residuals in a regional comparison.

8.4. Time-series analysis for weekly data in the Netherlands

The first analysis of the weekly data is performed on the country level and includes 52 exhibitions of the top 26 and lowest 26 artists and their exhibitions from the ranking of the top 300 artists on Artfacts.Net. As seen before in the descriptive analysis the chart (Figure 6) shows a rather divers distribution which does not allow statistical significant results based on the visible interpretation in the descriptive part. The analysis is performed in the same manner as the daily analysis on the country level. The pre-period is used to establish a forecast of the post-period to compare the predicted values with the observed values. The regression equation derives from the regression on the pre-period and weeks and the independent variable of time is y= 7,425+ 0,091 x weeks. The Chart below (Figure 6) in comparison to the daily distribution of the forecast (Figure 6) shows rather a representation of the original data from the pre-period. The visible interpretation goes as far that the forecast is an accurate representation of the original data. In comparison to the forecast of the daily data that shows a negative downward slope instead of an upward trend as predicted by the forecast.

The deviation of the predicted and observed data equals the residuals which are used to determine the impact of the treatment on the post-period. The results show almost no linearity based on the values of (R^2 = .082 while ß = .165 $p > .05$). Meaning that there is no significant influence of the treatment on the post-period. In comparison to the daily analysis that shows the result of a clear difference between the predicted and observed data meaning that there is a clear observed impact of the treatment. On the confidence level of 0.1 the significance can be established. The interpretation in that case could define a significant deviation between the pre- and post-period with the effect of the treatment. Further the residuals show a significant constant of coefficients for time.

Figure 5 Online attention for the Netherlands including the average weekly online attention, predicted attention and residuals

8.5. Time-series analysis for weekly data of top ranked 26 Exhibitions in North Holland

The weekly analysis of the top 26 exhibitions in comparison to the lowest 26 exhibitions from the ranking of artists aims to distinguish between the popularity of the artists and analyses the impact related to popularity of artists according to the ranking. The aim is to show if popularity is based on promotion or if curators use the level of attention the artist have already established themselves. The 52 exhibitions have been selected due to the need of a comparison between the whole sample of 208 exhibitions in the daily analysis and the 26 exhibitions that show the difference in trend in a longer time-frame. Due to time-limitations the sample is only comparably small with 26 exhibitions of the top ranked and 26 exhibitions of the lowest ranked artists. The time frame that is covered is also adjusted to the Vernissage as the treatment in the same manner as the weekly observations.

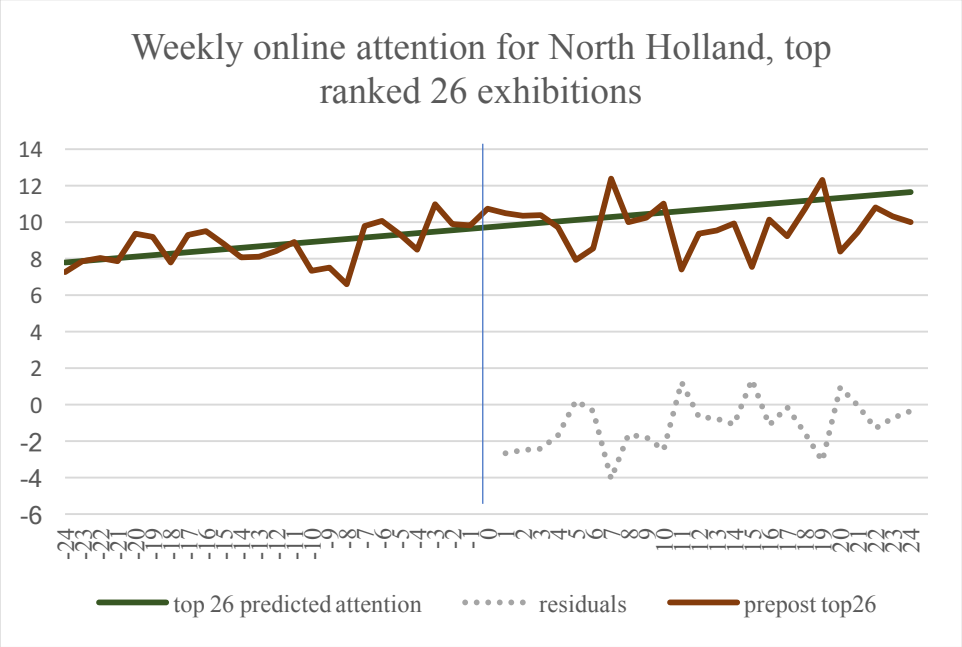
The analysis is yet again based on the time-series structure and is divided in two separate analyses for the top ranked and lowest ranked artists resulting in a comparison of residuals to analyse the difference in attention for the two groups. In comparison to the analysis above which shows the attention for all exhibitions in Netherlands this analysis focusses on the top 26 exhibitions that are held in North Holland. The data includes the cities

of Amsterdam and Haarlem in North Holland. Amsterdam as the capital reaches most of the scaled attention in comparison to the other provinces. The charts above and below look alike since they refer to the same sample even though North Holland is only a small part derived from the sample of the Netherlands. The means differ because the sample is narrowed down from the attention for all exhibitions in North Holland to only the exhibitions that exhibit in North Holland.

The regression equation for the forecast is the following y = 7,714 + (0,080 x weeks) which is used again for the forecast as shown in the linear graph in (Figure 7). The following analysis of the residuals shows that there is a significant deviation between the pre- and post-period. Meaning that there is an impact on the post period. The value (R^2 = 0,1) explains almost no linearity. While the significance is established at a 0,1 level since (0,1 <p .05). There is a significant influence of the treatment in the post- period and a significant constant of coefficients on time.

The additional paired sample t-test is yet again showing the influence of the pre-period on the post-period by comparing the means. Even though there is no significant correlation the means differ significantly (sig. 0,62, M Pre= 8,75; M Post= 9,99). The difference between the predicted and observed values show a significant negative correlation with a difference in means of (sig. 0,00, M observed= 9,89, M predicted = 10,78). In comparison to the previous analysis the outcome shows a long-term trend for the most popular artists of the Artfacts.Net ranking. The following analysis shows the comparison of the lowest 26 artists from the top 300 artists on Artfacts.Net. If the analysis shows a less pronounced upward trend the conclusion can be drawn that the most popular artists profit from the attention in the North Holland.

Figure 6 Online attention for North Holland including the average weekly online attention for the top ranked 26 exhibitions, predicted attention and residuals



8.6. Time-series analysis for weekly data of lowest ranked 26 Exhibitions in North Holland

The lowest ranked 26 exhibitions from the top 300 list is analysed in the same manner as the top 26 exhibitions above. The regression equation for the prediction plot is y = 0,598 - 0,009 x weeks. The regression on the residuals including the forecast and observed values show that the Null hypothesis cannot be rejected and that there is no impact from the treatment on the post-period and no constant for coefficients for time (Sig. 0,54 > p. 0,05).

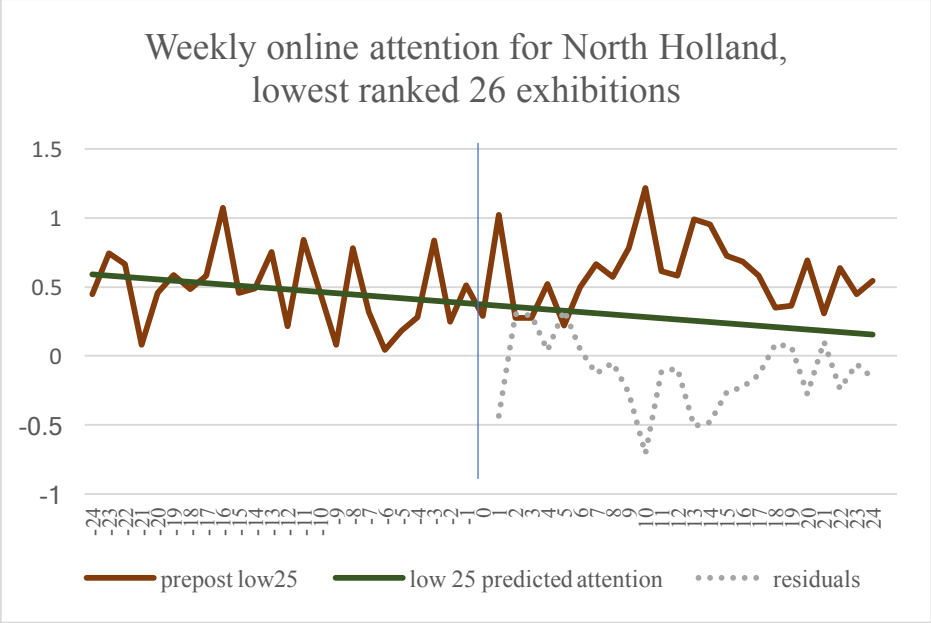
The additional paired sample t-test for the pre- and post- period the exhibition is additional showing that there is no difference between the pre- period and the post- period and there is no correlation between pre- and post- period. Therefore, the Null hypothesis can be rejected that the means equal prior and post the opening (sig. 1,1, M pre = 0,48; M post = 0,60).

The second paired sample t-test shows a significant deviation between predicted and observed values (sig. Obs. = -0,11; Pred. = 0,48). The overall result for the difference between top ranked and lowest ranked artists is that the impact on the post-period is significant for the top ranked artists but does not occur for the lowest ranked artists which indicates that popularity of the artist can influence the impact of the exhibition on the

attention for the artist online. The lowest ranked artist experience a negative trend in comparison to the top ranked artists in North Holland. The conclusions can obviously not be generalised since further analyses are needed for the comparison between provinces and the popularity of the top ranked and lowest ranked artists. The long-term aspect of the analysis is further limited to half a year and does not cover a longer period.

The following analyses refer to the regional comparison of North Holland in comparison to other regions to understand the aspect of proximity to where the exhibition is held in.

Figure 7 Online attention for North Holland including the average weekly online attention for the lowest ranked 26 exhibitions, predicted attention and residuals

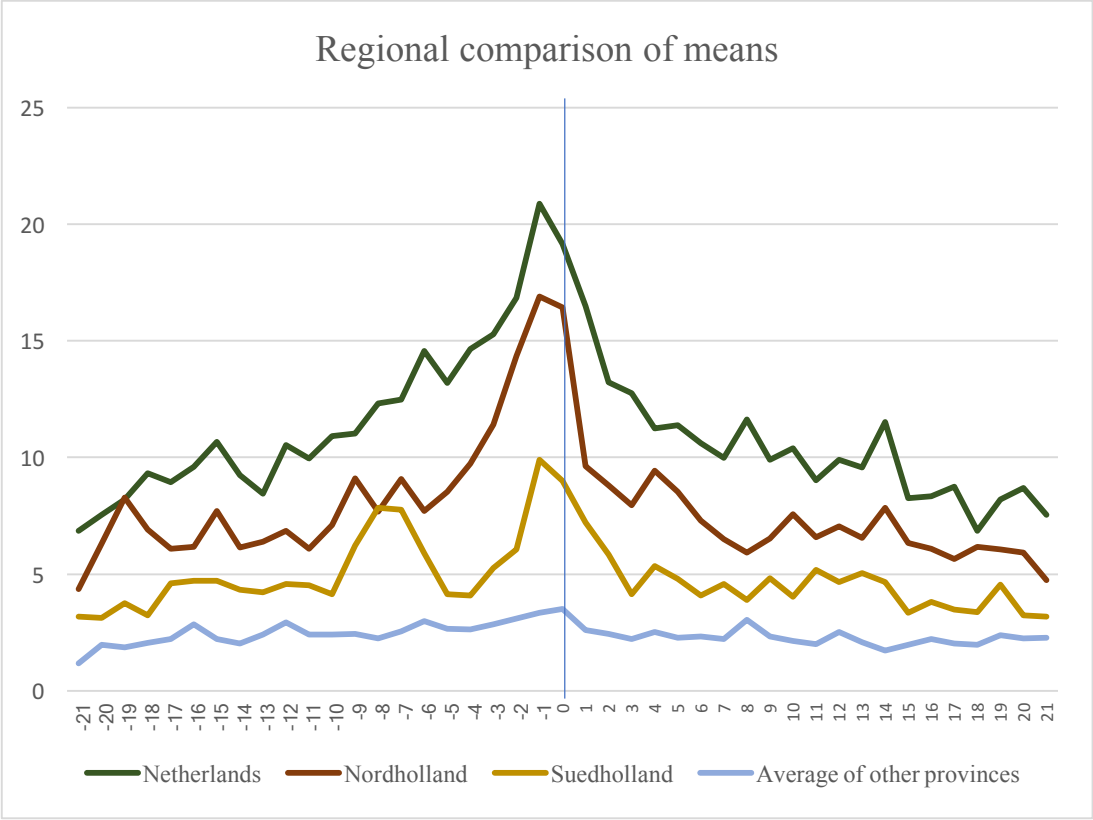


7.4 Regional comparison

The chart (Figure 9) represents the distributions of means in the Netherlands in comparison to the other regions is supposed to show the difference in means in the regional comparison. The mean of the Netherlands which compared to the other provinces has the highest average and the highest peak. The chart is a representation of national online attention while the other graphs show the online attention in the different provinces. The general trend of North Holland shows that the province that includes the capital Amsterdam accounts for almost as much scaled searches as the Netherlands including all other provinces. Followed by South Holland which includes the second and third biggest city of Rotterdam and Den Haag.

The scaled attention for the rest of the regions in the Netherlands is rather constant mostly below an average of five (from a total of 100 scaled points) therefore it has been summerized as average in the chart below (Figure 9). This results in a first preliminary conclusion that most of the scaled searches appear in North Holland and South Holland while the rest of the provinces account for less scaled, average searches online.

Figure 8 The Netherlands, North Holland, South Holland and the average of other provinces



8.7. Time-series analysis for weekly data of North Holland in a regional comparison

A regional comparison of means will further analyse the comparison between regional effects of the most popular and least popular artists of the top 300 list on Artfacts.Net. Online attention is compared to regional proximity and the provinces which have rather little scaled online attention. The chart above (Figure 9) represents the distribution of scaled attention in the Netherlands. Clearly the Netherlands represent the distribution of attention for the Netherlands in general followed by the scaled attention for the North Holland and South Holland while the attention for the rest of the provinces is on average below 5 (from a scale of 100) the 10 remaining provinces have been summarized in the chart “other provinces. The

two regions inherit further the cities with most inhabitants. Since North Holland inherits on average most of the attention it is used in the following analysis to compare the proximity towards the provinces the exhibition is held in.

The analysis of the distribution of regional attention in comparison to where the exhibition is held in is one of the final bivariate analyses that is included in this thesis. The analysis of the proximity is performed within the time-series model by using the residuals as the dependent variable to understand regional differences included in several regions as independent variables. The region of North Holland is used as an exemplary analysis in comparison to the 12 other provinces to understand if proximity towards the exhibition is generating a higher average in attention. This indicates that attention levels go down the further we are away from the exhibition. The Hypothesis is derived from the theory that suggests that cultural epicentres exist which are usually located in Metropolitan areas and the findings from James (2001) where less people attended cultural events if further away from the exhibition space. If an exhibition is held in Amsterdam, does the online attention reach other regions or stay within proximity of the exhibition? The second purpose of the analysis is aiming to analyse if attention is linked to the bigger cities in the Netherlands such as Amsterdam as the capital. Simultaneously the distinction between the top 26 artists from the sample are analysed in comparison to the lowest 26 artists to define the impact of popularity in regional comparison.

The time-series analysis is applied in multiple manners to derive the residuals from the predicted and observed values of the different regions as described in previous time-series analyses. The top 26 exhibitions are firstly analysed with the help of dummy variables by creating 11 dummies for the 12 provinces. The dummy variables are integrated in the regression with the distinction by region. The results as presented in the table below show the regional distribution of average, scaled online attention. The results show a significant outcome for the constant of North Holland while all other results are non-significant, indicating that the Null-Hypothesis cannot be rejected for the different regions and that attention is bound to the region the exhibition is held in. The unstandardized regression coefficient shows that the attention is highest in the region the exhibition is held in, which is in this case North Holland, while the attention in the regions close to the exhibition such as South Holland, Utrecht, Zeeland and Flevoland is bigger than in the regions which are further apart from the region North Holland. Referring to the statistical significance, the values cannot be confirmed. There is unfortunately no statistical evidence that the results are based on chance. The r^2 value also shows that only a small part of the regression can explain the

overall fit of the model. The explanation for the non-significant results could be linked to the small sample that is derived from all the regions included in the dataset. There is already a visible trend in the results for the regional dependency, without a significant result for the North Holland which includes most scaled attention, while the provinces surrounding North Holland such as Utrecht and South Holland receive proportionally more attention than further distant regions such as Limburg and Groningen as can be seen in the map below.

South Holland, Utrecht and Flevoland are direct neighbours with a higher level of scaled attention in comparison to Friesland which does not seem to be influenced by the regional attention.

Figure 9 Geographical distribution of online attention for North Holland

Table 4 Regional Analysis of the top 26 exhibitions in the Netherlands

	Unstandardized Coefficients		
	ß	t	Sig.
North Holland (Constant)	0,932	3.366	.001
Utrecht	0,26	.664	.507
South Holland	0,021	.055	.956
Zeeland	-0,021	-.053	.958
Flevoland	-0,044	-.112	.911
Over Ijssel	-0,05	-.128	.898
North Brabant	-0,065	-.166	.869
Limburg	-0,161	-.411	.681
Gelderland	-0,161	-.411	.681
Groningen	-0,199	-.507	.613
Friesland	-0,191	-.488	.626
Drenthe	-0,241	-.615	.539
R2 = 0,009			

8.7.1. Time-series analysis for lowest ranked 26 exhibitions with weekly data of North Holland in a regional comparison

The analysis of the lowest ranked exhibition spaces shows proportionally less scaled attention for North Holland and further shows an even higher number of a non-significant results for the different provinces. The interpretation is therefore without statistical evidence. The model does not prove significance since most of the values included in the lowest exhibitions in North Holland do not receive any online attention outside of North Holland with an r^2 of 0,000. The result is based on the small sample that is selected for only the exhibitions in North Holland and the dependent attention for the different provinces of the lowest ranked artists in the Netherlands. The conclusion that can be drawn from the analysis of the top ranked artists in comparison to the lowest ranked artists is that on average top artists receive more scaled attention for their exhibitions in North Holland, while the lowest ranked artists almost receive no attention outside of the region of the exhibition. The overall conclusion for the popularity is therefore that there is a distinction for the factor of popularity since higher ranked artists receive on average more scaled attention while the lower ranked artists do not receive any scaled attention meaning that popularity of the artists has an impact

on online attention. Therefore, it could be assumed that it is not the curator who have influence on the online attention by developing the popularity of the artists but its rather the already existing popularity of the artists that drives the attention under condition of a bigger sample and a significant result. The regional impact is also dependent on the popularity of the artist since the average scaled attention is bigger for the top ranked artists. Additionally, it also dependents on distance - the further away from the exhibition space is the region where the attention is analysed the less attention the exhibition receives. The conclusions must be treated carefully and cannot be generalised since the results are not statistically significant.

Further analyses for the other provinces in the Netherlands have been neglected based on the results of North Holland since the sample size is clearly too small to find significant results for popularity and regional proximity. An extension of the sample is unfortunately not possible in the time frame given for this project.

Table 5 Regional Analysis of the lowest ranked 26 exhibitions in the Netherlands

	ß	t	Sig.
North Holland (Constant)	-.281	-5.468	.000
Utrecht	.000	.000	1.000
Zeeland	.000	.000	1.000
South Holland	.000	.000	1.000
Flevoland	.000	.000	1.000
Overijssel	.000	.000	1.000
North Brabant	.000	.000	1.000
Limburg	.000	.000	1.000
Gelderland	.000	.000	1.000
Groningen	.000	.000	1.000
Friesland	.000	.000	1.000
Drenthe	.000	.000	1.000
$R^2 = 0{,}000$			

9. Results

The results for the daily comparison of means show a significant impact of the treatment in the comparison between the period before the exhibition and after the exhibition. This is related to the time-series analysis of the comparison of the predicted forecast and the observed values, meaning that there is a significant difference even though the result of the t-test of the pre- period in comparison to the post-period show no significant difference in means. This demonstrates that the treatment does have an effect in the level change but without a significant difference in means in the comparison of the pre-period mean and the post-period mean. Referring to the results of the bachelor thesis on awards (Stunz, 2016) a similar impact was observed. The overall research question: *What impact does a solo exhibition have on online attention?* shows that there is no significant impact in general from the solo exhibition on the post period for daily/ weekly online attention in the Netherlands.

The descriptive show a level change in trend shortly before the opening of the exhibition which drops drastically already shortly after the exhibition. The conclusion from the results could be related to promotion efforts which lead to an increase in attention.
The stepwise comparison of means includes 21 pairs for the paired-sample t-test that show that the average correlation of means peaks 9 days before and 9 days after the opening. The significant differences in means have their peak in means shortly before and after the exhibition which verifies the descriptive observation of the promotion efforts that result in the level change before the opening. Assumptions can be drawn about the cause of the results. As suggested by the Smithonian Institution (2002) increased online attention shortly before the opening could be due to promotion efforts and increased news surrounding the event as suggested by Weeks & Southwell (2010).

The weekly analysis results in a bigger picture of the period before the exhibition and after the exhibition. Since the analysis is more specific and less general, it is focussed on the regional impact and the popularity of the artists and is performed with a distinction of the artists in two groups reflecting the top ranked artists and the lowest ranked artists. Long-term impacts of the weekly analysis are described as follows. The bivariate weekly analysis is divided in separate analyses for online attention in the Netherlands in general to get an idea of the overall distribution of average, scaled attention for the 52 exhibitions in North Holland, and, to finalize the analysis, with two further distinctions in the analysis related to the proximity of the provinces in the Netherlands in comparison to North Holland. The last

bivariate analysis further includes the distinction between popularity of the top 26 artists and lowest ranked 26 artists from the sample of 300 top ranked artists on Artfacts.Net.

The descriptive observations for the weekly observations of 24 weeks before and after the opening indicate a less clearly defined impact in comparison to the short-term daily observations. The descriptive show rather random developments with room for interpretation towards seasonality that needs to be analysed in further research based on the identification of seasonality. For this purpose, the assumption of exhibitions or other kind of promotion activities could impact the online attention on the seasonal level.

The overall result for the Netherlands shows an impact between the pre- and post-period meaning that the period before the exhibition and the period after the exhibition differ from one another. The result for all 52 exhibitions in North Holland show a similar outcome with a significant difference between pre- and post-period. While the analysis of the top 26 exhibitions in North Holland including the comparison of the provinces does have a significant outcome meaning there is significant difference between the pre- and post-period for the top 26 artists in North Holland, the significance is not given for the regions beside North Holland. The same result is given for the lowest 26 artists while the non-significant impact shows a larger amount of average scaled attention for the top ranked artists with a clear distinction of the amount of attention in the different regions. The provinces South Holland, Utrecht and Zeeland which are closer to the exhibition receive more attention than regions further away from the exhibition. The conclusion that can be drawn without statistical evidence is that the impact is more defined for top ranked artists while the artists at the lower end receive less attention. The more interesting, but unfortunately non-significant result is that proximity towards the exhibition indeed has an effect, while also for this result the distinction must be made between top ranked and lowest ranked artists. Referring back to the literature the outcome of proximity towards the exhibition is expected related to the study by James (2001) that defined a relation between Moreover, the weekly analysis indicates that a bigger sample might have realised a significant outcome.

10. Conclusions

The attempt to analyze the primary art market from the perspective of online attention is realized thanks to reputation based mechanisms developed by Artfacts.Net and theoretically constructed by the economics of attention (Franck, 1998). The attention economy refers to the necessity of generating attention for the artist as an individual to build up reputation. Artists therefore are bound to the new commodity of attention to not only be evaluated by the art they produce but rather by the attention they raise due to exposure in news and exhibitions. The popularity is also clearly indicating that top ranked artists have a bigger impact on online attention than lower ranked artists. The superstars of the art world therefore acquire most of the attention online.

The economics of attention realize the framework for the reputation methods by treating attention as a scarce good which leads to the conclusion that attention needs to be raised by artists to build a reputation. As Schönfeld and Reinfelder (2006) discuss the social construct that reputation for artists is based on can be operationalised into factors that can be statistically explored. This thesis has managed to expand the analysis towards the regional proximity and analyze popularity in relation to distance. The primary art market is thereby accessible in contemporary research and should be explored further.

More specifically the reputation can be linked to the authorship of the artist which defines the value of an artists and is dependent on the certification of experts such as curators and collectors. Online attention is a result of the phenomenon of certification. Moreover, increased online attention is a part of the certification cycle online that might result in a bigger audience for the artist. As such it gives insight into the primary art market as a valuation instrument and Google Trends and Artfacts.Net can be used as tools to evaluate the reputation cycle.

The daily observations suggest that promotion efforts have a positive effect on online attention itself but do not influence the post-period strong enough to acquire significant difference in means. Consequently, the post-period after the exhibition does not profit from the promotion efforts before the exhibition. Even though the exhibition itself does profit from the promotion efforts since there is a visible peak around the Vernissage of the exhibition. Further tests on the relation between the pre-period before the exhibition and during the exhibition might reflect on the effect of the promotion efforts for the period of the exhibition. Even though they have been neglected for this thesis since it is dedicated to the impact of the exhibition on online attention in the period before and after the exhibition. Moreover, the

interest lies in the artist as an individual that could profit from the increased online attention after the exhibition. The treatment defined as the exhibition varies in duration and has been excluded from the analysis, while suggesting by the daily comparison of means that attention either goes up before the Finissage or is stable during the exhibition. For obvious reasons this result needs testing to be confirmed. It can be assumed that prior and post the exhibition the attention for the exhibition is most important.

There is a similar trend to be observed in previous outcomes in relation to the Bachelor thesis on awards (Stunz, 2016) where daily attention was measured in relation to the event of the award. Online attention also raised shortly before the ceremony of the award and drops shortly after the ceremony.

The weekly analysis shows that there is a regional trend of proximity; however, without significant evidence. The conclusion is therefore that a bigger sample might prove the assumption that an exhibition has a bigger impact in the province that is held in. The weekly analysis shows, without significant evidence, an effect of the exhibition in relation to distance. The further an exhibition is distant to North Holland the less average scaled online attention the province receives. North Holland has been selected as the subject of analysis since it receives on average most of the attention. Linked to the literature of the economic geography the attention distribution seems logically since the capital attracts most of the online attention and further offers a dense variety of cultural activities.

In practise the results of this thesis can be applied (disregarding the missing statistical significance at times) to shorten the intervals of exhibitions and focus on the events related to exhibitions. Regarding online attention, the momentum of the peak of the Vernissage could be prolonged for the short-term impacts on online attention, which might lead to more defined long-term impacts on online attention. These results correspond with the eventification of cultural events that formulate a commoditization of the exhibition itself (Jakob, 2013).

11. Future Research

Future research should include a panel study instead of the time-series analysis which in my case was a choice of realistic evaluation of the time available for this project. The time-series analysis was feasible while a panel study including multiple regressions would extend the time frame of this thesis. Further tests should also include a larger automatized sampling method to create a larger dataset which might have a higher chance of significant results. The control variables such as demographic information, further information about the popularity of the artist such as news related to the artist, and the ranking could be analyzed. For the institution control variables were collected such as the Facebook likes of the institutions, gallery rankings from Artfacts.Net and annual visitor numbers for the public organizations. These variables could help to disentangle the influence on attention from several perspectives to establish statistical results that could be applied to the population. The influence of attention related to institution or the artists could be explained with control variables. Lastly the regional aspect and the analysis of control variables such as the distance between the exhibition space to other provinces and the distance of the exhibition by public transport can be analyzed. Several factors can be identified with an influence towards the exhibition. The distinction between the institution, area where the exhibition is held in and the popularity of the artist are factors that can be expected to generally influence the online attention in terms of google searches. The popularity of the exhibition can be further analysed in relation to the ranking of the artist and its demographic features such as if he or she is still alive.

12. Literature

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13. Appendix

Table 6 List of Artists with Solo Exhibitions

List of Artists				
Adrian Paci	Dora García	Keith Haring	Rineke Dijkstra	Wolfgang Tillmans
Alberto Giacometti	Edvard Munch	Keren Cytter	Rirkrit Tiravanija	Yael Bartana
Alexander Calder	Erwin Wurm	Laszlo Moholy-Nagy	Robert Rauschenberg	Yayoi Kusama
Alfredo Jaar	Francis Alys	Lawrence Weiner	Roman Ondák	Yves Klein
Allora & Calzadilla	François Morellet	Lee Friedlander	Roni Horn	
Andrea Fraser	George Grosz	Liam Gillick	Rosa Barba	
Andy Warhol	Gilbert & George	Man Ray	Ryan Gander	
Anish Kapoor	Giuseppe Penone	Marc Chagall	Salvador Dalí	
Anri Sala	Günther Förg	Marcel Broodthaers	Sanja Ivekovic	
Arnulf Rainer	Haegue Yang	Marina Abramovic	Santiago Sierra	
Artur Zmijewski	Henri Cartier-Bresson	Mario Garcia Torres	Sarah Lucas	
Bill Viola	Henri Matisse	Markus Lüpertz	Shirin Neshat	
Boris Mikhailov	Hermann Nitsch	Marlene Dumas	Sol LeWitt	
Cao Fei	Hito Steyerl	Martha Rosler	Sophie Calle	
Carl Andre	Isa Genzken	Martin Kippenberger	Stephan Balkenhol	
Carsten Höller	James Lee Byars	Maurizio Cattelan	Sylvie Fleury	
Christo & Jeanne-Claude	James Turrell	Max Beckmann	Taryn Simon	
Christopher Wool	Jan Fabre	Mike Kelley	Thomas Demand	
Chuck Close	Jean Tinguely	Miroslaw Balka	Thomas Hirschhorn	
Claire Fontaine	Jeff Wall	Nan Goldin	Thomas Struth	
Cy Twombly	John Baldessari	Nedko Solakov	Tobias Rehberger	
Cyprien Gaillard	John Bock	Nobuyoshi Araki	Tracey Emin	
Damien Hirst	John M Armleder	Olafur Eliasson	Ugo Rondinone	
Dan Graham	Jonathan Meese	On Kawara	Vincent van Gogh	
Danh Vo	Jörg Immendorff	Pablo Picasso	Walker Evans	
Daniel Spoerri	Jorinde Voigt	Paul McCarthy	Weiwei Ai	
David Claerbout	Joseph Beuys	Pawel Althamer	Willem de Kooning	
David Maljkovic	Joseph Kosuth	René Magritte	William Eggleston	

Table 7 List of Exhibition Spaces

	EXHIBITION SPACE
1	Annet Gelink Gallery
2	Armando Museum
3	Art Affairs Gallery
4	BAK
5	Beurs van Berlage
6	Bonnefantenmuseum
7	Casco
8	Centrum Kunstlicht in de Kunst
9	Cobra Museum
10	Cokkie Snoel
11	de Appel Boys' School
12	De Hallen
13	De KetelFactory
14	DE PONT - museum of contemporary art
15	Ellen de Bruijne Projects
16	EYE
17	Foam Fotografiemuseum
18	Fotomuseum Den Haag
19	Frans Hals Museum
20	Galerie Akinci
21	Galerie Alex Daniels / Reflex Amsterdam
22	Galerie Onrust
23	Galerie Paul Andriesse
24	Galerie Post + García
25	Galerie van Gelder
26	Galerie Willy Schoots
27	Gemeentemuseum den Haag
28	Grimm Gallery
29	Groninger Museum
30	Huis Marseille stichting voor fotografie
31	Kunsthal Rotterdam
32	Kunstverein Amsterdam
33	Livingstone Gallery
34	Museum Boijmans van Beuningen
35	Museum de Fundatie - Paleis a/d Blijmarkt
36	Museum voor Actuele Kunst
37	Museum voor Moderne Kunst Arnhem - MMKA
38	Nederlands Fotomuseum
39	NIMk - Netherlands Media Art Institute
40	Rijksmuseum

41	Rijksmuseum Twenthe - Museum voor oude en moderne kunst
42	Stedelijk Museum
43	Stedelijk Museum ’s-Hertogenbosch
44	Stedelijk Museum Bureau Amsterdam - SMBA
45	Stedelijk Van Abbemuseum
46	Stroom
47	Teylers Museum
48	Van Gogh Museum
49	Wall House #2
50	Wilfried Lentz
51	Witte de With Center

Table 8 Table of Facebook likes for the Organizations

EXHIBITION SPACE	Facebooklikes28/02/17
Van Gogh Museum	1647081
Rijksmuseum	323793
Stedelijk Museum	110.295
Foam Fotografiemuseum	95533
Museum Boijmans van Beuningen	64607
Kunsthal Rotterdam	63923
EYE	57336
Gemeentemuseum den Haag	49614
Stedelijk Van Abbemuseum	35775
Witte de With Center	28209
de Appel Boys' School	24786
Nederlands Fotomuseum	23430
Fotomuseum Den Haag	18135
DE PONT - museum of contemporary art	17472
Groninger Museum	17152
Cobra Museum	11578
BAK	10483
Teylers Museum	9831
Stedelijk Museum ’s-Hertogenbosch	8526
Bonnefantenmuseum	8452
Stroom	8329
Rijksmuseum Twenthe - Museum voor oude en moderne kunst	8247
Museum de Fundatie - Paleis a/d Blijmarkt	8183
Frans Hals Museum	7983
Museum voor Actuele Kunst	6619
Casco	6118
Museum voor Moderne Kunst Arnhem - MMKA	5888

Annet Gelink Gallery	5335
Galerie Alex Daniels / Reflex Amsterdam	4948
De Hallen	3795
Grimm Gallery	3604
Ellen de Bruijne Projects	3271
Galerie van Gelder	2592
Galerie Akinci	2460
Beurs van Berlage	2155
De KetelFactory	1846
Galerie Onrust	1395
Livingstone Gallery	1250
Kunstverein Amsterdam	978
Art Affairs Gallery	744
Huis Marseille stichting voor fotografie	726
Galerie Willy Schoots	721
Cokkie Snoel	541
Galerie Post + García	479
Galerie Paul Andriesse	235
Stedelijk Museum Bureau Amsterdam - SMBA	223
NIMk - Netherlands Media Art Institute	81
Centrum Kunstlicht in de Kunst	52
Wilfried Lentz	32
Armando Museum	18
Wall House #2	5

Table 9 Index of Inhabitants in the cities an exhibition is held in

Index Inhabitants	
146.592	Amersfoort
151.752	’s-Hertogenbosch
146.592	Amersfoort
88.723	Amstelveen
838.338	Amsterdam
154.497	Arnhem
520.704	Den Haag
225.020	Eindhoven
157.999	Enschede
200.487	Groningen
158.305	Haarlem
122.418	Maastricht
631.155	Rotterdam

77.155	Schiedam
212.943	Tilburg
339.946	Utrecht
125.097	Zwolle