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ENJOYING SOCIAL TV
Re-discovering the social process and big data research

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Jinju Kim is a doctoral candidate in International Entrepreneurship and Management at Universitat Autònoma de Barcelona. She holds a BSc in Mass Communication and Journalism from Kyungpook University, South Korea, and an MSc in Art Management from the NEOMA Business School in Rouen, France. During her studies, she developed a keen interest in new media audiences and cross-cultural consumption. This led to her current research focus on media consumption and big data analysis in the field of media communication, particularly in regards to consumer behaviour. Her ultimate goal is to extend the field´s current knowledge on media consumption in the globalization era by investigating digital audiences' interpretations of various cultural media products in order to understand the impact of new media on these processes. These research findings can be used to develop new marketing strategies for media products to maximize the likeliness of their success in various cultural markets.

ENJOYING SOCIAL TV

Re-discovering the social process and big data research

Dissertation

for the purpose of obtaining the degree of doctor
at Universitat Autònoma de Barcelona

by

Jinju Kim

This disseration has been approved by the supervisor prof. Jordi Lopéz Sintas.

Declaration of Originality

No portion of this work written in the thesis has been submitted to qualify for another degree at another uniersity or other learning institute.

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Declaración de Derecho de Autor

Stefano,

we have done it

PREFACE

Life is not easy for any of us.

But what of that?

We must have perseverance and above all confidence in ourselves.

We must believe that we are gifted for something and that

this thing must be attained.

Marie Curie

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ABSTRACT

The social media, online sharing platforms, and online TV industry, among other innovations in communication technologies, have radically changed the media production and consumption environment. The globalization of the media markets is probably the most critical consequence of this digital revolution. Before the globalization, the media market was formed of locally produced products that were distributed and promoted using physical channels and traditional media and internationally consumed. Media products flowed in a one-way direction from the US (United States) towards the rest of the World. This model of production and consumption has changed radically. Now media products from all over the world are consumed anywhere, by anyone and at any time. Today the consumption of eastern cultural media productions has dramatically increased among western audiences due to the availability of online platforms. This fact has captured the attention of researchers in communication studies because it brings a new context in which the usual clash between two cultural backgrounds, the audiences' cultural background and the one embedded in the foreign media products, has changed: now many media productions come from Eastern cultures and are consumed in western cultures. However, the majority of previous cross-cultural research has studied the flow of western productions (the US mainly) to the rest of the World and conducted using traditional data gathering and analytical tools. Therefore, blindly applying these previous research frameworks to the globalization of media markets may reduce our ability to describe how global audiences enjoy media productions through social TV and interpret consumers' role in the popularity of Eastern media products. These new questions remain unexplored and refer us to the study of consumers' experience in terms of cultural values, enjoyment, and emotions by global audiences including the western audience.

One of the most recent and essential phenomena in the global market of digital media entertainment is the advent of social TV. The term refers to a new form of TV viewing experience that merges television and social media by enabling interactive TV viewing and allowing viewers to communicate and share their experience watching TV series. Practically, while watching TV programmes, viewers of social TV use second digital devices like tablets, notebook, and smartphones to interact with each other with text messages, tweets, online comments, and live chats. In consequence, social TV has turned out to be one of the best research environments where to investigate the cross-cultural consumption of eastern media products consumed by global audiences. From a research viewpoint, this dense set online

conversations and flow of comments carry valuable information about online viewers' experience of the media contents consumers have been exposed to.

Among this vast body of viewers' textual comments, emotional expressions are of the utmost importance to describe viewers' enjoyment with social TV. In other words, by identifying the emotional words presented in the viewers' comments, it is possible to describe audiences' reception, judgement, and enjoyment of foreign media products. Viewers' emotional expressions are also at the base of the social-affective interaction of viewers with media characters, called parasocial interaction. This form of social interaction comes out of an appreciation and enjoyment of the media personae performing in a particular media product. However, so far, studies focusing on the parasocial interaction in social TV are rare. Analysing the content of viewers' interactions while watching Eastern media products in social TV platform may help to identify the dimensions of the parasocial interaction with the media characters and provide an explanation of viewers' motivations for consuming eastern media product in social TV.

This research aims to fill the knowledge gap in cross-cultural consumption studies of eastern cultural media products consumed by global audiences' in social TV. We investigate the case study of Korean TV series distributed in online streaming platforms because it is one of the best-known eastern countries due to the global commercialization of Korean's electronics, cars, digital devices, and now cultural productions as well. We consider that the Korean case captures the cross-cultural consumption dimensions of watching social TV series. The findings of Korean case are just an illustration of the general phenomenon of enjoying social TV and will throw new light into the cross-cultural consumption in the context of global media markets, a context in which where, what, how, and when audiences consume media productions is coproduced in the air. This new line of research is almost unexplored. To examine the information embedded in the vast body of text data present in social TV we have a series of advanced computer-aided text research methods, such as sentiment analysis, topic modelling, and network analysis that have rarely been employed so far in communication studies. For the first time, this study adopts a mixed research approach with qualitative data (viewers' real-time comments) and advanced quantitative methods developed for big-data analyses.

Among this large body of texts, we first analyse the expression of emotions embedded in viewers' comments to measure the intensity of audiences' enjoyment of the Korean TV series. We consider three different linguistic groups of global viewers –English, Spanish and French–with two aims: 1) to replicate the pattern of emotions in three cultural contexts, and 2) to uncover possible differences and similitudes in the

intensity and way of expressing emotions in three different cultural contexts. The results reveal that at the individual level, the cultural context seems to influence the intensity of the emotions expressed. However, although these differences in the intensity of the emotions, a remarkable similarity is found on the bunches of words used to communicate the emotions (emotions in practice). This result suggests that the cultural groups do not influence the way consumers express their emotions when watching Korean TV series but do influence the intensity with which consumers express emotions in comments.

After studying the emotions expressed in comments, we have turned our attention to examine the parasocial interaction of audiences with media characters in social TV. With that aim, we have identified the thematic content expressed in real-time comments with the help of topic modelling, a new analytical tool for automatic thematic analysis. This advanced computer-aided text method of analysis identifies clusters of words that are related to particular topics. Remarkably, half of the topics contained in the comments of social TV viewers are directly related to the main media characters (media personae) of the Korean TV series analysed in this study. This fact suggests that only the series in which viewers talk about a particular media character, parasocial interaction was developed between media character and the viewer. The other topics are related to the dimensions of the para-social interaction. Then the analysis moves forward to measure the influence of the parasocial interactions and their dimensions on the popularity of the TV series. The most significant contribution to the series' popularity is the creation of parasocial interaction with media characters and, secondly, its various dimensions. In particular, the cognitive, criticism and referential dimensions have the highest influence on the series popularity. That is, viewers of Korean series seem to value media products that induce them to reflect, make judgments, and connect with events and personae that mirror their own lives and personal experiences.

Given the prominent role of the parasocial interaction between the media character and the viewer and the fact that it only seems to be developed among popular series, then we focus our attention to the process by which media characters are transformed from an ordinary actor into a successful star. Different theories are examined to model the process as a social network of interactions. Socially shared emotional experiences among viewers seem to be the starting point of a social process fuelled by a snowball effect. The results of the network analysis among the viewers' comments reveal three distinct structures according to the actor's popularity. Moving from low to high popular performers, the structure of audiences' network evolves from a poorly connected isolated individuals to a structure in which

few central communicators sustain multiple and simultaneous interactions with a multitude of other viewers. We call this process the Big Bang Theory of Stardom as it mimics the process of transformation of the network structure of actors as the evolution of our planets. However, the exponential growth of the social sharing process is mediated by the market size: the bigger the market, the stronger the snowball effect.

To sum it up, this research contributes to our knowledge of cross-cultural consumptions of Eastern TV series by global audiences on the social TV setting. Audiences' real time comments studied with new ways of analysing a large corpus of texts make possible to identify the emotions expressed, their intensity and the way they are expressed, and measure their influence on series popularity taking into account cultural differences. The analysis of the parasocial interaction with media characters reveals not only the role of parasocial interaction on Series popularity but also the influence of parasocial dimensions. Finally linking the shared comments among members of the audience makes possible to identify and describe the process of becoming popular, that we name the Big Bang Theory of Stardom. These findings would not be possible without an interdisciplinary theoretical framework, real time data shared on Social TV and new methods for analysing a large corpus of data. We conclude that social TV provides a promising new way of understanding the global audiences' behaviour of multidirectional cross-cultural consumption in the new media environment.

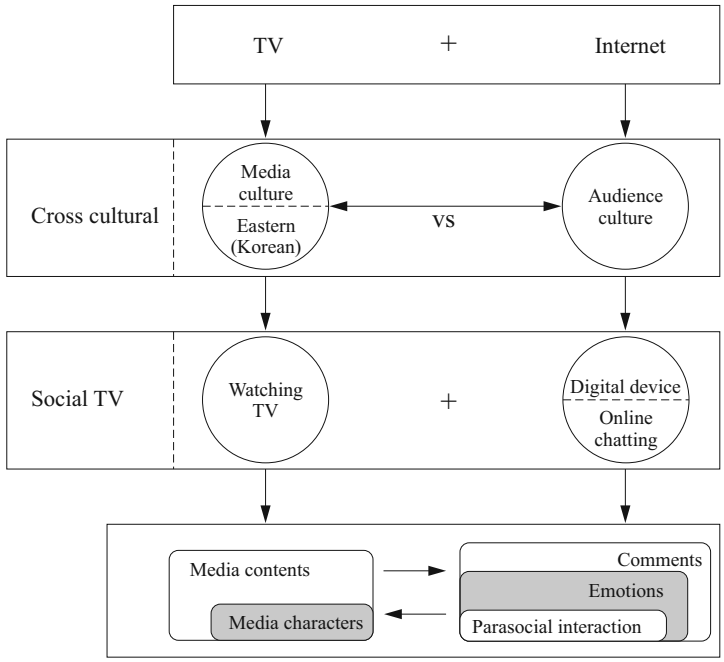


Figure 0.1: Illustrative map of the thesis outline

Contents

I INTRODUCTION

keywords: digital audience, cross-cultural media consumption, social TV

TV Audience

The word 'Television' comes from the Greek 'Tele', which means 'far' and from the Latin 'Viso', sight. It originally indicates a device we use to see from afar. However, nowadays Television (TV) comes closer and closer to us. It sits into our daily lives by reducing its size and tempts us with a variety of programmes from all over the world. All these changes have dramatically transformed our experience of watching TV. Audiences have rapidly adapted to this change in order to get the most from the new TV environment. At the same time, research has become interested in this innovative way of television viewing and suggested adopting new policies and marketing strategies to manage audio-visual productions. However, these changes occur so fast that they always are several steps ahead of companies and governments.

Past audio-visual industry

Until the beginning of the twentieth-century media studies were not worried about the heterogeneity of audiences (Pope 1983). After World War II, magazines and radio industries recognized the need for new models for audience segmentation. Due to the increase in the competition, media companies started to create different products aiming to segmented groups of audiences. From the mid-1980s US (United States) audiences were described as less socially unified, with a more frenetic lifestyle and the society became more fragmented than in the past. Market expertise considered social and social-psychological changes in their marketing strategies by pushing the differentiation of products along many small groups of audiences according to their interests, abilities, and media habits. In 1990s audiences became self-concerned, attention-challenged and allowed media firms to track them. In return, they asked rewards or benefits such as discounts and entries to media channels (Turow 2005). The media products were promoted through traditional media (the radio for music, the TV for movies), distributed through controlled distribution channels (retailers for music and DVD, theatres for movies), and adapted using local facilities to dub the native language of the target markets or adding subtitles. Therefore, the audience's choice was indeed influenced by the producer and the audience remained as "passive".

TV industry nowadays

The previous media production environment has been completely changed with the appearance of new social media and sharing platforms on the web. Since the mid-2000s innovations in the information and communication technologies such

as satellites, internet, and digital devices have brought about the boom of the online TV industry and the globalization of media (Olausson 2011; Thompson 1995). Audiences are not any more "passive" but capable of negotiating media information and opposing media companies by providing their preferences and media habits. In response media organizations have reflected this change and have evolved their perception of audiences in the new environmental conditions with new approaches. Napoli (2011; 2012) summarises the fundamental transformations in media audiences in two points: media-audience fragmentation and audiences' autonomy. Media-audience fragmentation concerns the audiences' division across a wider array of content options and across an array of distribution platforms thanks to the capacity of providing audiences more choices. Media contents are available from any location in the world including local, domestic and foreign products to global audiences (Y. Baek 2014; Bermejo 2007). The variety of distribution platforms has rapidly increased including now traditional broadcasting platforms, digital recorders (DVRs), online streaming and downloading to portable devices (Napoli 2012). In response to the continuous increase in choices, audiences have occupied a central and crucial position in the dynamic of media interaction. Communication technological development has transformed how audiences approach media from passive to active, being able to "pick and choose" the media programme (Olausson 2011). Audiences express their desire for co-participation in scheduling how, when and where to watch and engage with the media (Cover 2006; Livingstone 2003).

The dramatic changes in the online media environment were forecasted by Turow (2005). He predicted that viewers would choose the time to watch programmes with a variety of choices. "Intelligent navigators" would suggest programmes according to the previous choices. Moreover, viewers' active interaction with programmes would influence not only the plot but also the search and purchase of objects appearing on the screen, like the characters' clothes. Turow's predictions became true and perfectly describe TV viewing activities nowadays. We are in the digital age in which creative works can be preserved and consumed beyond their time of creation, beyond their original channel of distribution, and their place of origin, crossing any territorial boundaries. For example, Netflix which provides lots of media contents, from animation to documentary, from Korean TV dramas to American comedies, guides viewers through 'recommended for you list'. During the TV shows, viewers watch many products advertised in the media but at the same time mixed with the storyline. Thanks to the wide diffusion of new media such as the internet it is easier to access foreign cultural products. The distinction between domestic and foreign products has been lost, and also national loyalties are discouraged. This

circumstance has facilitated the cross-cultural consumption of media contents (Y. Baek 2014; Olausson 2011).

Cross-cultural Consumption in TV industry

Creative works such as movies, books, and music embed their original histories and cultures (Lena and Peterson 2011). As well in the TV industry, the TV format is socially and culturally based on the localization of audiences (Jensen 2007; Moran 2009; Roscoe 2004; Waisbord and Jalfin 2009). In other words, TV contents convey the norms, values, and beliefs shared by the locals (Keulen and Krijnen 2014). Hence, the socialization process is the key to understand TV contents. All those socio-cultural elements are shaped and influenced by the national culture, in the way individuals are socialized in their cultures and in the way their perceptions of the world are shaped, such as judging their proper behaviour as well as others. In turn, their national culture can display the communication behaviour of individuals (Gudykunst and Lee 2005; Heine 2010; Heine and Buchtel 2009). Extending this consideration to the interaction between audience and foreign media contents, the study of cross-cultural media consumption confronts a clash between two cultures: one of the audiences and one embedded in the foreign media products (Y. Baek 2014). In this respect, the national culture where the media are consumed influences the audiences' interpretation of the foreign culture conveyed by the media contents. For example, these cultural habits shape what is acceptable, enjoyable or interesting, and eventually affect the audiences' cultural interpretations.

Traditionally, the research on cross-cultural media consumption has been dominated by US audio visual products. This is due to the fact that the bigger the producer, the higher its capability of advertising the media products. As a result, it is evident that the US dominated the whole media industry in their local as well as global markets thanks to their large scale of marketing activities. The cross-cultural media conceived the message the US as "us" and all the rest as "them/others" (Hafez 2007; Turow 2005). The scheme of global media has focused on maintaining the stability of Western dominance (the US) rather than understanding global audiences (Olausson 2011). In this context of dominance of US media products, the research has mainly focused on examining the flux of US media to all over the world (i.e. one way direction media flow) which has generated an intensive stream of research in the field of global media consumption or cross-cultural studies (T. R. Miller et al. 2008; Schiller 1976; Tomlinson 1991).

Since international media trade has been rapidly increased through online platforms,

traditional media producers have lost their competitive advantage based on the firm's size, in term of finance, production, and marketing. Through social media, small size producers can now promote their productions, and even more importantly, their audiences can get the products through social media as well (i.e. two-way direction media). Social media provide tools for promoting and distributing media productions, but also for consumers to adopt the language. Subsequently, now the cross-cultural media consumption is not any more "unidirectional" from West (the US) culture to others (Achterberg et al. 2011), but also "multidirectional" both in terms of production and consumption. For instance, Korean pop music has followers all over the world from North America to Europe (Y. Baek 2014; Pease 2006; S. Sung 2006). Importantly previous researchers indicate that even though new digital media environments increase the interactivity and influences media productions, the creative works still have embedded their original histories and cultures (Lena and Peterson 2011). In consequence, the global flow of creative works heightens its diversity instead of leading the culture homogeneity (Dowd and Janssen 2011). Applying previous theory elaborated from a western cultural flow cannot explain the cross-cultural media consumption nowadays. Therefore, there is an urgent need to re-define the characteristic of cross-cultural media consumption by filling the missing gap of the new media flow from non-western culture.

Audience and social TV

The TV viewing experience has been always a sharing activity. However, the experience of traditional TV viewing had physical limits imposed by the moment you are watching the TV with the people (broadcasting) and by after watching, when you meet your friends at work, school, or even in a pub (Chorianopoulos and Lekakos 2008). Since mobile devices and the internet provide unlimited opportunities for co-viewing with widespread connectivity between users through digital platforms, the socially sharing TV viewing experience has been transformed (A. A. Raney and Ji 2017). Nowadays audiences use another digital device while they are watching TV in order to share their TV viewing experience instantly by chatting, messaging and tweeting in social media (Doughty, Rowland, and Lawson 2012). Ji and Raney (2015) refer to this particular sharing behaviour as 'social TV' meaning as 'the growing set of technologies that enable synchronous social interaction between television viewers at a distance'. Social TV has brought down the distance and time barriers to share. This integration of TV viewing with computer-mediated communications has connected viewers from all over the world, and it has changed the entertainment experience of TV viewing.

Compared to the traditional TV, social TV differs in the identity and numbers of people with whom audiences share their experience: family and local social group in traditional TV viewing while virtual social groups and anonymous audiences in social TV (Chorianopoulos and Lekakos 2008; Lochrie and Coulton 2012). Users of social TV effortlessly connect and interact with others through social media in order to share reactions, attitudes, opinions, and judgement about the program they are watching together during real time watching. Accordingly, an increased interest in social TV research has emerged in recent years. However, the vast majority of the previous studies has dealt mainly with the descriptions of this new phenomenon. Yet the actual conversation going on while experiencing social TV is not explored.

Thanks to the development and dispersal of online technologies, the traditional mass media consumption gradually shifted to an online environment such as using online streaming platforms and real-time interaction through social media. Using a second device for interacting activities does not distract the viewers or diminish the media enjoyment but on the contrary, it intensifies the entertainment. Social TV acts as an additional and even multiplicative tool for social interactivity and connectedness, which magnifies the TV viewing experience (A. A. Raney and Ji 2017). In this context, television consumption through social TV will be the overall result of active and deep interaction experience during watching TV rather than a simple audiences' evaluation of the TV contents.

This fact implies a change in the way domestic productions are channels to the markets. Traditional TV will be the first window of distributing media productions, in a way similar to what US studios have been doing for decades. The big difference is that now any producer from anywhere in the world can do the same and if the production is a successful one in the local market, producers can channel it to the world through social TV digital broadcasters. That is, the economies of scale advantage that US studies used to enjoy has now disappeared. At the same time, the more audiences actively search for the media productions they will like the most, the more audiences will be fragmented at the local level (Peltoniemi 2015) and segmented at the global level (Potts et al. 2008), just because they now have access to a great variety of productions, nationals, and internationals.

Additionally, this massive, real-time data from social TV allows researchers to approach audience behaviour from any discipline including communication, sociology, psychology, and business. Social TV captures the actual moment of viewers' reaction instead of after-exposure recalling the media experience and also contains the longitudinal reactions of viewers regarding the TV programme. The most important key feature of data from social TV is that it is produced naturally and freely by

the audiences' desire. More specifically it removes artificiality which most of the traditional research methods deal with (questionnaires, surveys) and enlarge the representativeness of research with more generalizable findings (Ji and Raney 2015).

Research Gaps

The great majority of cross-cultural studies of media consumption have been focused on the international success of US (Hollywood) products in other culture. However, following the rapid growth of foreign media consumption through online platforms, eastern cultural products consumption in western countries has recently become the main object of academic research. This new phenomenon opens important research questions about cross-cultural consumption of East media products consumed by global audience with different cultural background. The question that remains totally unexplored refers to how audio-visual products originated from East culture are experienced in terms of cultural values, norms, and emotions by the global audiences including the western audience.

Tackling this fundamental question also requires to account for the dramatic changes occurred in the media consumption and audience behaviour thanks to the new digital environment and especially in social TV. In this context, research has highlighted the need for innovative methodological tools in the light of the new active and dynamic behaviour of audiences. In particular, a new approach is required to re-conceptualize audiences by studying their experiences and gathering feedback from them. This can provide a framework for media organizations to re-define the value of audiences and how it influences the economy and the strategies of their business (Napoli 2012). The digital media industry belief in success is based on a rewarding relationship with the audiences. Hence media organizations need knowledge about their audiences' media activities in order to provide them with a satisfactory reward according to their preferences (Turow 2005).

However, the complex and fragmented panorama of media and audiences nowadays limits the media industry to access representative data set of the experiences and interactions of their audiences through traditional measurement tools. Traditional systems of audience measurement can in fact only capture the tip of the iceberg in terms of the dynamic of audience behaviour in online. The reception of audience behaviour thus remains poorly understood such as why and how audiences consume media products (Napoli 2012). As a result, in the digital age, it is essential to develop new approaches and abilities to track the audiences' experiences and behaviour in screen media in order to interpret their reception of media and its potential

contribution to the market success.

Research aim and thesis outline

This research aims to fill the knowledge gap in cross-cultural consumption studies of eastern cultural media products consumed by global audiences' in social TV. The case study of Korean TV series distributed in online streaming platforms is considered to capture the cross-cultural consumption represented by the clash between the East culture conveyed by Korean TV series and the culture of global audiences. This allows producing new insight into the cross-cultural theories for the multi-directional media consumption in social TV, still almost unexplored.

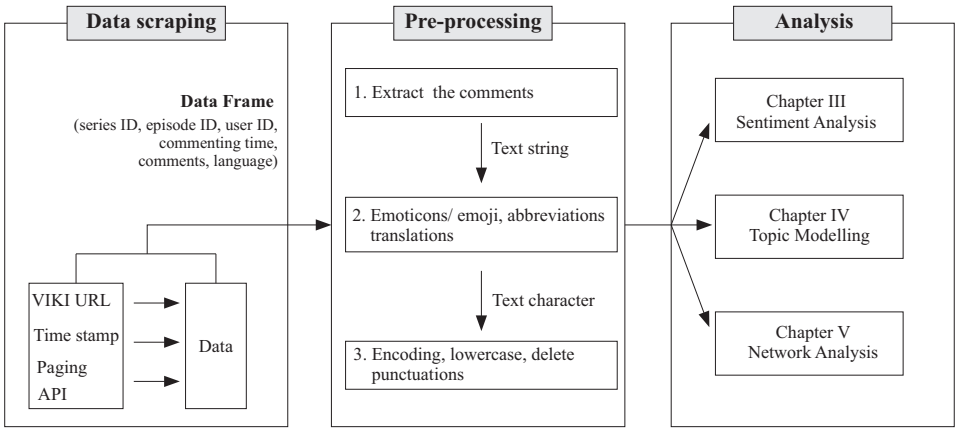
Particular attention is given to better understand the phenomenon of social TV by analysing in detail the audiences' shared comments while watching TV series. To address this aspect of social TV combined with the cross-cultural dimensions of consumption (media and audience), the present research analyses real time comments of social TV viewers. To interpret the information embedded in the massive body of texts shared in social TV, it is required to adopt advanced computer-aided text analysis methods such as sentiment analysis, topic modelling, and network analysis rarely attempted so far in communication studies. For the first time, this study adopts a mixed research approach with qualitative data (viewers' real time comments) and advanced quantitative methods developed for big-data analyses.

Thesis outline

The thesis is organized into six sections. Introduction and motivations are firstly outlined by discussing the role of the audience in Social TV and the cross-cultural consumption. Chapter 2 presents the Korean TV programmes distributed by an online platform used as a case of study of eastern cultural flow in global audiences. In the same chapter it is provided the description of each step required to analyse real time comments of viewers in social TV by adopting big data analysis tools such as data scraping and pre-processing. Chapters 3, 4 and 5 represent the core part of the thesis. Chapter 3 investigates the relationship between the audiences' emotions and the popularity of the TV series by using sentiment analysis. In Chapter 4 the attention is given to the interaction of audiences with the main characters of the TV series (parasocial interaction). Topic modelling analysis is used to identify the dimensions of the parasocial interaction of audiences in Social TV. Chapter 5 focuses the attention on the media personae of TV series by re-examining the long-lasting debate on stardom theories and the social process that transforms an ordinary actor

into a successful star. The communication networks among the audiences related to media personae are reconstructed in order to identify the contributing factors that distinguish the network of successful artists from ordinary artists. Eventually, the last section summarises the main results of this work and recommends new research avenues based on the current limitations. A graphic summary of the steps followed in this research is offered in Figure 1.1.

Figure 1.1: Research designs and process



II DATA

keywords: Big data, real time comments, qualitative data, Korean TV series, VIKI.com

Korean cultural phenomenon

This research attempts to understand cross-cultural consumption from non-western cultural flow brought by online TV platform and fill the research gap in cross-cultural theory for the new multi directional media consumption. We investigate the case study of Korean TV series distributed in online streaming platforms because it is one of the best-known eastern countries due to the global commercialization of Koreans' electronics, cars, digital devices and now cultural production as well.

The Korean culture industry is now the worldwide sensational phenomenon including K-pop (Korean pop music), K-drama (Korean TV series), K-e sports (online game), K-film, K-Beauty, K-fashion, and K-lifestyle. For example, PSY's 'Gangnam Style' music video was the most viewed on YouTube for five years straight, and it was the first ever music video reaching billions of views. Since his success, Korean cultural industry has reached extreme success. The Instagram executive explains also K-pop has been one of the most popular types of contents in the platform for the past four years since 2015 (B. Baek 2019). Now, the market glory is led by Korean boyband-group, BTS, who broke a world record in the global music industry. After BEATLES, this Korean boy group became the first singer group who takes the No.1 spot on the US Billboard 200 charts with three albums within a year. BTS remained at the top position for a year at Billboard's social media chart. This global supergroup recently started the world stadium tour concert in the US, UK, France, Brazil, and Japan. For six concerts in the US, 320000 spectators attended their concerts. For the London stadium concert which will be held on 1st Jun 2019, 90000 tickets sold out within an hour and a half. At the same time, Korean TV series (K-drama) also have got a worldwide spotlight. For example, the drama "Mr. Sunshine" broadcasted via Netflix from 2018 earned approximately $300M from the global market. Nowadays, Korean TV shows, including programmes which are currently on air in Korean Television broadcasting, are available around the world through online platforms such as Netflix, DramaFever, mVIBO, and Viki. The popularity of these online platforms also explains the booming of K-drama. Together with the US, Korea is now highlighted as a soft power standout nation due to its hugely successful pop culture industry. In the first half year of 2018 Korean cultural contents exportation valued around $1900M and it has continuously increased about 30% annularly (resource from business market trend report by Korea creative content agency:http://www.kocca.kr/).

Investigating and understanding the reasons for a western audience to consume, appreciate and enjoy Korean cultural media represent a crucial research opportunity

to re-define the cross cultural consumption in the modern age: non-western culture products consumed by a global audience in social TV.

VIKI

Viki online video streaming service (http://www.viki.com/) counts more than 40 million monthly active users. Viki relies on a community of volunteers, the audiences. It provides a novel approach to promote and subtitle Korean TV shows by crowdsourcing from its customers. Audiences voluntarily participate in adding subtitles and making clips/photos of TV shows for advertisement inside Viki page. Audiences also create debates and discussions around TV shows.

Our research is based on multiple qualitative datasets of real time comments containing a large number of short comments about Korean TV series, collected from the TV streaming website Viki. Real time commenting is one of the most active ways in which viewers express their thoughts and feelings. Viewers can comment while watching the episodes and their comments appear on the screen in real time. The co-occurring of time commenting and video viewing ensures a high correlation with emotions experienced during viewing.

Our data is retrieved digitally from Viki (http://www.viki.com/) using *R language and environment* for data analysis (R Core Team 2016) by means of web-scraping and text-mining techniques (Munzert et al. 2015). Viewers' real time comments are firstly extracted along with the timelines for each TV series/episode. We made sure that we could access to real time comments in three different languages (English, French and Spanish) by examining any single Korean TV series episode and checking its availability through the VIKI API. Data scraping was undertaken over a six months period from January to June 2016 for 173 Korean TV series available from Viki. Hence this study employs quantitative research methods for analysing a big number of qualitative incidents (i.e. time-comments).

Selected Data (series explanation)

Among 173 K-dramas, we selected nine series that were broadcasted from 2014 to 2015 and that had a sufficient number of comments to ensure both an adequate number of comments and a manageable volume of data. In detail we required: 1) series were available without having to purchase premium access (Viki Pass); 2) their broadcasting time was between 2014 and 2015; and 3) all episodes had English, French, and Spanish subtitles.

The nine series (Figure 2.1) were classified in three categories according to the number of subscriptions: most popular (over 80,000 subscriptions), moderately popular (40,000-80,000 subscriptions), and low popular (under 40,000 subscriptions). Each TV series had three different language datasets: English (EN), French (FR), and Spanish (ES) (Table 2.1).

Table 2.1: Description of the Korean TV series with three language datasets each

Categories	Name of Series	Subscription	N.en	N.es	N.fr	Period
POPULAR	Pinocchio	144605	53572	23223	9276	2014 (Feb)
	Who are you: school 2015	107428	51141	21821	10242	2015 (Feb)
	It's Okay, That's Love	88866	24915	8571	1641	2014 (Jan)
MODERATE	The Girl Who Sees Smells	64388	31589	10922	6117	2014 (Dec)
	Hyde, Jekyll, Me	59440	20797	11428	3076	2014 (Oct)
	The Time I've Loved You	52035	23822	5214	2616	2014 (Dec)
LOWPOPULAR	Sweden Laundry	12775	2192	59	301	2014 (Oct)
	My Unfortunate Boyfriend	15342	4256	66	554	2014 (Nov)
	Tomorrow Cantabile	15692	3609	28	261	2014 (Jan)

Series 1 (Pinocchio) is romance and drama. *Gi Ha-myeong* is an exceptionally smart boy who lives happily with his parents and older brother. Suddenly his father, a captain of a fire fighting squad, dies with all his men during a rescuing mission. However, only his father's body is missing and the media stigmatizes him as responsible for the death of his team. *Song Cha-ok*, the news reporter, leads this conspiracy in order to attract viewers by sensational reporting. All the nation, including neighbourhood and the family of the deceased, blame and scorn *Ha-myeong*'s family. His mother kills herself by jumping from a cliff. She jumps with *Ha-myeong* but *Ha-myeong* is rescued in a small island thanks to an old man,

Figure 2.1: Posters of the selected nine TV series

Choi Gong-pil. Due to his trauma-induced memory loss, *Gong-pil* believes that *Ha-myeong* is his older son, *Choi Dal-po*, who died thirty years ago. *Ha-myeong* has no one apart from himself so he acts as *Dal-po* and treats *Gong-pil* as his father. On the other hand, *Choi In-ha* follows her father after his divorce with her mother, *Cha-ok*, to the small island where her grandfather, *Gong-pil*, lives. *In-ha* and his father are confused with the introduction in their lives of a strange boy as his 'older brother' and her 'uncle'. *In-ha* has 'Pinocchio syndrome', meaning that she cannot lie, and, if she does, she hiccups until she confesses the truth. She adores her mother and wants to become a reporter as well, like her mother, despite her illness. *Ha-myeong* and *In-ha* grow up together and become family. Even though *Ha-myeong* knows that her mother is *Cha-ok*, he secretly falls in love with *In-ha*. Both become reporters although with different motivations, but eventually *In-ha* realizes what his mother inflicted to *Ha-myeong*'s family and helps him to clean his father's name and reveal the conspiracy of the media industry.

Series 2 (Who are you: School 2015) is the sixth part of 'School' series which premiered in 1999. It is a high school drama about identical twins *Eun-byul* and *Eun-bi*. When they were five years old *Eun-byul* was adopted but *Eun-bi* remained in an orphanage unaware of her sister's existence. *Eun-bi* is a very cheerful girl but she experiences being bullied by a group of mean girls at her school. On the other hand, *Eun-byul* lives with her adoptive mother and attends the most prestigious private high school in Gangnam, Seoul. However, *Eun-byul* knows the existence of

her sister. When *Eun-byul* disappears during a school field trip, *Eun-bi* is expelled unjustifiably from her high school and jumps from a bridge. Fortunately, *Eun-bi* survives, but she lost her memory. *Eun-byul*'s adoptive mother takes *Eun-bi* home instead of *Eun-byul* by mistake. Since then *Eun-bi* lives as *Eun-byul*. Later *Eun-bi*'s memory comes back. Meanwhile, *So-young*, one girl of the mean group in the previous school was also transferred to the *Eun-bi*'s new school because *Eun-bi* attempted to commit suicide. *Eun-bi* becomes a friend with *Yi-ahn* and *Tea-kwang*. When *So-young* tries to reveal *Eun-bi*'s identity and bullies her again *Yi-ahn* and *Tea-kwang* protect *Eun-bi*. Finally, *Eun-bi* also stands up to *So-young* and *Eun-byul* also comes back home. *Eun-byul* had decided to disappear after she had become aware of *Eun-bi*'s unhappy life accidentally during the school trip in order to make *Eun-bi* happy. *Eun-byul* is the one who rescues *Eun-bi* from the river and switches both identities. *Eun-byul* decides to come back in order to help *Eun-bi* to face *So-young* bad behaviour and to find both lives back.

Series 3 (It's okay that's love) is a medical and romantic drama. *Jae-yeol* is a bestselling mystery fiction novelist and a famous radio DJ. However, he is suffering from a serious obsessive-compulsive disorder due to his troubled past. *Hae-soo* is a first-year fellow in the psychiatry department at a hospital. She is a smart and compassionate doctor, but she also suffers from sex phobia and anxiety after she saw her mom cheating. *Jae-yeol* and *Hae-soo* have had an argumentative relationship since the first day they met in a TV programme as a famous novelist the former, and as a psychiatrist the later. After *Jae-yeol* moves into his new house which he rented, he meets *Hae-soo* again as one of his tenants. Slowly they fall in love and attempt to heal each other's wounds. Later, as the relationship is getting deeper and deeper they learn that *Jae-yeol*'s mental health issue is more serious. He has undiagnosed schizophrenia.

Series 4 (The girl who sees smells) is a science fiction and crime drama. When *Eun-seol (A)* arrived home, she found her parents murdered. The murderer was absent-minded so he didn't notice *Eun-seol (A)*. While she was trying to escape, she was hit by a car. She was moved to the hospital in a comatose state. The same night *Moo-gak* was at a hospital visiting his sister, *Eun-seol (B)*, who was hit by a bus with a very small wound. He left the hospital for a few minutes to buy some food for his sister, *Eun-seol (B)*. However, when he came back to her sister's hospital room, he found her sister dead. Six months later, *Eun-seol (A)* comes back from her coma, but she lost her memory. Also, her left eye changes its colour to green, and she is able to "see" the smells as visible colours and shapes. The head of the police officers adopts *Eun-seol (A)* as his daughter in order to protect her and

gives her a new life with a new name, *Cho-rim*. After his sister's death, *Moo-gak* becomes a police officer with the aim to catch his sister's murderer. *Moo-gak* joins the investigation team of another main character, Lieutenant *Yeom-mi*, in order to catch the murderer and *Cho-rim* helps *Moo-gak* with his cases by using her unique ability. She can trace people by searching their smells using her left eye. While *Moo-gak* and *Cho-rim* work together, they find out that *Moo-gak*'s sister died instead of *Cho-rim* by murderer due to the same name.

Series 5 (Hyde Jekyll, Me) is a romantic comedy based on a literary character. *Seo-jin* is the third heir of a powerful company with multiple industries and the next CEO successor. He is cynical, cold but good looking and smart. However, *Seo-jin* has a dissociative identity disorder. When his heart rate exceeds more than 150 pulses, another personality appears *Robin*, who is kind due to a saviour complex. *Robin* first appeared 15 years ago due to the sense of guilt of *Seo-jin* about a traumatic incident. *Seo-jin* avoids anything which raises heart rate such as a strong physical or emotional reaction in order to prevent *Robin*'s appearance. His company also runs the theme park "Wonder Land" and *Ha-na* is the third-generation master of the circus show at Wonder Land, which has been the primary attraction for the theme park. She returned to Korea to save the failing circus and regain its glory. However, she faces strong opposition from *Seo-jin*, who wants to close the circus. *Seo-jin* notices that arguing with *Ha-na* rises his heart pulses and makes alarms of his heart monitor. *Seo-jin*'s mysterious assailant puts *Ha-na*'s life in danger. Because of this, *Robin* seems to be destined to save *Ha-na*. Finally, *Seo-jin* and *Ha-na* fall in love and save the circus and company.

Series 6 (The time I've loved you) is a romantic comedy and drama. *Ha-na* and *Choi-won* have been the best friends to each other for seventeen years, almost since high school. They have been together for every critical moment of their lives. However, they missed several timings and never had a chance to become lovers. *Ha-na* is a confident career woman and *Choi-won* works as a cabin crew. On *Ha-na*'s 34th birthday Choi-won makes a joke about ageing that does not make her happy. She is angry about the urban belief that men are like grapes that turn into a good wine as time goes, but women are like grapes that shrivel into raisins as time passes. *Ha-na* proposes a bet to *Choi-won*: she will get married before they become 35 years old. Meantime *Seo-hoo*, the ex-boyfriend of *Ha-na*, returns to Korea. *Seo-hoo* is a famous pianist and *Ha-na* meets him again by chance due to their work. *Seo-hoo* tries to resume his romantic relationship with *Ha-na*. *Ha-na* and *Choi-won* desire true love, but they are blind to themselves: they do not realize that they love each other. Fortunately, at last, they realize that it has been always each other whom

they care and love the most.

Series 7 (Sweden Laundry) is a comedy-fantasy drama. *Bom* is the owner of a laundry shop, Sweden Laundry. She has the unique ability that she can understand her customers' worries when she touches their clothes. There are worried about love, work, friendship, and family in ordinary daily lives. *Bom* also had a difficult childhood because of her family. Her parents only show affection for her old brother *Eun-chul* and the youngest sister *Eun-sol*, but forget the middle child, *Bom*. She uses her unique ability to help her customers to solve their problems as well as hers.

Series 8 (My unfortunate boyfriend) is a love story. *Tae-woon* and his girlfriend *Ji-na* have opposite attitudes about life. *Tae-woon* believes that honesty is important. He has a pure innocent heart but too naïve. He works as a florist and by chance he meets *Ji-na* during her job interview for joining a big company. *Ji-na* is smart but sometimes arrogant, and she does everything for gaining a successful professional career, even if has to lie to succeed. She comes from a poor family in a rural area which makes her care only about career and professional success. They don't like each other at first. After various messy and embarrassing situations, they become to get along. Finally, their relationship evolves and makes each other's lives better and even both fall in love with each other.

Series 9 (Tomorrow Cantabile) is a reproduction of Japanese animation "Nodame Cantabile". *Yoo-jin* is exceptionally talented, a musical genius majoring in conducting orchestras and playing the piano. His father is a famous pianist all over the world. However, due to childhood trauma, *Yoo-jin* has a flight phobia. He wants to learn to conduct orchestras in Europe under the supervising of a famous conductor, *Franz Stresemann*. *Yoo-jin* is meticulous and perfectionist. On the other hand, *Nae-il* is very clumsy and messy but also a virtuoso pianist. For the lesson, *Yoo-jin* and *Nae-il* must perform a piano duet. At first, *Yoo-jin* tries to teach *Nae-il* the way how he plays the piano but every time he tries he ends frustrated. At the same time, the world-famous conductor *Franz Stresemann* comes to *Yoo-jin*'s university. *Yoo-jin* is so excited to learn from him without having to go to Europe. However he does not realize the old history between *Franz Stresemann* and his father. Later *Nae-il* changes *Yoo-jin*'s perspective about music with her unique world view. *Yoo-jin* finally accepts her way to play and widens his view of the world thanks to *Nae-il* and *Franz Stresemann*.

Data Pre-process (Natual language processing)

The data scraping resulted in 331309 comments from the entire nine TV series. In general VIKI platform provides comments in different languages. We decided to consider not only English but also Spanish and French in order to enlarge the analysis domain and the results of this study. However, it is worth remarking that these three languages cover almost all the totality of the comments on VIKI. Most of the comments are formed by 8 words on average for all the languages and TV series. By looking in details, the comments are mainly exclamatory sentences written in the first person such as "I love..., I think..., I know..., I am..." or sentence referred to the media character as "You go..., You do..., You run..., You die..., You need..., etc." Questions regarding music, styles, names, and places are also often found in the comments.

For popular and mid popular series, the numbers of commenters range from 5000 to 10000. For low popular series, it ranges from 400 to 600. Around eight comments are typed by each commenter per series. Compared to the numbers of subscribers the percentage of commenters is about 6% for popular and mid popular series while 3% for low popular series. The conversation among viewers is limited to one-way reply to others' comments, A to B, very short and quick reply. 12094 comments generate one-way conversation in our data. However, there was no on-going debate or long conversations.

Each data frame contains eight variables: time comment ID, user ID, commenting time, value (real time comments), language (EN, ES and FR), user information (ID, name, username, image, and status, i.e. whether or not a VIKI staff member), series ID, and episode ID.

Dealing with textual comments accessed in the Web requires a pre-processing task before having the data ready for analysis. Among the real time comments, URL data were excluded while emojis (images), emoticons (built from keyboard characters), web-slang and abbreviations were translated into their meaning. Emojis (images) and emoticons (built from keyboard characters) are frequently present in viewers' comments — emojis on the basis of written descriptions in the Emoji Unicode Tables (Whitlock, T., n.d. retrieved 23 July 2016 from http://apps.timwhitlock.info/emoji/tables/unicode), and emoticons using emoticon punctuation tables (Christensson, P., n.d., retrieved 23 July 2016 from https://pc.net/emoticons/).

The emoticons and emoji tables mentioned above were only available in English, whereas our data included comments in French and Spanish. We therefore translated

them into these other languages, for which purpose we created a complete set of functions to convert emoticons and emojis into text strings representing their meanings.

Time-comments also contained web-slang and abbreviations that were translated according to the definitions provided by the Urban Dictionary (n.d. Retrieved 20 July 2016 from http://www.urbandictionary.com/). We removed all stop words using 'quanteda' R package (Benoit 2018), including numbers and punctuations.

III WHY AND HOW DO WE SHARE TV VIEWING EXPERIENCES?

Keywords: digital audience, social TV, online series viewing, online comments, sentiment analysis, emotion, sharing, media popularity

Why and How do We Share TV Viewing Experiences?: A cross-cultural analysis of the linguistic expression of emotions

Introduction

Globalization allows media products from all over the word to be delivered directly into consumers' hands. This breakthrough has been possible thanks to technological developments that have transformed tangible into dematerialized products, thereby allowing access to products sourced anywhere in the world. This erosion of local and national boundaries (Boone and Péli 2016) has implications for how cultural products are marketed, distributed, and consumed by transforming the traditional TV viewing experience into what is now known as social TV (A. A. Raney and Ji 2017).

Traditionally, media products have been promoted internationally through traditional mass media (e.g. via radio for music, via TV for movies, etc.), distributed through channels controlled by major US studios, directly or indirectly (networks of retailers for music and DVDs, theatres for movies, etc.), and adapted — dubbed or subtitled — as necessary according to local markets. The audience was passive in terms of consumption choices, as producers and marketers essentially decided what products audiences had access to. With the emergence of the social media as a web-based sharing platforms, cross-cultural media production and consumption is no longer a one-way process from Western producers (mainly based in the USA) to the rest of the world (Achterberg et al. 2011); rather, the process is now multidirectional[1].

Nowadays we are observing a transition from traditional media to social media changing the familiar TV experience into a social TV experience (A. A. Raney and Ji 2017). Social media play the role of key devices in promoting, distributing, and adapting products to local markets. Users of social media themselves play now an active role in this process, not only as co-producers who adapt — dub or subtitle — media products for other consumers to enjoy but also as promoters and even as distributors. Consequently, although established producers may still control traditional marketing channels, they have less control over the social media and the

[1]The current conflict regarding net neutrality masks the battle of large firms (studio producers, etc) to regain control of distribution channels. In the USA, the Federal Communications Commission voted against net neutrality in December 2017 (The New York Times, 14/12/2017)

active role played by consumers (Denison 2011), losing their competitive advantage based on economies of scale in finance, production, and marketing. Particularly, nowadays audiences play a key role in promoting audio-visual productions through social media. As Keib et al. (2018) propose, the information audiences share on the media can channel attention, selection and also sharing emotional responses of other audiences.

However relatively little is understood about the reason why and how social media drive consumers' attention on particular media productions and influence their decisions about selecting and sharing the content (Keib et al. 2018). Even though recent research has started to pay attention to global media consumption and cross-cultural studies (Janssen and Peterson 2005; Katz-Gerro 2011; Kuipers and Kloet 2009), a number of crucial questions remain unanswered. In particular, scant attention has been paid to social media in the globalization of media products originated in eastern cultures and consumed in western cultures. Also, new media audiences and globalized audio-visual products require further research, in particular, about western audiences consuming non-western media productions through social media.

In this study, we describe the emotions that global audiences express while watching Korean TV series through a social TV platform. In particular, we aim to 1) describe the cross-cultural relationship between audiences' linguistically expressed emotions and the popularity of Korean TV series; 2) explore differences in intensity of linguistically expressed emotions while watching Korean TV series; and 3) describe how linguistically expressed emotions are communicated and whether they differ across consumers.

Theoretical Framework

Interaction and social media

Social media, as technological platforms available through the internet, facilitate the creation and sharing of digital products, whether ideas, career-related concerns, or audio and audio-visual products. According to several authors, social media are a set of collective online communication platforms (Obar and Wildman 2015) used to seek and access information, enjoy media products, and participate in co-production processes (Tse 2016). As for the reason why people participate in

collective online platforms and share their interests, scholars suggest that they do so not only for cognitive reasons (to seek information) but also to share common interests (Bakardjieva 2003; Rimé 2009). In interacting with peers and sharing their interests in particular products, individuals experience what researchers call 'social togetherness' and so form a social bond (Boyns and Loprieno 2013). With greater connectivity between individuals within network communities and between communities, there are more chances for sharing among individuals in the community and, therefore, greater impact of the information shared (Cappella 2017).

Socially shared TV viewing

Social interaction through social media has transformed the Television viewing. Traditional TV viewing, as well as social TV, are both shared activities. However, they differ in the identity and numbers of people with whom audiences share their experience: family and local social groups in traditional TV viewing while virtual social groups and anonymous audiences in social TV. Regarding the social nature of watching TV series through social media, some researchers call it "social TV" (A. A. Raney and Ji 2017) and others "second screening" (Lochrie and Coulton 2012) or "connected viewing" (Holt and Sanson 2014). The second screening of TV series through social media has connected viewers from all over the world, and in the process, social TV has changed the entertainment experience of TV viewing. The users of social TV connect and interact with others (virtual others as well local others) in real time through social media in order to share reactions, attitudes and opinions about the program they are watching together. A. A. Raney and Ji (2017) suggest that the second screening requires the same six basic processes as the first screening experience, such as motivations, selection, reception, reaction, appraisal, and effects. From all processes, in this research, we are interested in the emotional reactions of social TV viewers. The appraisal of enjoyment (and appreciation) of the Social TV experience is ultimately at the heart of the second screening experience.

Emotional reactions play the role of social glue among the members of an online community capable of transmitting affection (J. E. Katz and Aakhus 2004). This process of social affection develops from the sharing of emotions (Boyns and Loprieno 2013; Serrano-Puche 2015). Hence emotions are important factors to understand how people respond to stimuli and why they share their experience and thoughts in online networks (Hasell and Weeks 2016). Social interaction essentially transfers emotional energy and transmits a sense of belongingness to a community of peers and

generates a sense of intimacy within a social community (Collins 2004). Therefore, to understand the active role played by audiences in social media, we need to focus our attention on the emotions expressed by audiences through social TV.

Emotions and the sharing of experiences

Rimé (2007; 2009) has suggested that intense emotions trigger the desire to share an experience. Viewers of an emotionally intense film, for instance, want to share and discuss the experience. The probability of sharing the experience is then linked to the intensity of the emotion inspired by the experience. Rimé (2009) has also suggested that people who share their experiences and the associated emotions tend to form intimate groups. Sharing emotions creates a sense of social cohesion and intimacy with peers using social media (Christophe and Rimé 1997; Pennebaker, Zech, and Rimé 2001). But, what is the influence of emotions on the media audience's attention to the stimulus from the media world? According to Keib et al. (2018) emotionally charged images have a positive impact on the attention and predisposition to share through social media. A finding that provides additional support comes from Luminet et al. (2000) who report evidence that there is a link between the valence of emotions experienced and the extent of social sharing. This suggests that without being exposed to emotional stimuli people do not engage in social sharing.

In particular, when an experience triggers an intense emotional reaction, individuals tend to use not only a verbal communication language but also non-verbal aids, for example, hugs. In the case of communication via social media consumers use specific aids to express the non-linguistic channels, such as emoticons, which act as 'indicators of affective states, the purpose of which is to convey non-linguistic information' (Dresner and Herring 2010; Wolf 2000). We expect that individuals sharing their experience watching Korean media productions will demonstrate a positive relationship between the intensity of the emotions elicited by the audio-visual experience and the intensity with which individuals share their experiences with the media products.

Emotions and language

On the other hand, emotional experiences take place in two levels: at the individual scale, micro level, and within the social system, macro level (Beck 1992; Risi

2013). Leaving apart the individual level, the social system may produce that the same audio-visual experience triggers emotions of different intensity, particularly when we compare the emotional intensity expressed by audiences that use different languages. For that reason, any study of emotions in media consumption should consider language since individuals use it as a tool for expressing and understanding emotions. Xu (2002) introduces the concept of language as an 'essential place holder' then, concepts and the abstract meaning of emotions are placed into specific categories that group similar emotions according to previous emotional experiences. Since language is the medium through which we perceive and express socially and culturally developed emotions (Wirth and Schramm 2005), the expression of emotions may differ among languages. H. Lee (2018) conducts language-based research on hashtags as linguistic markers of emotions in order to better understand users' multilingual hashtagging practices and language attitudes. The finding reveals a dependence of both emotions and social activity on the choice of language with a special link to self-perceived national identity.

In this article, we conduct audience research based on real-time comments during online media viewing within the framework of cross-cultural consumption from Korean cultural products (K-drama) to non-Korean viewers from all over the world. To extend the representativeness of this research, this paper explores the interplay between multilingual comments, emotions and sharing behaviour. English, Spanish, and French online comments are considered in the present study.

Textual expression of emotions

Traditional research has suggested that emotions can be divided into six main categories that are universal to all human cultures: fear, disgust, anger, surprise, happiness, and sadness (Ekman 1972). However, Scherer (2001; 2005) suggests that, since there is no direct one-to-one relationship for emotional terms in different languages, emotional words are not fully equivalent in meaning, but are related to the triggering situation; therefore, we should focus on clusters of emotional words used together when expressing emotions rather than on the meaning of isolated emotional words. Scherer (2001; 2005) accordingly proposes the component process model (CPM) consisting of five components: bodily reactions, action tendencies, feelings, expression, and appraisal. These five components are described as follows: bodily reactions refer to a response of body systems; action tendencies refer to a direction of action; feelings reflect an awareness of one's emotional state (differentiated from

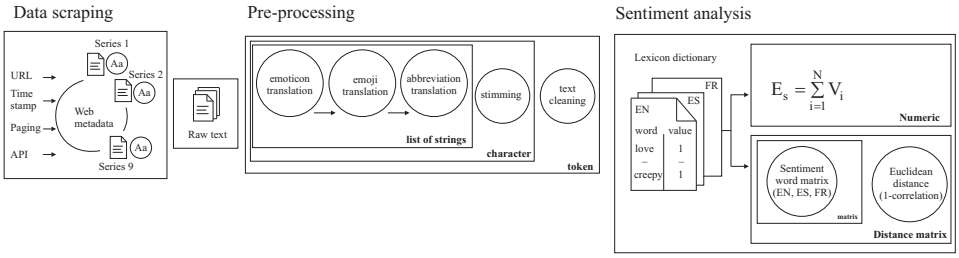


Figure 3.1: Pre-processing and sentiment analysis

emotions, in the sense that emotions prepare people to deal with a given situation); expression considers what occurs during emotional expression; and, finally, appraisal is triggered by features such as general valence of the experience (Fontaine, Scherer, and Soriano 2013). Consequently, if Scherer's (2001; 2005) theory is correct, we should find that emotional words are clustered together according to the situation that triggers the emotions rather than by the isolated meaning of emotional words, as in Ekman's (1972) theory.

Methodology

Sentiment analysis and Process

Figure 3.1 is a graphic summary of the processing of raw text and the sentiment analysis procedure. The notation used for the indicators is listed in Table 3.1.

Table 3.1: Indicator notation

Notation	Description
S	Index of the sentence
N	Number of words in the sentence S
i	Number of words in the sentence S
W_i	Number of words in the sentence S
V_i	Number of words in the sentence W_i
E_s	Number of words in the sentence S

Sentiment analysis

In text mining, sentiment analysis is the process of converting a sequence of characters into a sequence of tokens (strings with an identified meaning) that reveal the sentiments expressed in the narrative. We assigned to each sentence S (i.e. real-time comments) an emotional value E_s. The final outcome was a chronology of viewer feelings — reflected in terms of positive or negative emotional valence — as expressed during each episode of each series.

To compute sentiment scores for the comments we applied the lexicon-based sentence-level sentiment classification procedure described by Liu (2012). The sentiment score for each sentence was thus determined by summing the valence of each emotional word in the sentence, awarding +1 for a positive word and -1 for a negative word.

Even though sentiment analysis is widely investigated, few dictionaries (lexicons) of emotions are available for non-English languages. We, therefore, used the Data Science Lab, which provides sentiment lexicons in various languages (Retrieved 29 April 2016 from https://sites.google.com/site/datascienceslab/projects/multilingualsentiment).

Emotional words in these lexicons are classified as positive (+1) and negative (-1) emotions according to Liu's Sentiment Lexicon (Jockers 2014; Liu 2010; Liu 2012). However, in regard to emotional sharing, Rimé (2009) concludes that 'both negative and positive emotions stimulate important social interactions'. Therefore, the valence of emotions experienced by individuals does not matter, as the stronger the sentiment (positive or negative), the greater the social sharing of the emotion evoked and of the episode that triggered the emotion. Thereby we modified the emotional score of the single word V_i as the absolute number.

French and Spanish verbs, unlike English verbs, have several conjugations, which means that verbs varied according to the subject (first person, second person, singular, plural, etc.) in a process called stemming. Since dictionaries only list infinitive forms, we changed verbs to their infinitive form to overcome this difference.

Since viewer comments are informal conversations that frequently include onomatopoeic expressions for laughter ('haha', 'hihi', 'hehe', etc), we classified these as positive expressions reflecting the emotions 'happy'/'contento'/'content'(Ortigosa, Martín, and Carro 2014). To sum it up, each word W_i in comment S is matched with the lexicon dictionary and the emotional values for each sentiment word V_i are summed. Finally, the result of the sum of the emotional score for each word in a comment gives E_s.

Figure 3.2: Word cloud for comments: English (left), Spanish (centre), and French (right)

Our analysis of emotional words found in a narrative context was conducted at three levels. First, we described the intensity and variance of emotions expressed in comments of each language according to the series' popularity. Then, we analysed the relationship between language and emotion, taking into account that episodes are nested into series and that viewers may watch multiple episodes or series. Finally, we analysed how emotional words were combined to express emotions.

Findings

Description of the emotions expressed in comments

To describe the relationship between the intensity and variance of emotions linguistically expressed in comments and series' popularity, first we describe the most frequent words shared in comments using word clouds that displayed the frequency of the most used words in time comments in English, French, and Spanish. Secondly, we display the relationship between emotions intensity, sharing and popularity.

Figure 3.2 shows the word clouds, which reflect the frequency of all the words used by the viewers in their comments (not just words with emotional values).

The three-word clouds show that the most frequently used words are emotional words. Note that 'haha' (English), 'excitado' (Spanish), and 'excité' (French) mainly come from text translations of emoticons. The word cloud output showing the emotional content of comments in all three languages would suggest that the data processing and text construction of the comments produce a corpus of data suitable for researching emotions in audio-visual user comments.

Relationship between emotion, sharing and series popularity

To explore the relationship between the intensity with which individuals share their experiences about Korean media products and the intensity of the emotions expressed in their online communications, we computed the comments' sentiment scores (see also Jockers (2014)) and correlated them with the number of comments, used as measure of the sharing experience, taking into account the series' popularity. Figure 3.3 reports the intensity of the sum of emotions (positive and negative) expressed in the comments for each TV series (x-axis) and the corresponding number of comments (y-axis). The intensity of emotions was computed as the sum of the absolute sentiment score for each time comment, following a procedure described by Rimé and co-workers (Christophe and Rimé 1997; Pennebaker, Zech, and Rimé 2001). Thus, the higher this score, the greater the emotional intensity expressed in the comments pertinent to each series and each language. The number of comments triggered by each series was computed as the total number of comments for each series at the time of downloading.

The three languages, English, French, and Spanish, (pink, blue, and green respectively) are considered for each series grouped in three different popularity categories (unpopular, moderate, and popular represented by square, triangle, and circle, respectively). The correlation computed with a regression model (see Table 3.2) plotted in Figure 3.3 reflects the strength of the relationship between emotional intensity and sharing: 1.00 (EN), 0.603 (FR), and 0.651 (ES). The results point to a general positive relationship: the greater the emotional intensity, the greater the sharing of the experience and the popularity of a series. Among the three languages here considered, the relationship is stronger for the English comments.

In Figure 3.3, it is noteworthy to notice that the variance of the emotional score differs according to the language (reflected in the size of the circles). The variance in the emotional value of English comments remained under 10 while that of Spanish and French comments attained values around 20 to 30 (the dots' size is proportional to the variance). Due to this fact, we now want to look at each individual commenter and how the total amount of emotions expressed in the comments are distributed among audiences in all the three languages.

Figure 3.4 shows how emotional scores are distributed according to the TV series popularity and the language. Positive and negative emotions are plotted in a boxplot showing the median value, the lower quartile, the upper quartile, and the

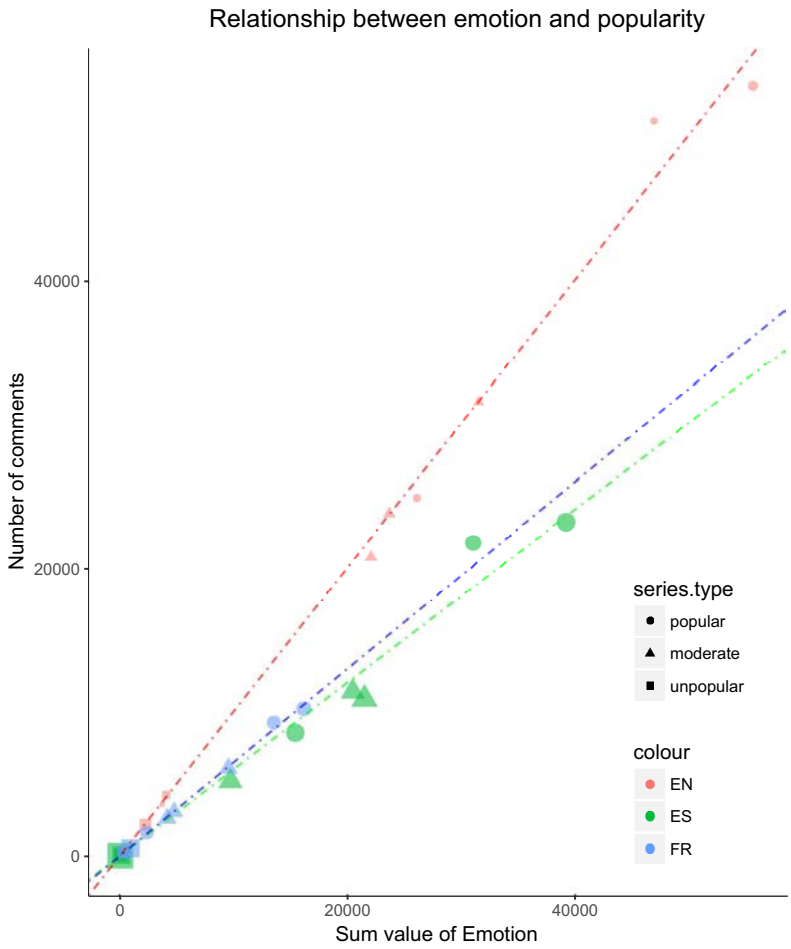


Figure 3.3: Relationship between the number of comments and sentiment scores for comments.

Table 3.2: Regression analysis for the number of comments and emotion

Predictor	Dependent Variables		
	N.comments(EN)	*N.comments(ES)*	*N.comments(FR)*
Sum of emotional value (EN)	1.00***(0.020)		
Sum of emotional value (ES)		0.603***(0.023)	
Sum of emotional value (FR)			0.651***(0.009)
Observation	9	9	9
R^2	0.997	0.988	0.999
Adjusted R^2	0.997	0.987	0.998
Residual Std. Error	1,765.514	1,403.833	205.395
F Statistic	2,603.429***	685.143***	5,866.397***

note: *p<0.1; **p<0.05; ***p<0.01

probable outliers (the dots plotted correspond to values more/less than 3/2 times the upper/lower quartile). Two interesting findings can be observed: 1) the value of the emotional intensity of the individuals in the middle of the distribution of positive and negative scores is smaller for English comments than for Spanish and French comments; and 2) the variation in the emotional intensity is higher for Spanish and French audiences, but English commenters show more outliers. Except French comments which have only one outlier in positive comments for low popular series, the number of outliers increased with the TV series popularity both for English and Spanish comments. We can conclude that both positive and negative emotions are similarly elicited by the series, but their intensity differs according to language and the series' popularity. To further explore this relationship, we must take into account the fact that the distribution of audiences' emotional scores has a nested structure. That is, that emotions expressed by individuals are related to concrete episodes nested in series, but all individuals may have not watched all series and episodes. Audiences' emotional score, then, may be affected by the popularity of series, of series' episodes, individual characteristics as well as the social context. As we did not have data on the viewers' social context, we used language as a proxy for it.

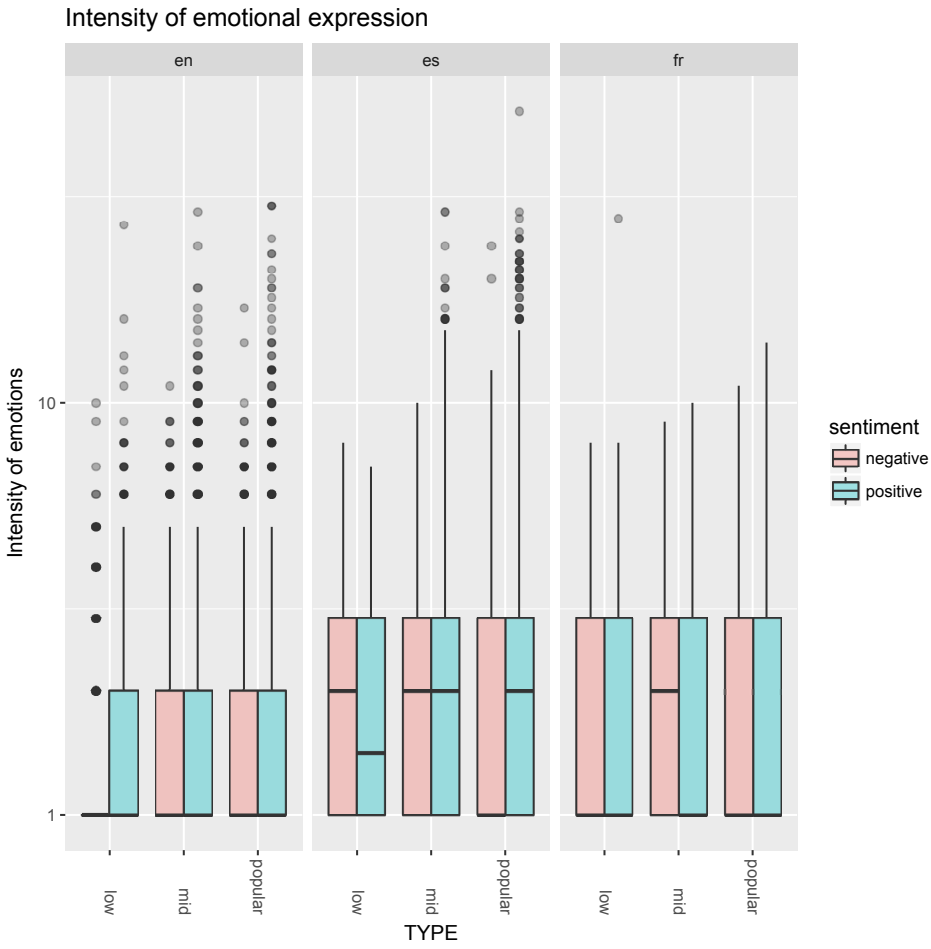


Figure 3.4: Box plots of positive and negative emotional scores according to language and TV series popularity

Linguistic context and emotion intensity

To seek evidence in support of the proposition that there is a relationship between the emotions expressed in comments, the characteristics of series and episodes, and the individuals and the viewers' linguistic context, we formulated a multilevel regression model (Bates et al. 2015). The models relate the emotional scores to the language, taking into account that while episodes were nested in series, individuals may view single episodes as well as all the series. We propose that differences in viewers' emotional scores — once the sociocultural context (with the language as proxy) is taken into account — depends on the series popularity, the nested episodes, and the reactions of individuals to the episodes. For this reason, the standard regression model, $y(i) = a + bx(i) + e(i)$, has to be modified to take into account the fact that the mean emotional score depends on the attractiveness of a series, denoted as s(i), on the attractiveness of an episode denoted as $p(i)$, and on the individual idiosyncrasies, $n(i)$. Consequently, the mean emotional score, a, was decomposed as $a = r + s(i) + p(i) + n(i)$, where r is the mean emotional score once we consider series and episode attraction as well as the individual's emotional reaction to the same episodes and series. The final model is then $y(i) = r + bx(i) + e(i) + s(i) + p(i) + n(i)$, where $e(i)$ is the usual regression error, $s(i)$ is the variation accounted for by the series, $p(i)$ is the variation accounted for by the nested episodes, and $n(i)$ is the variation accounted for by individual differences (in the specification of the model, we take into account that individuals may not have seen all episodes in a series).

Table 3.3 shows that differences in emotional scores for comments according to linguistic contexts — as suggested by Figure 3.4 — are statistically significant (see p-values) and that the confidence intervals (CI) do not overlap. The coefficients estimated for Spanish and French comments are positive and statistically significant, meaning that viewers' comments in Spanish and French express more positive and negative emotions than viewers' comments in English. It should be borne in mind that series and episodes vary in their emotional content, and viewers' moods may also be different when viewing the same series/episode. We can observe that in Spanish comments, variation is greater in positive sentiments, whereas, in French comments, variation is greater in negative sentiments.

Variation (random effects) by series, episodes, and individuals suggests that there is more variation regarding nested episodes (within-series variation, see t00, episode: series id) than series (between-series variation, see t00, series id), and that the variation between individuals (see t00, user id) is higher than the variation in episodes and series (see t00, episode:series id and see t00, series id). Even though

language explains part of the variation in mean scores, the residual variation in the sentiment score, var $e(i)$ (see σ^2 in Table 3.3), is higher than the variation explained by the random effects of series and nested episodes, and by the cross-effects of individuals viewing different series and episodes.

Table 3.3: Multilevel analysis according to language

Predictors	Dependent Variables								
	Total sentiment			Positive sentiment			Negative sentiment		
	Estimate	CI	p	Estimate	CI	p	Estimate	CI	p
Fixed Parts									
(Intercept)	0.97	0.94 1.01	<.001	0.61	0.56 0.65	<.001	0.37	0.35 0.40	<.001
Language ES	0.61	0.60 0.63	<.001	0.42	0.40 0.43	<.001	0.2	0.19 0.21	<.001
Language FR	0.53	0.50 0.56	<.001	0.22	0.20 0.24	<.001	0.31	0.29 0.33	<.001
Random Parts									
σ^2	1.573			1.058			0.575		
$\tau_{00_{user.id}}$	0.183			0.094			0.043		
$\tau_{00_{episode:series.id}}$	0.003			0.007			0.004		
$\tau_{00_{series.id}}$	0.002			0.004			0.001		
$N_{user.id}$	27462			27462			27462		
$N_{episode:series.id}$	152			152			152		
$N_{series.id}$	9			9			9		
Observations	331309			331309			331309		
R^2/Ω_0^2	.181/.177			.151/.147			.120/.115		
Deviance	1104892.673			971470.561			768306.725		

The multilevel analysis points to the existence of a difference in emotional intensity depending on the language the emotions were expressed (Table 3.3). However, more indicators about the social contexts of individuals are needed to have a more comprehensible explanation. The impact of language on emotional scores is statistically significant, giving support to our proposition that emotions are embedded and expressed differently in different languages. Bearing in mind that series and episodes may differ in emotional content and that individuals may have different moods, we can conclude that the intensity of emotions expressed in comments differs according to language but there is variation left to be explained.

We find that emotions' intensity differs among audiences expressing themselves in different languages, but do they differ as well in the way they express emotions?

Communication of emotions-in-practice

Below we describe how emotional words are used together when viewers express emotions in comments. We selected the 30 most frequently used emotional words in each language to construct a word distance matrix. Words that are always used together have correlation 1 and maximum distance 0 (1 minus the correlation score), whereas words never used together have correlation 0 and maximum distance 1. Words are grouped using the Ward procedure (J. H. Ward 1963) implemented in the R Environment and Language (R Core Team 2016).

Figures 3.5, 3.6, and 3.7 show the results for English, Spanish and French comments, respectively, displayed as dendrograms depicting how words in comments are grouped, with positive and negative words coloured differently.

It is now possible to assess whether the aggrupation of words fits the six emotional categories described by Ekman's (1972) basic emotions theory or by Scherer's (2001; 2005) component process model (CPM). As can be appreciated in Figures 3.5 to 3.7, each group of words includes a mix of basic emotional categories, with positive as well as negative words; thus, for example, the words 'excited' (positive) and 'disgust' (negative) — which should belong to the 'happiness' and 'disgust' categories, respectively, in the basic emotions theory — are used together. This aggrupation does not fit the Ekman's (1972) basic emotions theory.

To further interpret our results, we label the clusters described in the previous figures according to the emotional words used. As proposed by Scherer (2001; 2005), we name each group of words according to the situations that triggered the emotions expressed: excitation, judgment, appreciation, negativity, expression, and action (Table 3.4). Although the labelling is based on the interpretation of the words clusters, it is useful for comparing the findings across the linguistic contexts. Assessing the words classified in each cluster across languages it can be observed that the situations that triggered the emotions and the bunch of words used to express the emotions have more similarities than differences in all three linguistic contexts. We call the six groups of emotional words, emotions-in-practice following Scherer (2001; 2005).

Noteworthy, in contrast with the differences in emotional intensity and language, emotions-in-practice show greater similarity in meaning of the bunches of emotional

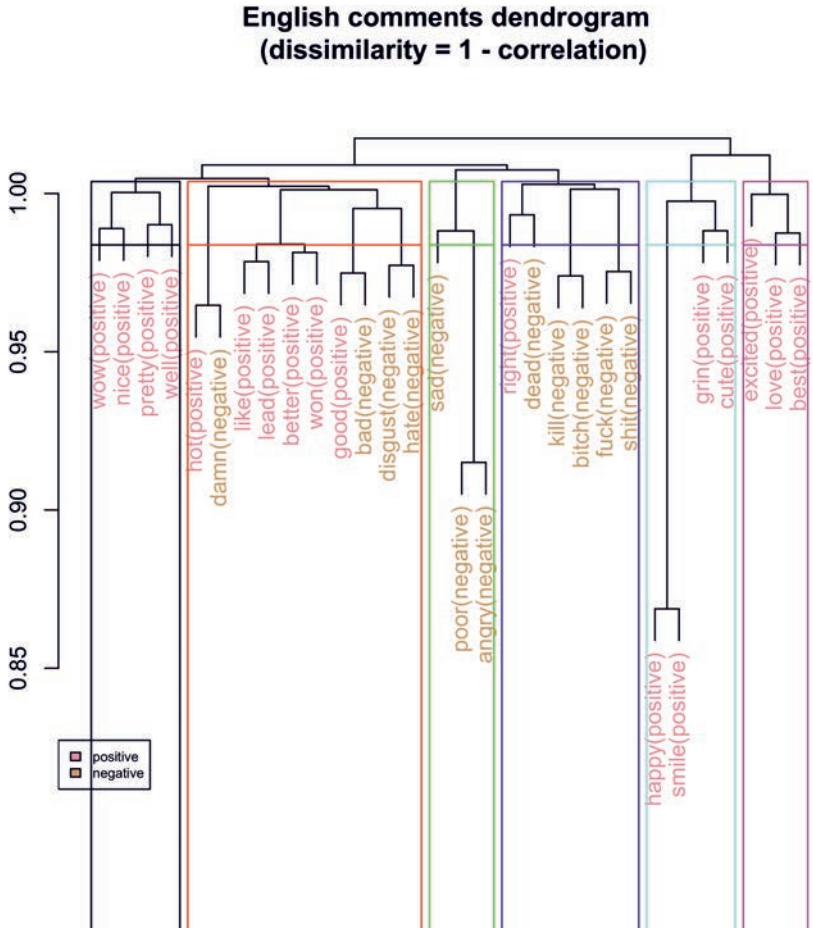


Figure 3.5: Correlation of words in English comments

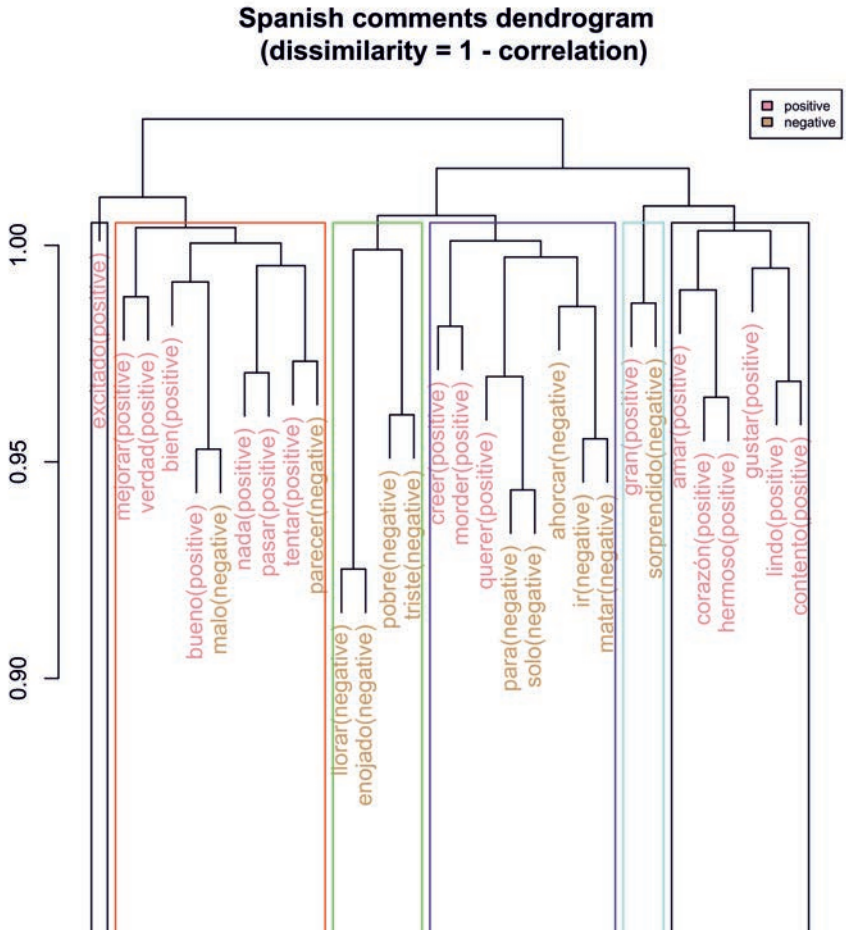


Figure 3.6: Correlation of words in Spanish comments

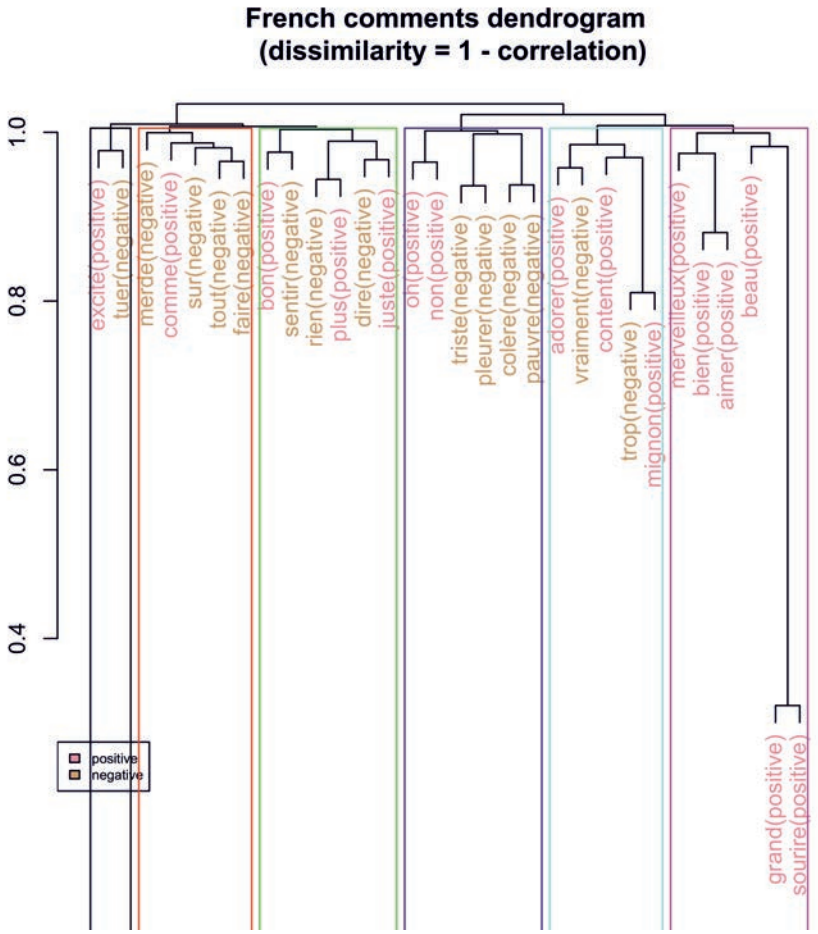


Figure 3.7: Correlation of words in French comments

Table 3.4: Functions of words in comments in the three languages

	ENGLISH	SPANISH	FRENCH
Excitation	excited, love, best	excitado	excité, tuer
Judgment	hot, damn, like, lead, better, won, good, bad, disgust, hate	mejorar, verdad, bien, bueno malo, nada, pasar, tentar, parecer	adore, vraiment, content, trop, mignon
Appreciation	wow, nice, pretty well	amar, corazón, hermoso, gustar, lindo, contento	merveilleux, bien, aimer, beau
Negativity	sad, poor, angry	llorar, enojado, pobre, triste	oh, non, triste, pleurer, colère, pauvre
Expression	happy, smile, grin, cute	gran, sorprendido	gran, sourire
Action	right, dead, kill, bitch, fuck, shit	creer, morder, querer, para, solo, ahorcar, ir, matar	merde, comme, sur, tout faire, bon sentir, rien, plus, dire, juste

words across the three languages, as proposed in the CPM (Fontaine, Scherer, and Soriano 2013; K. R. Scherer 2001; K. R. Scherer 2005). Overall our findings suggest that in practice emotional words, positive as well as negative, are used together according to the situation that triggered them, namely, an exciting situation, a judgement situation, an appreciation situation, a situation that triggers negative feelings, a situation in which facial emotions are expressed, and a situation that triggers the desire to act to change something. The similarity between our emotions-in-practice classification and the CPM (Fontaine, Scherer, and Soriano 2013) would suggest that, when studying how individuals express linguistically their emotions, we need to take into account the context in which emotions are experienced rather than any general classification of emotions.

Discussion

Our research contributes to understanding cross-cultural social TV watching, particularly to the expression of emotions by western audiences while viewing the Korean TV series. We have shown evidence that there is a relationship between the

intensity of emotions linguistically expressed and the activity of sharing the while watching South Korean TV series. This relationship holds among audiences expressing themselves in the three languages (global audiences watching non-western TV series). As proposed by Bakardjieva (2003) and Rimé (2009), audiences participate in social media not only for cognitive reasons but also to be able to share experiences and common interests. Our findings suggest that social TV audiences in a global community which share an interest in the second screening of Korean TV series also share emotions and intellectual interactions in the digital space. By doing so, they enhance the popularity of the audio-visual products: the greater the intensity of the emotions triggered by the episodes and series, the more the experience is shared, and the greater the popularity of the media product. This finding is also congruent with the works of Huffaker (2010), who asserts that messages with emotions tended to receive more feedback.

This relationship is found among the sum of emotions expressed by audiences communicating in three linguistic contexts. The fact that the relationship is stronger among English emotions than in Spanish and French audiences, suggests that there may be a snowball effect in the relationship between sharing experiences and emotions triggered, and then between emotions and series popularity. For that reason, we have analysed the distribution of individuals' emotions in the three languages considering the series' popularity.

We have found that the emotional score for the English individuals located at the median place of the distribution of emotional scores is lower than the median emotional score for Spanish and French commenters. This finding suggests that English commenters have a lower emotional score that varies less than the emotion score for French and Spanish commenters. That is, the link between emotions and sharing audio-visual experiences has a global snowball effect, stronger for the English commenters (they are more in number), but the latter were more moderate in the expression of their emotions. However, this descriptive relationship does not consider the nested structure of the emotional comments.

The expression of audiences' emotions according to their language of communication are nested in episodes and episodes in series, whereas individuals are not necessarily nested (they could watch as few or as many episodes of a series as they wished). The model adds evidence to the description of emotional scores' distribution but suggests that we need to add more indicators—not available for our data—related to the social context of the audiences and that there is more variation among individuals' moods than in episodes and series, in that order. In summary, our findings support our proposition that there are differences among individuals' emotion intensity

according to the linguistic context used to express their emotions.

Thus, our findings would support language's role as an 'essential place holder' (Xu 2002) which converts emotional concepts into concrete meanings according to previous emotional experiences situated in a particular cultural and social setting. According to Beck (1992) and Risi (2013) emotions are expressed at two levels: a micro level — referring to individuals— and a macro level — referring to the linguistic context where individuals learn to express their emotions. The results here reported reflect differences in linguistically expressed emotions, TV series attractiveness and episodes enjoyment differences, as well as variations at the individual level. Our measurements of the micro and macro levels are gross measures because we do not have better information. We can only know that the micro and macro levels do have a bearing on the intensity of the emotions expressed in comments but we are missing the influence of other factors as the sociocultural background of the audiences due to the fact that there are not available for the analysis.

In consequence, we have found that the intensity of emotions is related to sharing and that emotions varied according to the language that media users used to express their emotions, but also according to the emotion's valence (the language is related to the intensity of both, negative and positive emotions). Commenters using Spanish language are more expressive in positive emotion than those using French and English. While commenters using French are more negative emotions than those using Spanish and English. Also, the emotional score variation is greater for Spanish and French comments, with English, in contrast, obtaining more homogenous emotional scores. If there is a relationship between the emotion's valence that media users are exposed to and their predisposition to share the experience (Keib et al. 2018), then the predisposition to share media news may depend not only on the valence of emotions but also on its intensity and it is related to the language used to express and share emotions.

The differences in terms of emotional intensity contrast with the homogeneity of the way emotions are expressed. This means that even though audiences from different linguistic families may differ in the intensity with which they express and share their emotions, they are more similar in the way they express their emotions in practice. Contrary to the expectation that emotional words have isolated and universal meanings (Ekman 1972), in practice, we have found that how words are used to express emotions is similar across languages. In a way that the bunch of words in all languages are related to the situation that triggered the emotions. This finding adds evidence to Fontaine and Scherer's (2013) component process model (CPM), which

suggests that emotions clusters as a bunch of words are related to the situation that triggers them, not according to the six main categories proposed by Ekman (1972) and Plutchik (1980). Emotional words in five of our six emotions-in-practice clusters (excitation, judgment, appreciation, negativity, expression, and action) agree with the CPM; the only exception is our excitation cluster, which may be related to the media context in which the research was conducted.

Referring to specific components in the CPM (bodily reactions, action tendencies, feelings, expression, and appraisal), our judgment cluster matches the CPM appraisal component, suggesting an emotional need to cope with a situation by judging it (i.e. evaluating how good/bad an experience is using words like, e.g. 'good'/'bueno'/'mignon'). Two of our clusters, appreciation (with words like 'nice'/'hermoso'/'merveilleux') and negativity (with words like 'sad'/'llorar'/'triste'), match the CPM feelings component. Our expression cluster (with words like 'smile'/'sonrisa'/'sourire') matches the expression and bodily reactions components, while the action tendencies component is matched by our action cluster (with words that reflect what individuals want to change like 'kill'/'matar'/'ahorcar'). This suggests that individuals use clusters of words to express emotions elicited by particular situations in viewing an audio-visual product. This finding contrasts with the fact that while the emotional intensity and variability may differ depending on the commenters' sociocultural context, the bunch of emotional words used to express emotions is similar across sociocultural contexts.

Meyer (2014) reveals cross-cultural differences in intercultural communication explaining that in the global environment we need to understand the role that culture plays in each individual as well as in each individual difference. According to the culture, communication and the expression of emotions can be different among individuals from different cultures. For example, Anglo-Saxon culture is recognized to be very much practical and focused on delivering the exact message at face value. English speakers normally communicate in a concise, clear, and precise way. They are emotionally less expressive and more cautious to express negative feedback. On the other hand, Latin cultures such as Italian, Spanish and French are definitely more emotionally expressive and use more sophisticated and nuanced message than the point message. Comparing to Anglo Saxon culture, Latin culture is franker and more direct, especially with criticism and affection. These findings are congruent with the work by Salager-Meyer et al. (2003) who investigate the academic conflict from a cross-cultural perspective using Spanish, French, and English articles. Their overall findings indicate that French and Spanish scientists speak much more passionately and also more directly when expressing the criticism

than English speaking scientists.

Within this complex cultural framework, our results need to be interpreted as an expression of cultural variety. Thanks to textual data from Social TV the actual expressions and opinions of three different cultural groups (English, Spanish, and French) are decomposed. Our findings indicate that these three groups indicate their emotional state in a similar way (i.e. similar words in Spanish, French, and English). This is related to the way they understand and perceive the situation which triggers a specific emotion. For example, for the same scene of TV drama, it would not happen that one culture perceives it as horror and the other as romance. However, how much they want to express their emotional state depends on their culture. Our results show that Latin culture such as Spanish speakers and French speakers are more emotionally expressive, passionate and vigorous than Anglo Saxon culture of English speakers. But when we compare Spanish and French, French speakers are more direct about their negative opinion or feeling towards the media contents than Spanish. That means that our results support Meyer's study in the sense that the culture is definitely comparable, but not definable. This research reports that culture and language are bound and that the emotional expressiveness is a cultural manifestation. It is noteworthy to remark that social TV can represent a new exciting research environment where investigating the role of language and cultural background in audience' behaviour.

Limitations

The main limitation of this work comes from the scarce information available on individuals' sociocultural context and social position. Even though user profiles yielded some personal data (such as whether individuals are staff members and whatever could be deduced from profile images), no information is reported about, education, nationality or place of residence to name a few (this information, in fact, is treated as confidential by VIKI). Were this information available, we would have been able to separate the effect of culture embedded in language from the sociocultural context effect. Another limitation is related to the methodology used to compute the emotional score. The Stanford Natural Language package available in R (Arnold and Tilton 2016), for instance, allows the sentence to be set as the unit of analysis instead of the word; using sentences could improve accuracy, as it would enable better analysis of ironic sentences and negative sentence with 'not' for example. However, the sentiment analysis tool in Stanford Core NLP is not available for the French and Spanish languages.

Conclusions

The emotions linguistically shared by global audiences while watching Korean TV series on social media (viki.com), at an aggregated level, seems to be instrumental in the popularity of series, but this link may be related to the audio-visual market size. At the individual level, the language used to communicate emotions seems to influence the intensity of emotions in general both positive and negative. However, in contrast with the differences in emotional intensity and language, emotions-in-practice show greater similarity in the meaning of the bunch of emotional words across the three languages. In summary, emotions play a key role in sharing the experience with TV series, however, individuals differ in the intensity with which they express emotions but are more homogeneous in the way they express emotions.

IV PARASOCIAL INTERACTION IN NEW MEDIA

Keywords: parasocial interaction, topic modelling, online audience research, social media communication, TV series popularity

Parasocial Interaction through Social Media During TV Viewing as a predictor of Korean TV series popularity

Introduction

Parasocial interaction — a concept proposed by Horton and Wohl (Horton and Wohl 1956) — is understood as a one-way interaction between viewers and media characters in TV programs. After a long period of exposure to the media characters' performances, viewers accumulate knowledge about media the characters' personalities, preferences and personal lives, interpreting the meaning of a character's behaviour from the storyline. Viewers come to believe that they really 'know' the media characters as if they were close friends (Chung and Cho 2014). This perceived intimacy with media characters results in 'influential' and 'satisfying' relationship with the audiences.

The fact that viewers rely on media characters for important and useful information (Boon and Lomore 2001; Chung and Cho 2014) implies that media characters who have successfully established a strong parasocial interaction with viewers can influence choices of media products, motives for viewing, and even satisfaction and enjoyment of the consumed media (Hartmann and Goldhoorn 2011; Yuksel and Labrecque 2016). Parasocial interaction may then be strongly associated with the consumption of media and can be related to the popularity of media (Ashe and McCutcheon 2001; Yates 2015).

The new media environment gives the viewers new opportunities to interact with other viewers and with the audio-visual productions far beyond what was offered by traditional media (Vonderohe 2016). This new way of consuming the media has changed the way viewers interact with media characters. In particular, the new social media have enhanced the feeling of intimacy with celebrities by changing the dynamics of the relationship with media characters from a passive to an active and interactive experience. In traditional media, parasocial interaction was promoted and managed by media producers through carefully designed publicity and promotion plans. Nowadays, in contrast, viewers obtain information about their favourite media characters and even about other viewers through social media. Media characters are also willing to share personal information with their followers through social media.

Traditional research on parasocial interaction relied primarily on non-interactive

media communication tools, but today interactive social media platforms have changed the nature of the interaction with media characters. Thus, this change in productions has opened a new path of research. Consequently, recent research attention has been directed towards the analysis of parasocial interaction in new media including SNSs, blogs, and YouTube (E. L. Cohen and Tyler 2016; Ferchaud et al. 2018; Labrecque 2014; Rasmussen 2018; Tsai and Men 2017). However, it has hitherto not been studied extensively. This study pursues an examination of parasocial interaction among online viewers in a TV streaming platform by describing audiences' spontaneous response when they are actually watching the media products. It allows us to understand how parasocial interaction occurs in the new interactive social TV environment and its effects on the success of media products.

Our threefold aim is to (1) describe audiences' spontaneous response to the media personae on a particular social media platforms and break down its components; (2) compare the distribution of parasocial interaction components according to the TV series popularity; and (3) measure the relation between the set of components and the TV series popularity. To do this research, we built a textual data containing 214632 English online comments by viewers of Korean TV streaming website VIKI and analysed the content using a topic analysis model implemented in the R language and environment for data analysis (R Core Team 2016).

Theoretical Framework

TV consumption and social media

The Web 2.0 era has transformed individual TV viewing experiences. A major change brought by social networks has been a configuration of the new media ecosystem and the consequent transformation of individuals' roles within this ecosystem. The availability of TV series on social networks in portable devices has transformed the traditional TV viewing experience, transferring the control of what to see, when and how from producers to viewers (Shao 2009; Stefanone, Lackaff, and Rosen 2010). Broadcasters have started to use social media platforms to promote their programs and to connect with their audiences. Social media provide viewers with a virtual-community experience and capitalize on real-time viewers' interactions regarding a TV program, particularly valued by young people (Lin, Chen, and Sung 2018; Manjoo 2015).

Technology has also changed traditional TV promotional practices. Individuals are now perceived not just as a target for broadcasters, but as active members in the production and marketing of media products. By making possible social interaction around audio-visual content, social media allow individuals to interact with media products (Stefanone, Lackaff, and Rosen 2010). Individuals also actively participate in user-generated media, generally defined as an extension of media productions in many forms: podcasting, digital video, and mobile phone photography — all accessible to the public. Other user-generated media include video/image-sharing sites, social networking sites, and any other user-generated websites. The extraordinary growth of these media co-productions has been fuelled by two main properties of social media—ease use and user control—which means that users have friendly and controllable ways to interact in social media and to consume or to co-produce media productions (Shao 2009).

User-generated media also allow interface-based customization options, such as customization of profiles, channels, and playlists and personal information editing, etc. This kind of customization generates positive attitudes and behaviours toward a website as it allows users to express their interests, tastes, thoughts, and values (Carpenter 2000; Kalyanaraman and Sundar 2006; Shao 2009). It has been argued that the reason why user-generated media are popular is that they meet information, entertainment, mood management, self-expression, and self-actualization needs in interaction with content and with other users.

Parasocial interaction in traditional TV consumption

Since Horton and Wohl (1956), parasocial interaction is generally referred to the relationship of a TV viewer with a remote media persona, such as a person on the screen (presenters, actors, celebrities), who is perceived as a close 'friend' or an interaction partner. Many scholars have applied this concept to study the audience-media relationship and communication science (D. C. Giles 2002; Klimmt, Hartmann, and Schramm 2006; A. M. Rubin, Perse, and Powell 1985).

Unlike a face-to-face interpersonal relationship, parasocial interaction is a one-side and non-reciprocal interpersonal involvement with media characters who are not aware of the existence of the viewers or of the relationship with the viewers (R. B. Rubin and McHugh 1987). The viewers, however, perceive their relationship with media character as one of friendship and feel deep states of intimacy in the interaction experience (A. M. Rubin, Perse, and Powell 1985).

Parasocial interaction is the media viewer's experience of being in the 'simulacrum of conversation give-and-take' with media performers (Hartmann and Goldhoorn 2011). This process of parasocial interaction is similar to how one chooses friends, by observation and interpretation of appearance, gesture, voice, conversation, and conduct in various situations (Vonderohe 2016). However, this parasocial interaction is the viewer's illusion of being engaged with TV performers meaning that there is no real interactivity or mutuality; there is rather, a form of pseudo-interaction. The viewer may never meet in person the media characters and the friendship happens only his mind (Tian and Hoffner 2010). While early studies suggested that parasocial interaction results from isolation, loneliness and limited social interaction, later research seems to indicate that parasocial interaction is based on the purposive, intentional and goal-directed behaviour of motivated and active viewers (A. M. Rubin, Perse, and Powell 1985; Sood and Rogers 2000). In consequence, understanding the parasocial interaction phenomenon in consumer research is necessary to consider how it influences viewers' interpretation of TV programs (Russell, Norman, and Heckler 2004; Vonderohe 2016).

Parasocial interaction in social media

Given the remarkable development of the internet and other novel technologies, numerous scholars have recognized the importance of studies regarding the influence of social media on parasocial relationships (Ballantine and Martin 2005; Bonnstetter 2014; Sanderson 2009; Yates 2015). Social media platforms provide a space for users to connect socially. Unlike traditional media, social media platforms offer various tools for users to interact parasocially, such as sending messages to media persona or retweeting them (Yuksel and Labrecque 2016). Social media platforms also allow viewers to obtain an endless stream of information (Yates 2015), to observe other viewers' reactions to TV programs (E. L. Cohen and Lancaster 2014), and to create meaningful interactions among viewers and around TV programs (Chorianopoulos and Lekakos 2008; Lin, Chen, and Sung 2018). Users of social media are active and goal-directed in terms of their needs and wants (Lin, Chen, and Sung 2018; Papacharissi and Rubin 2000). They not only share their interests but also care about the feeling around these interests that boost the parasocial interaction with media characters (Yuksel and Labrecque 2016). The interaction between viewers around TV programs creates a sense of togetherness and belongingness (C. C. Miller 2009; Shin 2013), and this, in turn, enhances their emotional connection (Lin, Chen, and Sung 2018; Pagani and Mirabello 2011).

The concept of parasocial interaction is not restricted to traditional media (Ballantine and Martin 2005), and recent research has emphasized the importance of studying parasocial interaction in computer-mediated environments, such as online environments (Labrecque 2014; Yuksel and Labrecque 2016). The number of studies about parasocial interaction on social media platforms has been growing exponentially during the last few years. The majority of the studies in this area have analysed parasocial interaction on SNSs. For instance, the work of Bond (2016) analyses how exposure to media personae in social media is related to the strength of parasocial interaction among adolescents. Tsai and Men (2017) have found parasocial interaction from Twitter comments between a company CEO and workers favored by the down to earth tone communication style on social media of the CEO. The results show a positive influence on the trust and satisfaction of the workers. Cohen and Tyler (2016) provide evidence that a genuine and candid appearance of media personae reduces the perception of social distance from followers and facilitates the development of a parasocial relationship. Also, the parasocial interaction has been studied in the YouTube platform. In particular, Ferchaud et al. (2018) explore the correlation between contents features such as video genre and video attribute (for example camera angle) and the parasocial interaction among top most subscribed YouTube channels. Economic implications of parasocial interaction are investigated by Labrecque (2014) who examines the effect of parasocial interaction on a brand's success indicators such as customers' loyalty and willingness to provide personal information through social media. Similarly, Dijkmans et al. (2015) suggest a positive influence of parasocial interaction through social media on the perception of the company's reputation. Colliander and Dahlen (2011) study the interaction that occurs in online fashion blogs. They have found a positive effect on consumers' attitude towards the brand and on their intention of purchase.

However, none of these studies has analysed viewers' interactions while watching a set of TV series available in social media platform. In this case, the interaction is not only with the media personae but also with other equals. In traditional parasocial interaction viewers communicate with the media personae, not among viewers themselves, but today all viewers can see each other's interactions with the media production through the comments they write while watching it. Furthermore, there is not yet a study about the dimensions of parasocial interaction in a comparative setting (a set of TV productions).

Dimensions of parasocial interaction

Based on the work of previous scholars (Levy 1987; Levy 1983; Levy and Windahl 1984), Rubin and Perse (1987) study media user activities, motives, and attitudes of college students viewing TV soap operas. They propose that parasocial interaction consists of various levels of involvement in the affective, cognitive and behavioural dimensions according to the following definitions. Affective involvement (personal and inner-directed as friendship (R. B. Rubin and McHugh 1987) refers to a media consumer's sense of interpersonal relationship with media characters, consisting of reactions of empathy, emotions, and mood (Klimmt, Hartmann, and Schramm 2006; Singhal and Rogers 1989; Sood and Rogers 2000; Tsao 1992). Cognitive involvement refers to a viewers' thought processes regarding what is happening in the story, what was seen and heard, and reflections on its meaning and importance. Behavioural involvement constitutes the media messages and the verbal utterances with other audiences and/or with the media characters, discussing character and plots or talking back to media. Liebes and Katz (1986) additionally propose referential and critical involvements, the former referring to the interaction of audiences who symbolically connect with the context of TV program through their personal experiences, and the latter referring to the aesthetic engagement of viewers.

Later, Sood and Roger (2000) consolidate the framework of Rubin and Perse (1987) and Liebes and Katz (1986). The authors propose that affective, cognitive and behavioural interactions can be conceptualized as dimensions of parasocial interaction, while referential involvement and critical involvement may reflect a general involvement of viewers with the TV program. Within this framework, users' involvement consists of numerous dimensions which describe many different types of interaction with different media channels. More importantly, the viewer's interaction with the media encourages attraction and liking (Konijn and Hoorn 2005), and it is strongly linked to viewing motives, attitudes and activity levels (R. B. Rubin and McHugh 1987). Hence, by stimulating viewer interaction with TV programs by eliciting high levels of involvement might provide the key for media producers to successfully promote their programs (Sood and Rogers 2000).

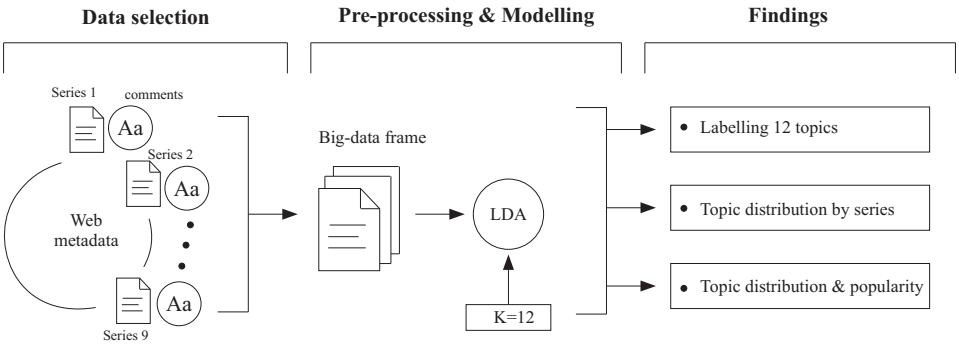


Figure 4.1: Topic modelling using latent Dirichlet allocation

Methodology

Topic modelling

In order to reveal and describe parasocial interaction occurring among global viewers of online Korean TV series, viewers' comments are exploited by means of topic modelling. Topic modelling is an exploratory method for interpreting large bodies of texts (Brett 2012). According to the co-occurrence of each single word across the text, this technique simplifies the text corpus in clusters, each of them referring to a precise topic (D. Blei 2012); thus, words are clustered together according to similar occurrences in the corpus, while words in a cluster refer to different aspects of the same phenomenon, theme, or topic. We applied a latent Dirichlet allocation model implemented in the Mallet package (D. M. Blei, Ng, and Jordan 2003; Mimno 2015) to facilitate the interpretation of the proposed set of topics and their distribution across texts. For the sake of clarity Figure 4.1 (adapted from Gatti, Brooks, and Nurre (2015)) displays the adopted research methodology.

Pre-processing and topic modelling

We located and changed words duplicated with one character more than three times; thus, "suuuuuureeeee" became "sure". After this pre-processing procedure, the text body consisted of 214632 comments in a corpus of 152 long documents labelled by series and episode ID (e.g., 'series1.episode1').

Findings

Before measuring the dimensions of parasocial interaction by analysing real-time comments on TV series viewing, we wanted to assess whether the topics modelling could identify and measure the dimensions of parasocial interaction. With that aim, we identified all commenters whose messages explicitly mentioned they were fans of the actors. Additionally, we identified commenters saying they loved the media personae, with messages like "I love Shinhe (the actress), my idol (user ID: 645400u)". Lastly, we located comments that mentioned the actor's name specifically, such as "I'm starting this because Yoochun (the actor) is enlisting (user ID: 10935102u)". We counted the messages from these three groups of messages resulting in the 57.3% (122915) of the total number of messages (214632). Therefore, most messages refer to the media personae and to the interaction between the commenters and the media personae. Obviously, we cannot say that the messages not included in these three groups do not parasocially interact with media persona; they may be just less explicit in their comments. All this evidence makes us confident that the online comments data could be used for measuring the dimensions of parasocial interaction.

Topics identification

Topic modeling analysis requires to define the number of topics, K, in which the body text must be clustered. Griffiths and Steyvers (2004) propose to use the harmonic mean (Ponweiser 2012) as useful estimator to determine the optimal marginal likelihood due to its computational properties (Newton and Raftery 1994). As shown in Figure 4.2, the harmonic mean of the log-likelihood is maximized when the value of K is 12. The model presented here is the one found with the maximum likelihood. As all the models based on maximizing the likelihood of a function, to assure that this value corresponds to a global maximum, the procedure has been repeated for 10 times starting from different initial values of topics. Every model estimate presents the topics on specific media personae in popular and middle popular series that we describe below as well as the other dimensions identified with minor differences.

Figure 4.3 shows the word clouds for each of the 12 topics previously identified (the size of each word is proportional to its frequency). Words in Topic 1, reflect the interested in the series 6 (*The time I've loved you*), a romantic comedy about

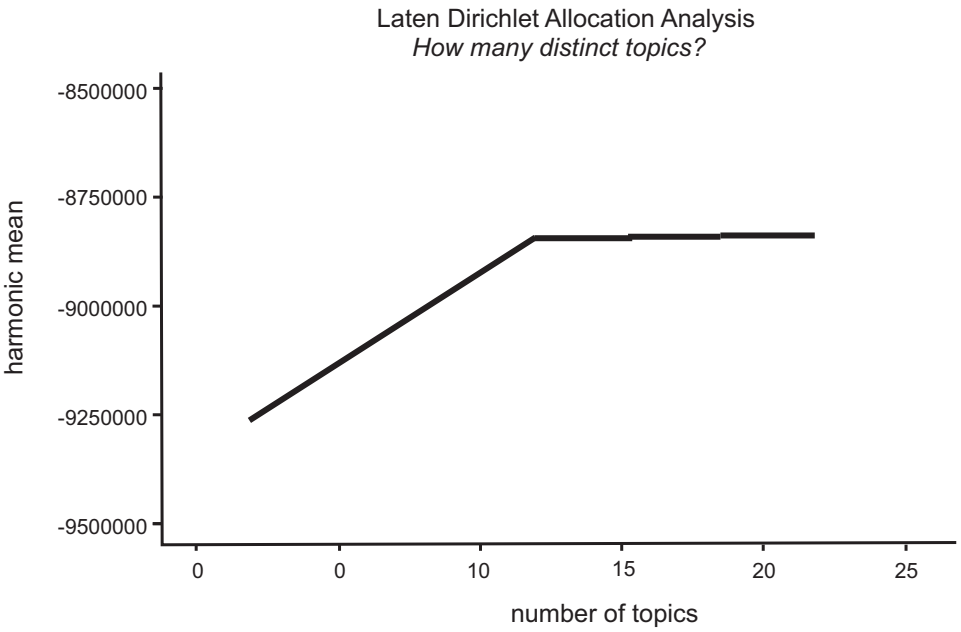


Figure 4.2: Defining the parameter K number of topic using the harmonic mean

two best friends called Ha-na and Choi-won, who, after 20 years of friendship, find true love in each other. The most frequent words in this cloud are the name of characters such as Seohoo (Ha-na's first love) and keywords such as 'relationship', 'friends', 'years', and 'wedding'.

The words in Topic 2 can be interpreted as empathy based on keywords as 'like, happy, sad, hate, and angry' appearing in the word cloud. The inclusion of words such as 'understand', 'realize', 'deserve', and 'sorry' suggests that the commenters understand and feel what the characters are experiencing in the drama. During viewing, the commenters place themselves inside the plot and express empathy through a broad range of emotional reactions, with comments like 'I understand how he feels, I am crying, he deserves to be mad, I can understand his pain, he's lived poorly, I really understand his anger, I feel for this character annoyed'.

Topic 3 suggests a possible link with criticism in terms of 'judging' or 'giving an opinion' based on careful thought. Commenters express their judgments with words like 'love' or 'disgust' associated with a favourable or unfavourable opinion, respectively. The commenters also criticize the aesthetic construction of aspects of the series including acting, actors, roles, Korean drama, and music such as comments like 'The ending is perfect. Love everything about the drama, the plot, the actors,

the characters, and especially the soundtrack'.

Topic 4 seems highly linked to Series 3 (*It's okay that's love*) in high popular categories, a romantic drama about life and love that focuses on the scarred minds of people in modern society. The main character, Hea-soo, is a psychiatric doctor and Jae-yeol is a famous writer who has been emotionally damaged by his family, mother, and brother. Other main characters are Kwang-soo, the housemate of Heasoo, and Kyung-soo, an imaginary friend of Jae-yeol. 'Drama' is the most frequent word because numerous comments refer to the level of drama in the series, 'amazing drama', 'beautiful drama', etc.

Topic 5 mainly refers to Series 4 (*The girl who sees smells*), a science fiction and crime drama, in which the younger sister of the main character Moo-gak is murdered by a serial killer. Devastated by the loss, he becomes a police officer to catch the murderer. Another main character of this series is a young woman called Cho-rim, who survived an attack but lost her memory and acquired the unusual ability to visualize smell. Yeom-mi is the chief detective who leads the crime investigation. While Moo-gak and Cho-rim work together to catch the murderer they also heal each other's wounds.

The words in Topic 6 can be interpreted as viewers' cognitive involvement, who think and perceive the viewing experience by elaborating the message from series. It seems that some commenters become aware of the feature of the Korean drama from comments such as 'oh my god stupid kdrama clichés, kdrama logic'. Many commenters said 'thanks' when discussing 'subbers' (the individuals who created subtitles), the 'team' (the group of subbers), and 'staff', all reflecting the environment of the Korean drama viewing experience (e.g., 'thank you sub-team for all your hard work big grin'). Commenters also tend to express their thoughts on series, e.g., 'such a beautiful drama with good ending really thanks for it'.

Topic 7 reflects media personae in Series 2 (*Who are you: School 2015*), a high school drama about twins Eun-byul and Eun-bi. Eun-bi grows up in an orphanage and experiences bullying by a group of girls at her school, while Eun-byul lives with her mother and attends an elite high school in Gangnam. When Eun-byul disappears during a school field trip, Eun-bi who has lost her memory in an accident lives as Eun-byul. Yi-ahn and Tea-kwang, friends of Eun-bi at her new school, try to help her find Eun-byul.

The words included in Topic 8 tend to reflect a referential involvement of the viewers whose perceptions of the media content is based on their own lives and personal experiences. We observe that viewers refer to their own experiences ('flashback',

'memory', 'familiar') to gain insights when reflecting on the series situations and characters (e.g., 'I'm adopted and I know this feeling so beautiful and warm', 'these places are all familiar').

Topic 9 can be interpreted as reflecting media personae in Series 5 (*Hyde Jekyll, Me*), a romantic comedy and drama. Ha-na is an owner and an actress of a circus at Wonderland amusement park where Seo-jin is the CEO. Seo-jin is a cold and mean character but also has multiple-personality disorder; one of his other personalities is Robin, who is sweet and kind. The story begins with the conflict between Seo-jin who wants to close the circus and Ha-na who fights to keep it.

Topic 10 reflects a behaviour involvement in the form of a verbal utterance regarding other commenters or media personae. Most of the words are verbs like 'think, know, see, tell, and remember'. Some verbs indicate what commenters are doing or want to do, such as 'I think...' or 'I will remember...', while other verbs refer to what commenters suggest or insist characters should do (e.g., 'you must accept' or 'she must love him').

Topic 11 mainly reflects Series 1 (*Pinocchio*). The main character In-ha has Pinocchio syndrome which means she cannot lie. If she lies, she hiccups until she confesses the truth. Despite her illness, she wants to become a reporter, like her mother, one of whose news stories brought tragedy to the family of Dal-po. Dal-po is living with Inna's family when Dal-po's brother finds out and seeks revenge. Interestingly, we have found that commenters also use Korean as if their media persona. For example, the word 'Hyung' means a brother in Korean which Dalpo calls his brother.

Finally, Topic 12 indicates the expression of positive emotions. Most of the words are translations of emoji and emoticons, used as a way to convey non-verbal emotions (e.g. 'grin' or 'heart'). There are also many onomatopoeias of laughing such as 'hahahahaha' or 'ahahah'. We specify this topic only for positive emotion as many words are expressional words for emotion such as 'cute', 'dazed', or 'adorable'.

Figure 4.4 summaries the 12 topics obtained from the real-time comments. It is worthwhile to notice that 6 out of the twelve topics are directly linked to specific media personae (main actors) of 6 popular and middle popular TV series (yellow fraction of pie-chart in Figure 4.4). This result supports the possibility of using real-time comments on online as a form of interaction. Among the comments, specific information is found on what the audiences are discussing linked to their favourite character as subtopics. Other topics are presented in various colours, as follows: empathy (light blue), criticism (red), referential (purple), behaviour (green),

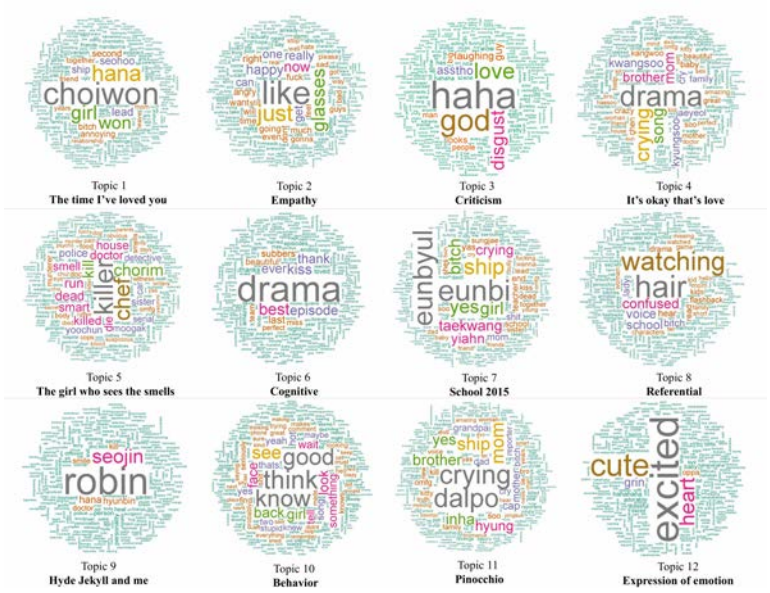


Figure 4.3: Word clouds for topics 1 to 12

expression of emotion (orange), and cognitive (blue). Empathy represents nearly a third (31%) of the entire topic distribution, while the referential and cognitive topics account for the smallest shares (4% each) probably due to the more personal degree of involvement required to the viewers. The criticism (19%), behaviour (17%), expression of emotion (10%), and media character (15%) topics all have similar shares. These results seem to suggest a favourable environment to the occurrence of parasocial interaction.

Topic distributions across series

After having defined the most representative topics for the TV series here considered, it is worthwhile investigating their distribution across the series. By so doing, possible patterns may be revealed in relation to the popularity of each TV series. The results are reported in Figure 4.5 in terms of heatmap implemented in R environment. This tool consists of a powerful visual representation of the matrix proportions in which each row represents the distribution of all the topics in a particular series. Vice versa, each column represents the distribution of each topic across all the series. The colour of each matrix cell is proportional to the distribution, with darker colour indicating higher distribution of a specific topic in the series. For

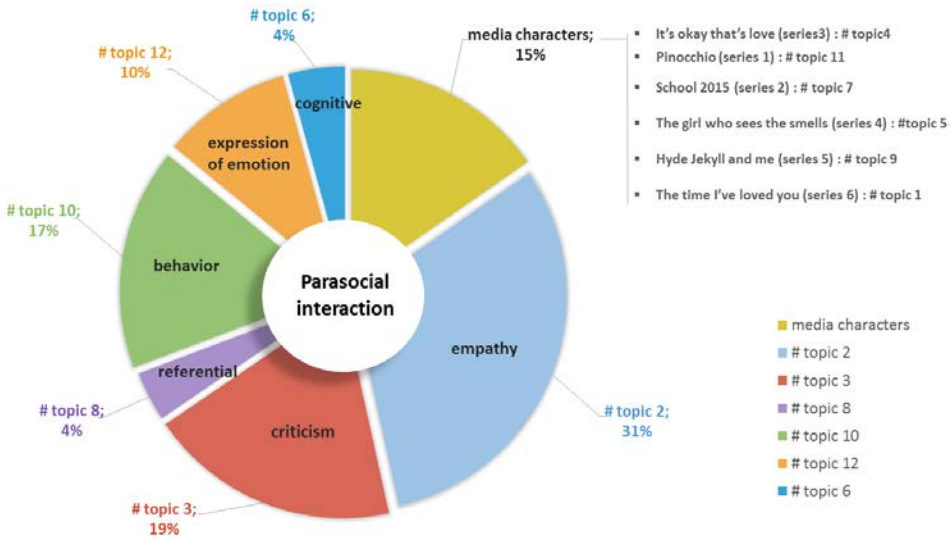


Figure 4.4: Dimensions of parasocial interaction and results for the 12 topics

the sake of clarity, in the right side of Figure 4.5, popular series are labelled in red, middle popular series in yellow and less popular series in blue. The similarity and differences between series have been identified by hierarchical clustering. To measure the distance between series, we have used the Jensen-Shannon distance, defined as the square root of the Jensen-Shannon divergence (Endres and Schindelin 2003; Sun and Yin 2017). The hierarchical clusters are illustrated as a dendrogram on the left side of the heatmap presented in Figure 4.5. The heatmap not only presents the distribution of topics among series but also arranges the series according to a similar topic distribution pattern together with the help of a hierarchical clustering method.

As shown in Figure 4.5, the results confirm similar topics distributions across the series according to their popularity. For example, the less popular series (series 7, 8 and 9 in blue) share substantially the same topics distribution (idiosyncratic distribution). The same results hold for middle popular series 4 and 5 (in yellow) while series 6 is clustered together with the most popular series (series 1, 2 and 3). In summary, the distribution of topics across the series seems to suggest the existence of a correlation between the topics distributions and series popularity which is investigated in the next section.

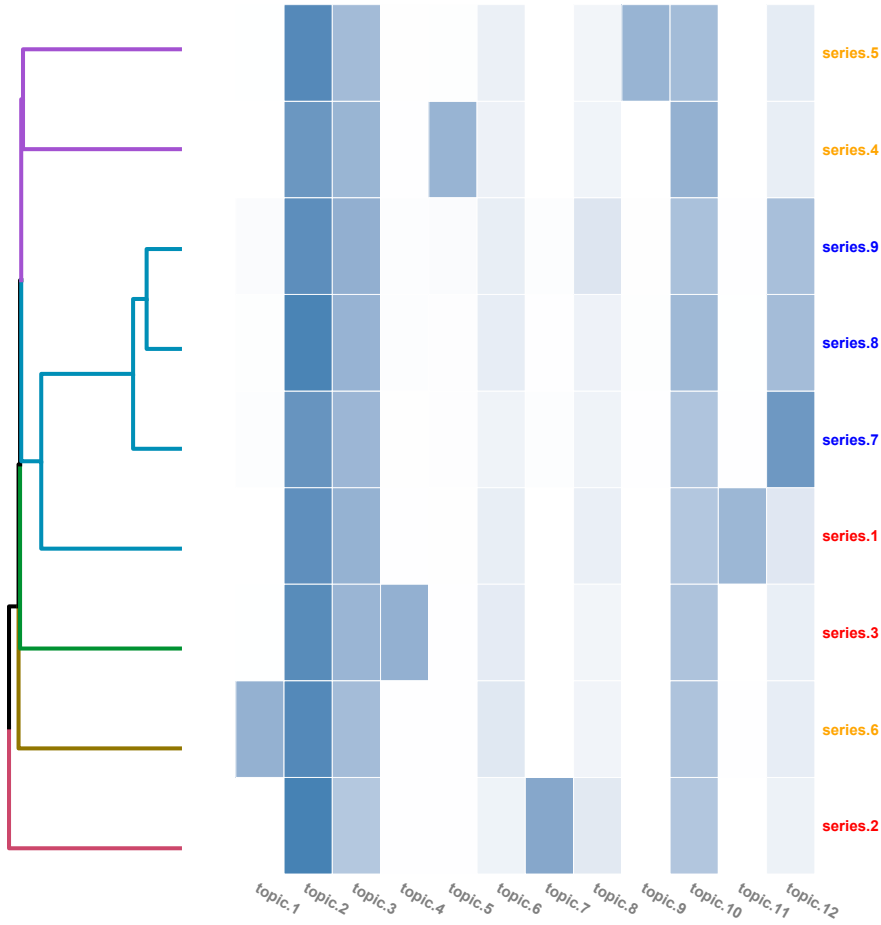


Figure 4.5: Similarity of topic distribution across series (heatmap)

Topics as popularity predictors

We have analysed whether and how the parasocial interaction dimensions are correlated with the popularity of series by conducting multi-linear regression model analysis. The number of comments in each episode is used as indicator of popularity (i.e. dependent variable) while the distribution of each topic is the independent variable. The natural logarithm of the dependent variable has been applied to reduce the amplitude of its numerical values. This overcomes the great difference in scale between the dependent variable (the sum of many comments) and its predictors (topics distribution among series and episodes). The sum of the distribution of probabilities is one (numeric value, 1). Therefore one topic (topic 12, expression of emotion in this analysis) has to be excluded for the regression analysis. Consequently, all coefficients must be interpreted as variations in reference to the excluded topic.

Figure 4.6 depicts a visual representation of the estimated regression parameters, with the vertical axis representing the estimated value of the estimated parameters, and the horizontal axis representing the twelve dimensions listed on the right (topics). The parameters estimated for the regression model are shown as twelve white circles and the confidence intervals are shown as vertical lines, with the thicker and thinner lines reflecting p-values of less than .01 and .05, respectively. All the coefficients in Figure 4.6 are greater than 0 and statistically significant, except for two dimensions, behaviour and empathy. It can be inferred that almost all parasocial interaction dimensions are positively correlated with the series popularity, with the expression of emotion having the least influence on popularity. Figure 4.6 shows a significant difference in terms of influence between the media personae topic in high and moderate popular series and the parasocial interaction dimensions, indicating that the estimated value of the media personae variable is much higher (around 10) than the values for the parasocial dimensions (below 10 and close to 0).

Our findings suggest that there is a positive correlation between all parasocial interaction dimensions and series popularity and that media characters account for the most influence in popularity. The results of the regression analysis add evidence that a high level of parasocial interaction and involvement with the TV series are key factors in the success of media products, with media personae having the greatest influence on popularity.

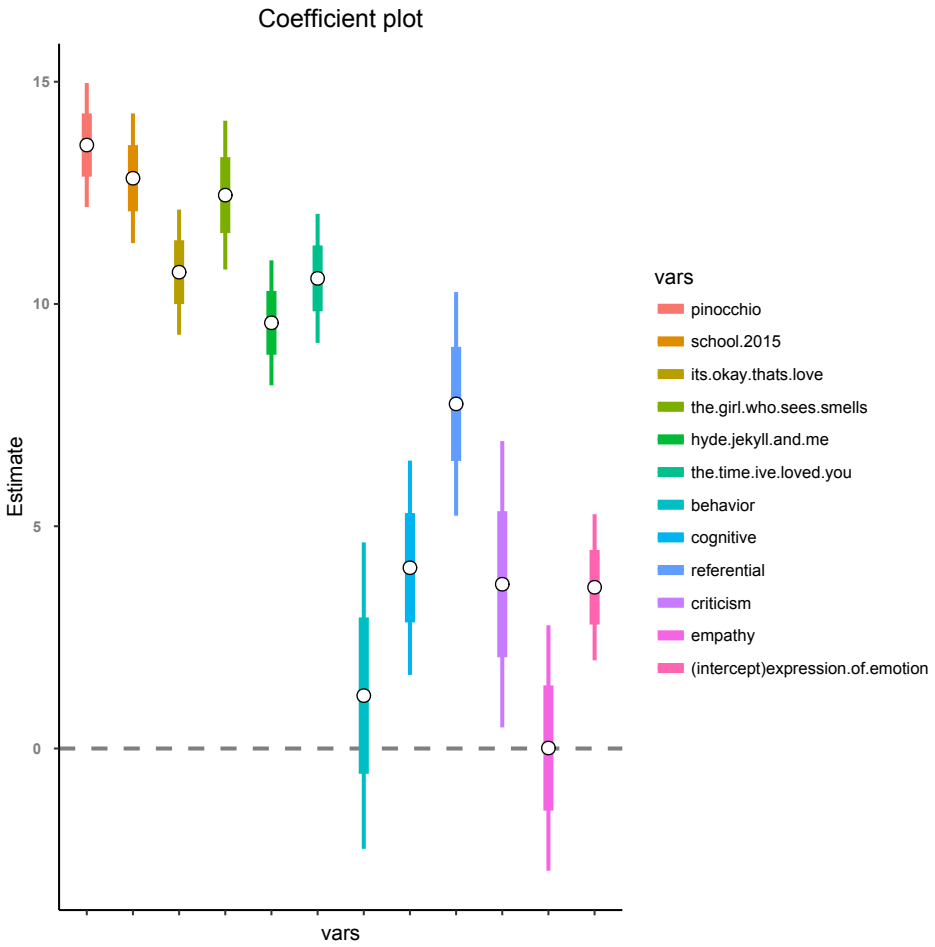


Figure 4.6: Regression analysis coefficients from the log of comments and the topic distributions

Discussion

Since Horton and Wohl (1956) introduced the concept of parasocial interaction, a number of studies have examined the relationship between audiences and the media in order to study social interaction (Hartmann and Goldhoorn 2011; Klimmt, Hartmann, and Schramm 2006; Tian and Hoffner 2010). An increased interested in parasocial interaction through social media has emerged. However, important questions regarding parasocial interaction through online television viewing remain unanswered. To fill this gap our research examined the messages of viewers while watching Korean TV series on social TV. In social TV, viewers can write comments simultaneously during viewing their favourite series and the comments appear on the top side of the streaming page. Thus, our research analysed a large set of qualitative textual data using topic modelling to identify and interpret the dimensions of parasocial interaction in a systematic way. Moreover, we collected and analysed not a single media personae but several media personae from nine online TV series that differ in their popularity. Our findings shed new light on parasocial interaction with TV series and personae. First, we found evidence that supports cognitive, affective and behavioural engagement. However, only the highly popular and moderately popular series showed a strong link to media personae. Second, the distribution of topics differed according to the series popularity, suggesting that popular series generate a particular kind of parasocial interaction with media personae. Finally, we assessed the association of parasocial dimensions with the series' popularity.

In decades of research into parasocial interaction, most of the TV-focused studies have targeted a single TV program and its media characters. Sood and Roger (2000) used viewer letters to investigate parasocial interaction with the Indian TV series *Hum Log*, while Chory-Assad and Cicchirillo (2005) used an online survey to investigate parasocial interaction with the TV series Lost. While several studies have investigated parasocial interaction on the internet, the media personae were specific. Yates (2015) researched parasocial interaction with Bruce Springsteen by conducting a survey posted on the musicians' Facebook fan page and Twitter platform. Lueck (2015) investigated parasocial interaction with Kim Kardashian through her Facebook page by analysing her posts and the responses from the followers. To date, however, few attempts have been made to investigate parasocial interaction with a set of media productions in the new media context. One exception is Ward (2016), who investigated parasocial interaction with various media personae by analysing Instagram posts by three singers (*Taylor Swift, Selena Gomez, and Ariana Grande*), reporting a relationship between post popularity and parasocial

interaction. However, the dimensions of parasocial interaction were not analysed but only the degree of parasocial interaction measured by the number of comments or direct mentions referring to the celebrities.

In our study, we identified different dimensions of parasocial interaction with several TV series and analysed their relationship with series popularity using content generated by users of the VIKI online media platform. We were able to identify the distribution of parasocial interaction dimensions according to episodes and series, and their contribution of series popularity, finding evidence of a link between parasocial components and series popularity. Unexpectedly, we found that the link between parasocial interaction dimensions across series was not as strong as the link with media personae, found to be an especially important contributor to the popularity of a series. Our study contributed to the field of parasocial interaction in social media proving that it is possible to describe parasocial interaction in a comparative setting and simultaneously identify its components and the role of media personae. Additionally, media personae played a key role in parasocial interaction which was the main influence on popularity. Among the parasocial dimensions, the cognitive, referential and criticism had the strongest influence on popularity, while behaviour, empathy, and expression of emotion were the least influential components. It seemed that viewers of Korean TV series value audio-visual productions that cause them to reflect, make judgments, and connect with events and personae that mirror their own lives and personal experiences.

Limitation

In this study, it was not possible to access the personal traits of viewers due to the restrictions imposed by VIKI. Despite this limitation not affecting the results presented hereby further research efforts to include audiences' socio-cultural backgrounds, age, gender, language, geographical locations, are currently perused. This could enrich the results as reported by Boon and Lamore (2001), Cohen(1997; 2003), and Gleason et al. (2017) who found that gender effects on the strength of the parasocial interaction or preference of media personae (Ferchaud et al. 2018).

Conclusions

We have proved that it is possible to study parasocial interaction in a comparative setting and simultaneously identify its components and the role of media personae in the interaction. According to our interpretation, media personae play a key role in parasocial interaction, and it is the main influence on popularity. Among the

parasocial dimensions, the cognitive, referential and criticism have the strongest influence on popularity, while behaviour, empathy, and expression of emotion are the least influential components. It seems that Korean TV series viewers value audio-visual productions that cause them to reflect, make judgments, and connect with events and personae that mirror their own lives and personal experiences.

V BIG BANG THEORY OF STARDOM

Keywords: digital audience, social TV, online series viewing, online comments, sentiment analysis, emotion, sharing, media popularity

BIG BANG THEORY OF STARDOM:

The social process of sharing emotional experience of performers

Introduction

Given the prominent role of the parasocial interaction between the media character and the viewer and the fact that it only seems to be developed among popular series then we have analysed the process by which media characters are transformed from an ordinary actor into a successful star among the viewers of our data set. Therefore, the research interests moved on the media characters and the comments regarding them. Many scholars have proposed different theories to explain the phenomenon of being a star. The literature on this issue has its roots in the Rosen's theory based on the artists' quality (1981; 1986) and in the Adler's stardom theory based on the artists' popularity (1985; 2006). Rosen (1981) formulates a strong tendency for market size and artists' rents to be skewed towards the most talented people in a particular activity, so that small differences in ability would translate into enormous differences in income. In contrast, Adler (1985; 2006) points out that skewness of rewards is not necessarily related to the best quality artists, as consuming artistic performances is not only about artistic quality but also about a sharing experience with peers, as it follows the notion of "the more you know, and the more you can share it with your peers, the more you enjoy it" (2006, pp 3). Consumers enjoy discussing art with friends and acquaintances for social exchange, and knowledge, either by direct consumption experience or by learning from others, called social process (Meiseberg 2014; D. E. Giles 2006; D. E. Giles 2007; Throsby 1994). Most of the successful stars start their popularity process just being the first to enjoy an initial advantage that develops exponentially until they become popular performers, and eventually stars. Debates about these two theories have continued until now due to the difficulty of objectively measuring quality.

Within this context, this paper proposes an insight into the stardom theories by analysing the case of nine Korean actors for K-drama distributed globally through online platforms. Last May 2018 one of the most popular Korean band in the world, the BTS, took the No.1 spot on the US Billboard 200 charts. This is only one example of the Korean cultural boom that the world is currently experiencing. After the success of K-pop, Korean drama (K-drama) is now a big part of the

successful export for $239M according to the most recent official annual figures from all over the world. The popularity of Korean culture has been noted not only in neighbouring regions but also in Europe, the Middle East, and North America since the late 1990s (Jin and Yoon 2016; Oh 2014). Half of the economic success of K-drama, in fact, comes from all over the world (Maybin 2018). Its popularity is constantly growing, driven by fandom as well as its export contributing to making K-drama worldwide globalized.

This remarkable expansion of Korean culture would not have been possible without online technologies such as social media that have become one of the building blocks for social TV experience (Yi 2011). Nowadays, Korean TV shows including programs which currently air on Korean Television networks, are available around the world through online platforms such as Netflix, DramaFever, mVIBO, and Viki. The popularity of these online platforms also explains the booming of K-drama. The crucial requirement for K-drama export is the availability of good subtitles which allow global audiences to access the media contents (H. Lee 2018). Viki online video streaming service, for example, provides a novel approach for subtitling Korean TV shows by crowdsourcing from its customers. As a result, Viki counts more than 40 million monthly active users.

The recent success of K-drama and Korean actors represents the most evident example of new rising superstars favoured by online technologies. Starting from the Korean case which provides the perfect resource, we set up fundamental research to define the contributing factors which explain the way actors become worldwide famous superstars. We analyse the contribution of viewers' comments while watching the actors' performances available at Viki platform, to the success of the actors' popularity. We test both Rosen's and Adler's theories focusing our attention on the social process of sharing the experience of actors' performances. If findings add evidence to Adler's social process of enjoying artists' performances we can infer that emotions work as the triggers for the social process of sharing experience, and the size of market influences the speed of snowball effect on the social process. Moreover, we propose a novel Big Bang Theory explaining how the snowball effect works from the initial stage of the actor's popularity until the moment the actor becomes popular.

This paper is organized into five distinct sections. Section 2 addresses the issue of previous studies on superstars. Section 3 summarises the adopted research methodology ranging from the data to the design model. Section 4 details the findings. In Section 5, the discussion outlines some of the key principles behind our findings and finally, Section 6 concludes and summarizes our research.

Theoretical Framework

What makes a superstar, quality or popularity?

Are popular artists popular due to their higher quality, or due to the social process that transforms them into a popular performer of superior quality? These two arguments are supported by two different theories which explain the mechanism by which few artists dominate the market, and the distribution of income, as well as how the public attention is skewed. Rosen's Superstardom theory explains the asymmetry in the distribution of artist's earnings as the result of quality differences. He asserts that the quality of artists brings success due to the fact that a lot of less good artists cannot substitute the best artist satisfying consumers' preferences. According to Rosen, small differences in talent translate into large differences in consumers' preferences and, thereby, artists' earnings. Most of the people are not satisfied with the less talented performance and cheaper artists when they are able to enjoy a higher quality performance, even if the cost is higher (Franck and Nüesch 2012; Frey 1998). In brief, Rosen claims that it is the talent the starting point of becoming a superstar and finally stars become popular and enjoy a dominant market share.

On the other hand, Adler (1985; 2006) argues that artists do not need to be the most talented to become the most popular. He instead suggests that consumers' need to share their artistic experience (with artists and their music) with their peers and this social process is the starting point of becoming a super-star. According to his theory, it is essential to be the first to build up a significant number of fans. By sharing with friends about their experiences and preferences for an artist's work, the artist's market expands with new consumers who are influenced by the initial fans and learn from them to enjoy the experience of the performer (Meiseberg 2014; D. E. Giles 2006; D. E. Giles 2007; Throsby 1994). In summary, the bigger the number of people sharing their experience of the artist's performance, the bigger the artist's audiences, and finally the more the artist becomes popular.

Adler proposes that the most popular performer becomes as well the most talented performer. However, the social process of becoming a popular artist changes the Rosen's causal order; now it starts with being the most popular and ends with being the most talented (see Figure 5.1) (the social process that influences utility). Menger's discussion of the artist labour market (2001) acknowledges that "talent" is shaped only progressively through a process of learning-by-doing. Since the demand is uncertain when choosing a performer to be promoted, the sponsoring is focused

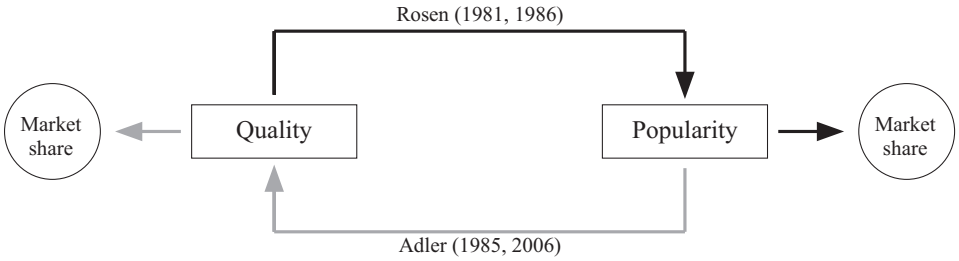


Figure 5.1: Two contradictory theories about stardom suggested by Rosen (1981;1986) and Adler (1985; 2006)

on a few artists who have already a reputation on the market. The reputation gives numerous opportunities for working and learning-by-doing improves the artistic quality. As a result, the actor who is capable of being the first to build a bigger network of his fans becomes the most popular and gains a greater reputation in the market. Then the reputation brings the chances to work more which gives the artist the possibility to learn and practice his artistic skills from experience.

Interestingly, this social process has taken place as well in the software industry when realizing new versions of Apples, first, and Microsoft Windows, later: being Apple operative system the best in terms of quality (easy to use) during the 80s, Microsoft became the most popular due to the a better market strategy that built up a larger market share, and finally grew better or as better in terms of quality (or easy to use). In fact, every new released since 2012, Windows has been promoted as a superstar (Perman 2009) as Apple releases many years before.

To date, the debate around these two contradictory theories still remains. Testing one theory against the other is not easy empirically because it is difficult, if not impossible, to separate quality from popularity. Quality is supposed to be an 'objective' property of media productions, singers and actors, but it is almost impossible to measure it, as quality means different things to different people. Instead, in this research, we propose to find support for the social process behind Adler's theory. If we find evidence in favour of Adler's social process, then we will find support to his theory; otherwise, rejecting the social process will mean that Rosen's theory will remain as the best theory to explain the asymmetric distribution of consumers' preferences for artists.

Adler's Social process

According to the Adler's theory of superstars and talent (1985; 2006), obtaining a significant share of the market is crucial to becoming the most popular artist. It is not necessary to be the most talented artist to be a superstar, but it is enough to be the first to build up a significant market share of consumers' preferences. Then the desire of the consumers to share with peers their experience about the artists, the desire to 'talk' about their experience and feelings about artists' works, such as listening to music or attending a concert, will make the artist's market share of preferences growing. This social process explains the artist's success. Towse (1992) introduces the bandwagon effect as a psychological phenomenon for which consumers' choices are primarily determined by what other consumers have chosen. It implies that the experience shared by an initial group of consumers will influence other consumers' choices. As the social process develops, the number of consumers that choose the artist gradually increases (Meiseberg 2014; Grant and Wood 2004; Strobl and Tucker 2000). Consequently, if the initial request of some artist's works is higher than for any others, his market share will grow exponentially due to snowball effects, and its effect will even be greater in larger markets. In consequence, the larger the market, the bigger the snowball effect and the more monopolistic artists will be in the market (Borghans and Groot 1998; Budzinski and Gaenssle 2018).

Historically traditional media were the instruments to promote a reduced set of artists that studios used to choose for creating a superstar and a monopolistic economic position (property rights, and all other related instruments from the antic system) (Adler 2006; Peterson and Berger 1975). This is due to the uncertainty of cultural products as experience goods (Nelson 1970). These few singers or actors selected by the main labels could enter the system of stars. This system was based on several concatenated activities. First the screening of new artist by someone working for the studios, and later by artist's managers. Secondly, the production based on copyright (that transforms performances into a good that could be sold and prevent competitors from copying), and then the distribution into markets through an initially proprietary network of the production company (Peterson and Berger 1975; Peterson 1982). This model worked well for the US studios regionally, nationally, and internationally until the compact disc started a gradual but non-stopping process of change (Peterson and Maggio 1975).

This pre-digital business model has changed after social media entered the scene. Social media can perform many functions which allow easy interaction and communication among people. Even more importantly, social media also create a medium

for accessing digital productions that can travel without physical support. Due to the digitalization of cultural productions, the cost of producing a high-quality master has been drastically reduced, and social media has dramatically cut the cost of bringing the master to the air. In consequence, the market size has grown and more performers can be promoted through social media and become well-known. Which means consumers' preferences are distributed among many more stars. Thus, there are less well-known artists, but more singers are able to make a living from their music. By means of this, none of them is as well-known as the usual superstars of the past (A. B. Krueger 2005). Although it is more difficult to be "the" winner in social media, the attention of consumer is still heavily addressed to a few popular artists or productions, but there are more consumers and more variation among consumers, letting place to the existence of many more popular singers, although not as popular as in the pre-digital business model. In his discussion, Krueger (2005) reminds the role of the market size: the smaller market, the less strong the effect of social media (traditional media maintain their power); while the bigger the market, the stronger the effect of social media due to the snowball effect.

The social sharing of experience

The key point of the social process behind the theory of Adler (2006; 1985) is the consumers' desire to share with each other their experience and the knowledge about the artist's artwork. Then, this dynamic process grows exponentially with the size of the market, forming the community of fans to the superstar. Even though Adler proposed the social process of becoming popular, how consumers' start sharing their experience can be found in Langston (1994) and Rime's work (2009). Rime (2007) argues that emotional experience systematically elicits the communication about the events and sharing related thoughts and feeling in socially-shared languages. Rime (2009) defines this process as "the social sharing of emotion" which takes time, ranging from minutes, hours or several years or even the entire life (Rimé 2009; Rimé 1989; Rimé et al. 1991). Rime's argument builds on the works by Schachter (1959) and Langston (1994) who claim that exposure to emotional events arouses the motivation of seeking social contact. In a similar vein, Bruner (1990) also asserts that the context of emotion takes an important role in the narrative story for social communication.

Drawing on these previous works, Rime (2007; 2009) argues that emotional circumstances trigger social communication among human beings. The works of Rime demonstrate that the more experience is emotional (intensity of emotion), the more

frequently and the more urgently it will be shared and for longer periods. Thus, the correlation between the intensity of emotion and the extent of sharing has shown a positive result. Rime's theoretical framework accounts for the impact of positive and negative emotions exactly in the same way. By sharing a positive emotional episode, positive memories would be brought back and positive emotional feelings would be reactivated. People, therefore, are highly motivated to socially share positive episodes further. Even for the negative feelings, people are willing to engage in social contacts with notable benefits. Rime (2007) acknowledges that when collective emotional events happen the affected person talks with others about the emotional circumstance of the events and the experienced feeling. Therefore, these sharing emotions spark the emotion both in the person sharing and the peers.

Thus, according to the emotion-sharing construct, emotional waves propagate across individuals and set up an emotional atmosphere in accordance with emotional feeling aroused by the collective events. In consequence, social sharing provides and reinforces shared experience and people's emotional responses about this collective event. Sharing emotions, therefore, takes the role of a social trigger that starts the social process of sharing experience. During the process of sharing emotions, Rime (2009) proposes, five conditions for the sharing process to be effective: 1) interest, 2) emotional contagion, 3) empathy and sympathy, 4) attachment behaviours, and 5) enhanced affection for the narrator. This finding is congruent with the work of Peters and Kashima (2007) who have found evidence that emotion sharing creates a coalition between the narrator and the audience and makes the audience bond with the narrator. Hence sharing emotions creates important consequences for group integration by gaining interest and social attention from targets, eliciting empathy and consolidating intimacy among targets. The group integration is enhanced by active social-emotional sharing and the strength of the social ties is significantly stronger in the group where emotions are shared.

Research Aim

In this research, we aim at testing Alder's social process of becoming a popular artist based on sharing an emotional experience with the artist's works (Rimé 2009). As shown in Figure 5.2, the popularity mechanism starts with socially sharing the emotional aesthetic experience while enjoying the artists' works such as watching TV series. Firstly, we focus on the role of emotion on the process of sharing audiences' experience. Then, we discuss the snowball effect of socially sharing aesthetic experience on popularity. The scope of this paper is to identify

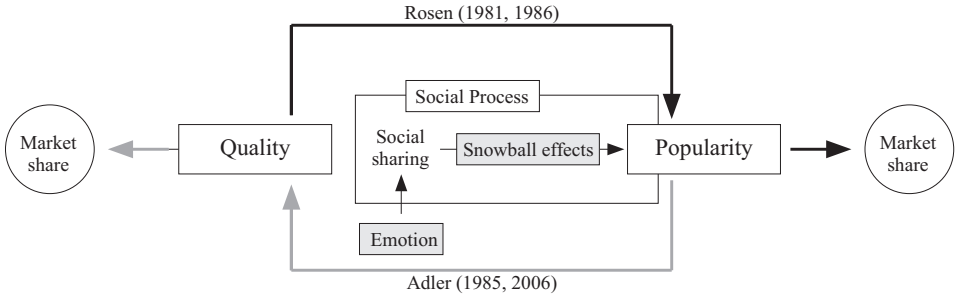


Figure 5.2: Proposed research design in this research for the flow of stardom process suggested by Adler (1985; 2006)

the social process of sharing emotional experience and its role in converting a TV actor into a star. To support Adler's theory (1985; 2006) for the case of online TV audiences, two conditions must be observed. First, the audience's emotions should be related to the social process of sharing their experience online (Figure 5.2). Secondly, the social process of sharing experience must be stronger in bigger markets to convert the sharing experience into a snowball effect. If these two conditions are met, then we have found support to Adler's stardom theory (1985; 2006). We can even describe how this snowball effect works for different levels of popularity. On the contrary, if no evidence of these two social processes is found, then the alternative hypothesis would be Rosen's theory proposing that it is the artists' quality what matters, not the social process of sharing the aesthetic experience.

K-drama is used as a case study due to the growing success of Korean actors and actress all over the world thanks to digital online platforms. Fans from different countries and continents enjoy K-drama and Korean actors' performance through Viki platform which not only distributes the media contents but also provides the viewers with new interactive tools as the possibility of real time commenting. The influence of market size on the social process of sharing experience among viewers is approximated by the size of commenters expressing comments in three different languages: English, Spanish and French. The impact of this contribution exceeds the simple case study but aims to reveal the role of emotion in the social process of becoming a superstar.

Methodology

In this study, we only focus on the time comments about main actors for each series which contain the actors' names. In this study, the main actor refers to the protagonist of the series who has the largest number of comments from the viewers. In order to gather more comments, we also consider comments containing both the real name and the character's name. For example (Jong-suk) in series "Pinocchio" we target comments containing "Jong-suk" (actor's name) and "Dal-po" (character's name). The results are summarized in Table 5.1.

Table 5.1: Description of the nine series chosen

Series title	Abbreviation	Main actor's name/character's name	Actor ID	N.comments (main actor)
Who are you: School 2015	School	Sohyun/ Eunbi/ Eunbyul	Act.1	5381
Hyde Jekyll,Me	Hyde	Hyunbin/ Seo-jin/Robin	Act.2	4601
Pinocchio	Pinocchio	Jongsuk/ Dalpo	Act.3	2432
The Time I've Loved You	The time	Jinwook/ Choi-won	Act.4	1243
The Girl Who Sees Smells	The girl	Yoochun/ Moogak	Act.5	573
It's Okay, That's Love	It's ok	Insung/ Jaeyeol	Act.6	376
Tomorrow Cantabile	Tomorrow	Joowon/ Yoojin	Act.7	102
My Unfortunate Boyfriend	Boyfriend	Jinsung/ Jina	Act.8	82
Sweden Laundry	Sweden	Hayoon/ Bom	Act.9	44

The real time comments data consist of series ID, main actors' name, Episode ID (1:16), user ID, user's comment, and languages information. The comments about each actor consist of three languages; English, French, and Spanish. English commenters and comments are approximately three times more than Spanish's and French's. Accordingly, we sampled our data into three markets, namely English (EN), Spanish (ES) and French (FR) with a proxy of the market size in order to interpret the market's size effect on the process of success for actors. In this study, popularity refers to the number of commenters who wrote the comments about the main actors in the specific series. Then, according to the number of comments

about the main actors, we divided nine actors into three groups and named their level of popularity: popular, middle popular and unpopular category.

Emotion measurement

Sentiment analysis is defined as the computational study of construing people's sentiments based on their language expression in the text. Liu (2010; 2012) provides one of the earliest discussion of sentiment analysis. The sentiment words, also called opinion words, polar words or opinion-bearing words (Liu 2010), are unquestionably the most important indicators for the sentiment analysis. They are commonly used to express positive (+1) and negative (-1) sentiments. In this study, each word W_i in the comment C is searched within the lexicon dictionary. When the word W_i appears in the lexicon an emotional value V_i is assigned. Our study aims to reveal a magnitude of viewers' emotional reactions— reflected in terms of positive or negative emotional valence — as expressed during series viewing. Thereby we applied the emotional score of the single word V_i as the absolute. By so doing, we were able to assign to each comment's emotional score E_c defined as:

$$E_c = \sum_{i=1}^{N} V_i$$

Where

C index of the comment

i index of words in the comment C

N number of words in the comment C

V_i emotional value (absolute) of the word W_i

Network analysis

Network analysis is a method used to monitor the interaction by path-tracking the relationships between entities in a visualized structure. The two components of network analysis are the multitude of entities and the connection between them. In analysis terms, the entities are referred to as nodes or vertices of a graph, while the connections are edges or links. Primarily, it is important to identify the nodes. The concept of nodes in this work is the commenters who communicate directly to another by using "@lc" symbol. In detail, the interaction of commenters is tracked

by the specific structure of comments containing @*lc*. The centrality of the nodes is measured by how many times the nodes speak to and answered back from others.

Finding

The intensity of emotion when talking about actors

First, we computed the emotional score of comments, but in order to explore the emotional intensity of general comments and of comments related to the leading actors or actresses, we computed: 1) the average emotional score found in comments talking about the leading actor or actress (in grey in the plot), and 2) the average emotion score of all comments including the comments of leading actors (in yellow). For each TV series, three languages were considered, EN-ES-FR

Figure 5.3 reveals that comments towards leading actors/actresses are higher in emotional intensity among viewers than the emotional score for all the comments across all the series. Only two exceptions are found in the series "Tomorrow" and "Sweden" in which no Spanish comments are found for the leading characters. The differences in the average general emotion score and the average emotion for actor follow similar patterns across the commenters in the three languages. However, in the series, "Time" and "Boyfriend" Spanish comments about actors are much more emotional than general comments. In summary, Figure 5.3 suggests that comments about the leading actors have stronger emotional content. This result illustrates that the contribution of actors to the emotional experience is significant.

Emotion and popularity

To investigate any potential relationship between the actor's market share and actors' emotional score, we computed the sum emotional score defined as Eq (1). Figure 5.4 consists of two parts: the left side of the graph, (a) cumulative emotional score, relates to the leading actors during episodes while the right side, (b) the cumulative number of commenters, shows the accumulation of the commenters during the course of the series. We see that the accumulation of emotions and commenters is stronger for English commenters which is the biggest market according to the number of commenters and comments. The difference in the accumulation of commenters and emotions suggests that the market size matters in the process of accumulation of fans. Specifically, when the emotional experience is shared, new commenters are

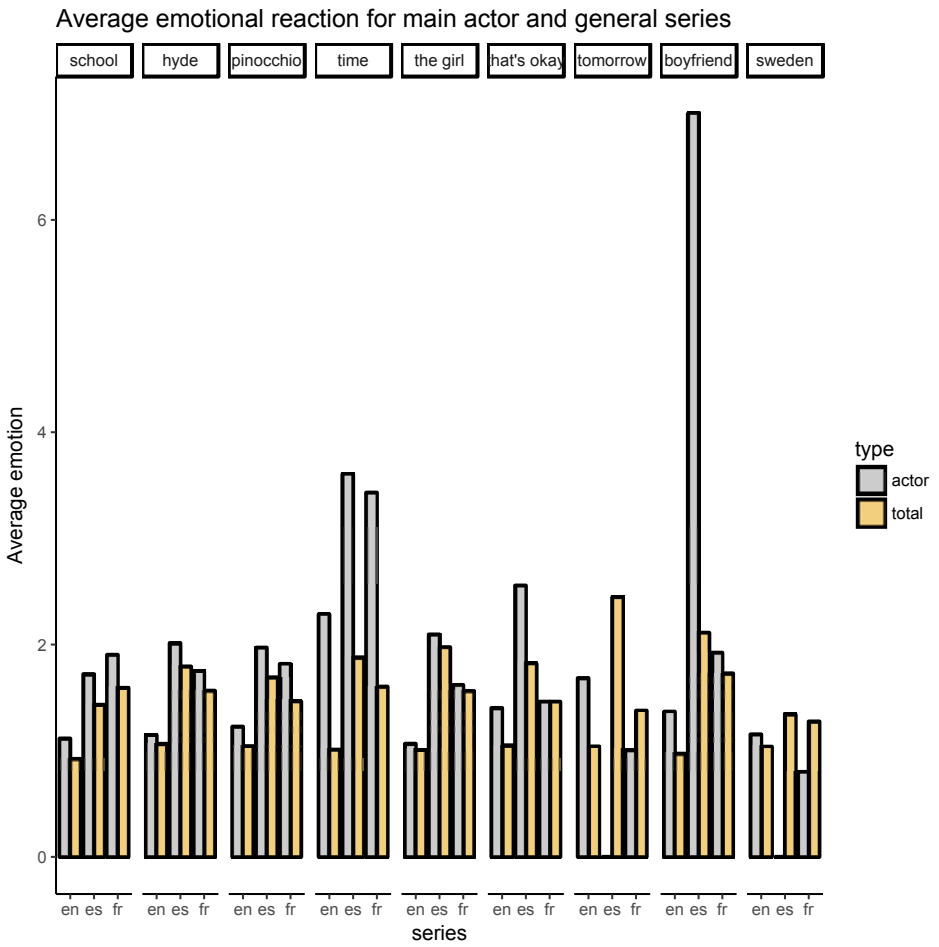


Figure 5.3: Average emotion on the main actor comparing to the average emotion on the series

highly encouraged to join and share their emotion with their group also, and this process is stronger the bigger the market size. This result provides evidence that the emotion felt by viewers is indeed related to the actors' success in the market, but this relation is mediated by the market size. Based on the result in Figure 5.4(b), as expected also in Figure 5.4(a) a much lower growth occurs for the Spanish and French market with the only exception of the actor 2.

Snowball effect according to the size of the market

Figure 5.4 shows graphically the snowball effect and it is evident that the cumulative number of English commenters is characterized by a much higher growth rate compared to the other two markets, French and Spanish. We can see a clear pattern: the cumulative number of commenters, as well as the emotional score, grows faster in the bigger market, English, but in French and Spanish markets, the growth rate is small. Episode by episode, new commenters join steadily for all the nine actors in the English market and the gap between other markets is widening gradually. The result suggests that the relation between emotion and market share may be mediated by the market size. The snowball effect works with different degrees according to the market's size; bigger market size brings stronger snowball effect in the actors' popularity. Moreover, this snowball effect accelerates the process of popularity by building up more rapidly the differences in popularity, and then the actor's market share among fans. No matter how strong the emotional experience is, if the market size is small, the possibility of becoming a successful actor is low; the reverse happens in a bigger market. But, how does the snowball effect work? Until now we have just found a pattern in favour of the snowball effect working particularly well in the bigger market but how does the snowball social process work?

Previous results add evidence to the role of the market size in the popularity process but at the same time introduce a new question: how does snowball effects operate according to market size and popularity? Or in other terms, why the English market (the biggest market size) attracts more participants? We expect that as commenters share their experience with each other through their comments, the snowball starts to operate. That is, we need individuals to interact with others in order the snowball effect to work and we expect it to be stronger in bigger markets. In general, commenters can post isolated comments, or they can interact with other commenters by answering back to others' comments.

In this research, we call communicators as the commenters who contribute to

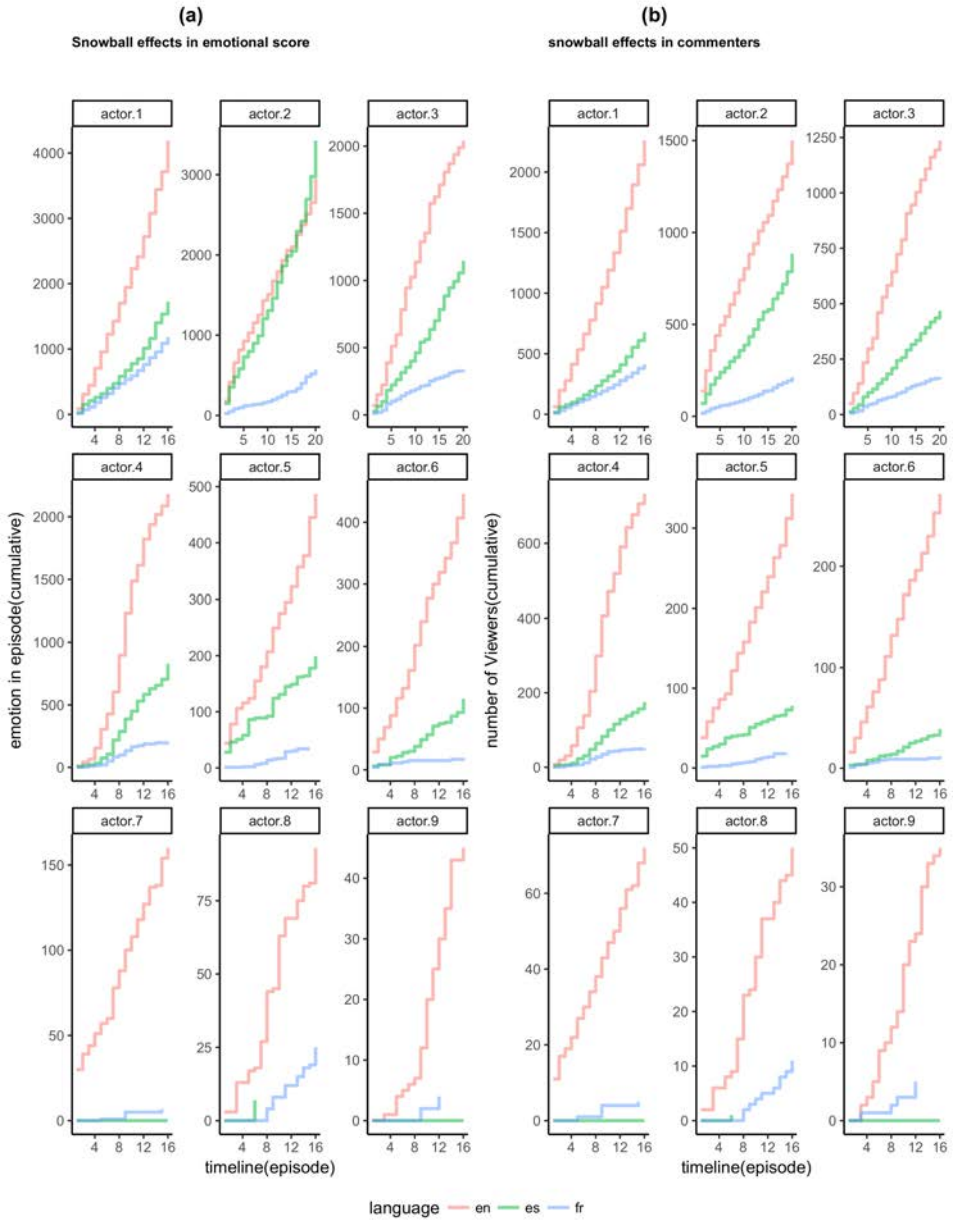


Figure 5.4: Cumulative graphs on the number of commenters and emotional score along the episodes for the nine actors

building a network of interactions with other commenters. Interestingly, we reveal remarkable different network structures for each market. A third of the commenters in the English market are communicators while almost no communicators are found for the Spanish and French markets. And if they are, they reply only once to another commenter. Taken altogether, this finding explains the evidence shown in Figure 5.4, the association between the cumulative process in commenters as well as in the emotional score and the market size. Commenters in the English market interact and share more their experience than commenters in the Spanish and French markets. We provide evidence of how the snowball effect works in bigger and small markets. In bigger markets, viewers engage in conversation with other commenters, not only with the one to many such as comments in public but also with one to another such as direct response to a certain comment.

In order to have a closer examination of the snowball social process, we draw the interaction networks that show the conversation among communicators. To reduce the noise in the data, we focused our attention on communicators with at least two comments towards other communicators. By so doing, we removed many communicators who replied only once. The results are presented only for the English market due to the fact that for French and Spanish, almost no communicators were found with more than two comments.

Snowball effect and popularity

To better show how the snowball effect works, we divided actors according to their popularity. In this research, the actors' popularity was determined based on the number of comments as shown in Table 5.1. Later, popularity was divided into three levels, namely popular, middle popular and low popular. Exploring the social network of English commenters according to actors' popularity, we can display how the snowball effects work for different levels of popularity. The results are reported in Figure 5.5, 5.6 and 5.7 respectively. Each communicator is represented by a circle whose colour refers to a particular actor he/she is talking about. As a result, each graph consists of three different groups of communicators according to the actor they are talking about. The size of the circle is based to the degree of the interaction, proportional to the number of comments the communicator sent to and received from other communicators. The degree of interaction was weighted by the sum of in-degree and out-degree which refers to the multiple interactions (Csardi and Nepusz 2006). The grey lines which link each dot in the graphs illustrate the interaction path between two communicators (see the arrows). The more a

communicator interacts with other communicators, the more lines depart from and arrive at him/her. Consequently, the results in Figure 5.5, 5.6 and 5.7 easily identify communicators with a predominant role within the communication groups by means of the size of the circle (proportional to the normal of comments written by each communicator) and the communication paths (grey lines).

Figure 5.5 presents the communication network for three popular actors where the pattern of communication is accentuated with few communicators. We named these commenters central communicators since we can observe their interactions receiving and sharing to other communicators. In this respect, central communicators tend to act as attractors multiplying their interactions with the surrounding communicators. A close look at Figure 5.5 shows that the communication patterns for Eun-bi (orange) and for Seo-jin (yellow) reveal the presence of central communicators: '10174831u (for Eun-bi)' with 115 interactions with other communicators, '7110010u (Seo-jin)' with 94 interactions. However, for Dal-po (grey), central communicators are not clearly identified. The reason is related to the fact that part of the communicators for Eun-bi (orange) are also common for Dal-po (grey). However, for the sake of clarity, we decide not to indicate overlapping commenters who speak about more than two actors. For example, '10174831u' who is a central communicator in the communication pattern for Eun-bi is also a central communicator for Dal-po. However, the degree of communication is lower than Eun-bi. As a result, in Figure 5.5 '10174831u' appears only for the Eun-bi. We find an irrelevant number of common communicators for all the other series.

In the mid popular actors' graph, Figure 5.6, central communicators are still present. Such as in the communication about Choi-won (actor 4) '996039u' with 29 interactions and '589938u' with 26 interactions. In the communication about Jae-yeol (actor 6), three central communicators are found: '1594471u' with 36 interactions, '7037817u' with 27 interactions and '7542412u' with 25 interactions. In the communication about Moo-gak (actor 5), two central communicators appear: '8992211u' with 22 interactions and '10594471u' with 28 interactions. '10594471u' (grey) interacts more in the communication about Jae-yeol with 36 interactions than about Moo-gak (yellow) with 28 interactions. However different to the communication network for popular actors focused on the one communicators in each group as in Figure 5.5, we found several communicators with similar interaction degree in each group as in Figure 5.6. Moreover, the interaction between communicators is also less dense according to the number of lines that depart from and arrive at the communicators. As a result, for the popular and mid popular actors, the communication networks reveal the presence of many central communicators with multiples communication

paths towards other communicators. However, for the case of popular actors, there is a bigger concentration around few central communicators, while for the middle popular actors, several central communicators are present inside each group of actors.

Eventually, Figure 5.7 shows the communication network for low popularity actors. At first sight, we could notice that there are not many communicators, and the interaction networks are divided into three related to each actor. This graph shows that there is no connection among central communicators who watched different TV series. It implies that commenters of low popular actors talk only about one actor but no more. Notably, this result shows a weak interaction pattern where almost no central communicators are found.

Discussion

The debate over the skewness of consumers' preferences for superstar still revolves around the controversy between quality (Rosen) and popularity (Adler). Rosen (1981) and Adler (1985) attempted to explain the reason why only a few numbers of artists enjoyed high streams of income, a bigger market share of consumers' choices and attention in the market for stars. From one side, Rosen proposed that small difference of talent fosters big market shares, while, on the opposite side, Adler claimed that it is the size of consumers' network of preferences that patronizes performers what transforms artists into superstars, regardless their initial talent (or favouring performers with less talent). This work attempted to confront both theories by testing Adler's social process of becoming a popular performer. We have chosen this path due to the fact that it is very difficult to define the talent (quality) of an artwork (or artist) as it is subjective, and it can be different according to various criteria (Franck and Nüesch 2012; Connolly and Krueger 2005; Throsby 1994; A. B. Krueger 2005). Therefore, following Adler's' theory (1985; 2006), this paper sought to provide detailed evidence about the social process of becoming a superstar. With this purpose, we linked Adler's theory with psychological theories about how individuals socially share their emotional experience.

The social process starts sharing emotional experience about a performer, but which performer has more chances of being the first to build a sufficient base of fans for the snowball effect to start working in his favour? According to Rime (2007; 2009) the stronger emotion intensity triggered by the experience, the higher individuals' desire of sharing an experience. Therefore, the more emotional the experience is, the more urgent it is sharing the experience with peers, also for a longer period of time. Accordingly, social sharing reinforces peers' shared knowledge and togetherness. Sharing emotional experience, therefore, takes the role of a powerful social tool for the continual updating of shared knowledge, theories, and world representations. Our finding is consistent with Rime (2007; 2009) work; we showed that viewers who felt stronger emotional experience while watching a leading actor in a TV series, were more prone to share their experience with other viewers. The relevance of emotion sharing in the process of becoming a superstar was advanced by Adler's theory stating that superstars emerge because art consumption is not an isolated activity but is a socially shared activity. By using big data from social media platform we directly computed the emotional content of viewers' comments towards actors, in the very same moment when they were actually watching the artwork (the acting). The results of this analysis add evidence to the proposition that

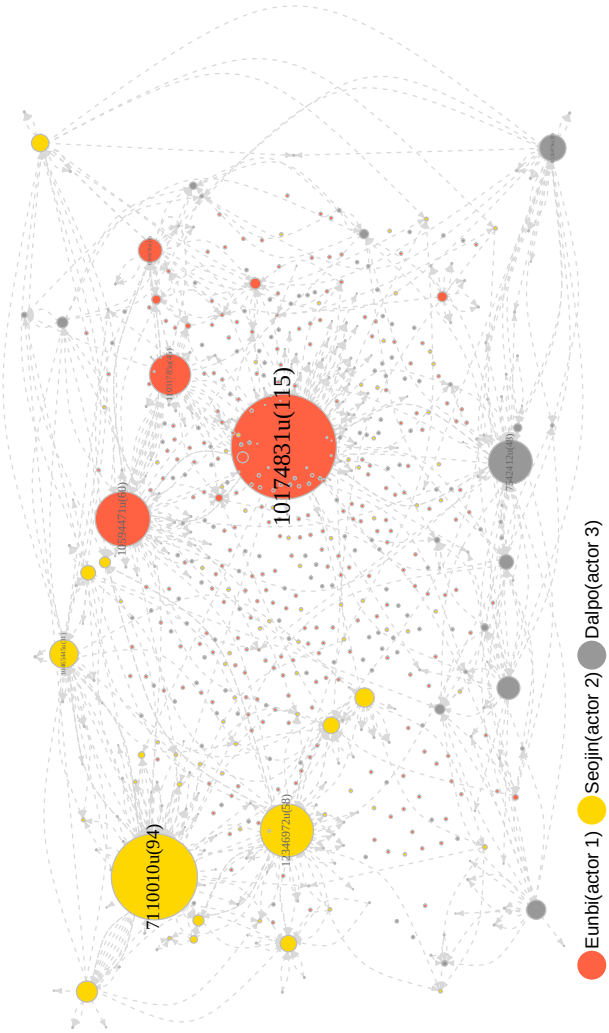


Figure 5.5: Interaction network for conversation among viewers of popular actors

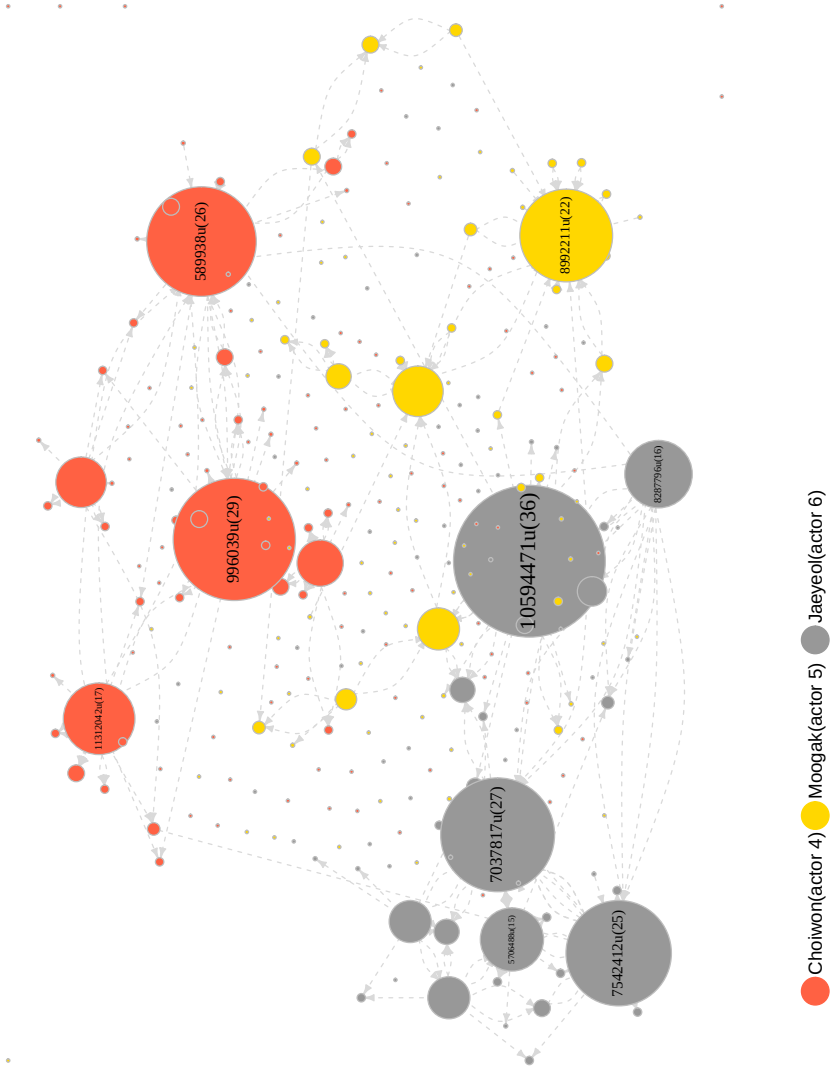


Figure 5.6: Interaction network for conversation among viewers of middle popular actors

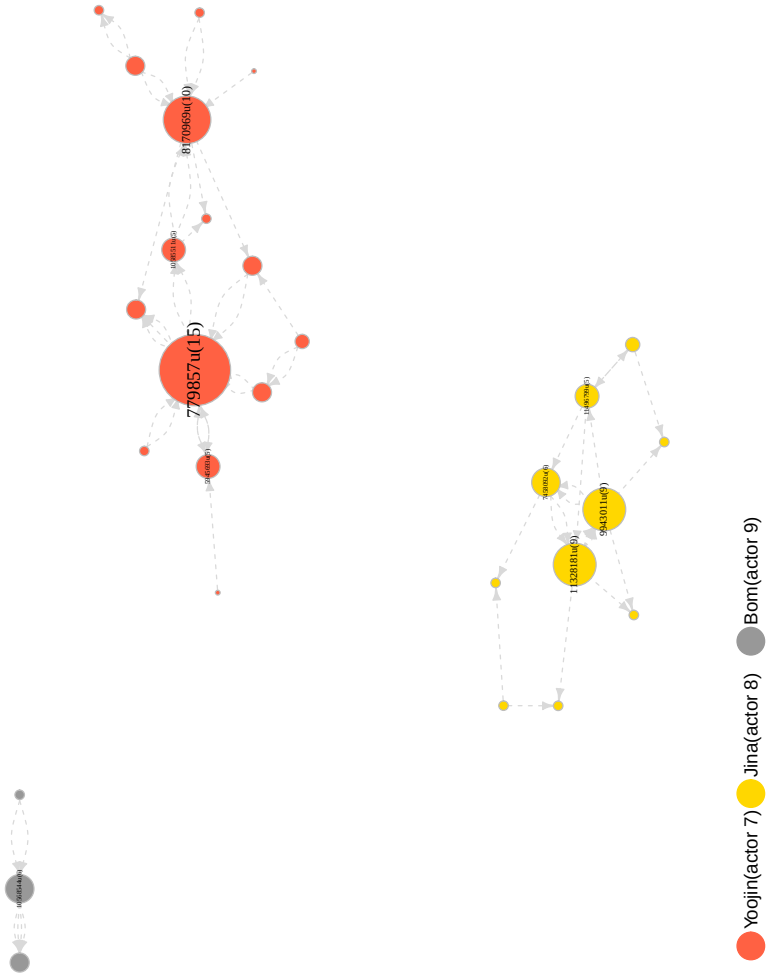


Figure 5.7: Interaction network for conversation among viewers of low popular actors

the social process of sharing experience is stronger for emotional experience. In detail, the actor/actress who provides viewers with highly emotional experience encourages viewers to share their experience and knowledge with others. This discussion includes the pleasure or emotional experience of consuming artworks. By viewers' sharing their experience, actors become widely known.

However, we found out that the strength of the connection between viewers' emotional reactions and the actors' popularity seems to be mediated by the market size. Of particular relevance in this study is the bandwagon effect (Towse 1992), a psychological phenomenon for which consumers' choices are primarily determined by what other consumers have chosen. The result is an exponential growth, like a snowball effect, of certain consumers' choice or preference which eventually turn to increase, for example, the request of some artists' works rather than any others (Meiseberg 2014; Grant and Wood 2004; Strobl and Tucker 2000). Indeed, a similar snowball effect was observed when analysing the evolution of the number of commenters for each actor, episode by episode, for each TV series. Among the three markets here considered, based on the languages of the viewers' comments (English, Spanish, and French), the English one had larger commenters than in the Spanish and French market. For the English market, the number of commenters kept increasing along all the series. The gap between the English and the other two markets, similar at the beginning of each series, became bigger and bigger episode by episode showing that the snowball effect in the English market was bigger. However, in a small size market, as the Spanish and the French ones, the snowball effect was not so evidently observed. Actually, the English market is 2.98 times bigger than the Spanish market and the latter was 2.45 time bigger than the French market. This result proposes that market size affects the process of becoming popular. Concretely, for the same emotional experience, its effect on the accumulation of fans is higher the bigger the market size.

Our findings provide evidence that snowball effect is observed particularly in bigger markets represented in this research by English comments. To further investigate how the snowball effect evolves during the social process of sharing emotional experience, we analyse the communication patterns among communicators (central communicators in the network of interactions). The actors are divided into popular, middle popular and low popular based on the number of comments they received. The results reveal distinctive interaction networks for popular and middle popular actors characterized by the presence of central communicators who interact multiple times with other individuals. Central communicators are absent from low popular actors.

In detail, the social network for popular actors is characterized by a clear division between central communicators and the remaining communicators. The results allow revealing the key role played by the central communicators. Central communicators place themselves in the middle of the crowd when they are commenting. Most of these central communicators comment more than 700 times or even 1400 times. Like other commenters, they are speaking freely about how they enjoy like "I love this drama". But interestingly they are very aware of the fact that she/he is watching Korean TV series surrounded by many other viewers on social TV. They use expressions such as "Comments, calm down" or "this is weird, huh everyone?" which implicitly show how central communicators are aware of their role within the social TV viewers' community. Central communicators are not afraid to talk on the stage. They suggest something to pay attention to while watching TV together as "I don't think they get along, guys!" or "what u guys talking about?? This song is amazing", "who else likes the hug more than the kiss?" Central communicators also take a position as a ruler who keeps the guideline for the appropriate behaviour such as being polite to each other, not ruin the TV viewing experience by laughing at the unsuitable moment. If someone breaks this tacit agreement central communicators reply directly to him/her saying that "Don't do spoiler", "What is your problem? Just leave". When central communicators are watching TV, they sit in the middle of the spectators and they build a special atmosphere which makes the spectators feeling as if they are inside a common virtual theatre together. Central communicators keep laughing, booing, crying, and express how they enjoy the media products actively and continuously in public. By doing so, they contribute to the explosion of emotions on top of the emotional context of media. The emotion expressed by central communicators generally triggers similar emotion in other viewers. This emotional contagion amuses viewers and relieves anxiety. Moreover, it seems like the central communicators are acting as caregivers. They respond many times such as "me neither, me too, same here, right? that is my thought precisely". Through this agreement, the affective similarity among audiences goes up together with a strong sense of belonging and understanding.

By socializing with other individuals, central communicators keep the conversation going on, thus contributing to the growth of the community of fans. Thus, the central communicators act as attractors for the entry of new commenters and for more active communication among the viewers. In other words, central communicators create a fertile social interaction where commenters are welcome to get involved in the conversation and to share their emotional experience by watching the same favourite actor's performance. It is interesting to draw the parallel between the role

of a central communicators nowadays and the one played in the traditional media in the promotion of artists. Both play a central role promoting the artists, but now the individuals promote the artists through the social networks (communication in many directions), not the labels through the traditional media (one direction communication). On the other hand, more central communicators are found among the communicators for middle popular actors. Accordingly, conversation and shared experience about the actors are divided into several small subgroups interacting among them but less across them. This pattern of interaction suggests that in social media more artists can promote their artwork and live as an artist despite receiving limited attention (A. B. Krueger 2005). Eventually, in the interaction network for unpopular actors, the big central communicators are absent. Very few conversations are present without central communicators trying to encourage or promote interaction and sharing among the viewers.

The structure of the social networks for the three levels of popularity can be interpreted as progressive stages of the snowball effect of becoming a popular artist, from low to high popular. The actors' capabilities of generating intense emotional experience among their audiences transform their fans' interaction networks, from isolated networks to networks with few central communicators but interacting with many other individuals. We call this process the Big Bang Theory of Stardom which transforms the structure of performers' social network of fans. In detail, in the first stage of the stardom process, actors are not able to generate strong emotional intensity among their viewers. Hence, the conversation about the actors hardly takes place and central communicators in the performers' fan social network are almost isolated in the process of exchanges their emotional experience of the performers. When some of these performers provide the experience of stronger emotional intensity, the structure of the social network of individuals' interactions expands and many central communicators start appearing. The multiple interactions among central communicators provide the channels for the social process of sharing experience about the actors to explode. Eventually thanks to this social process, few actors become popular and superstars (though more than before). In this last stage, the interaction pattern is ruled by a few central communicators who become central poles of the conversation. Central communicators strengthen and focus the viewers' attention and discussion around popular actors. Finally, the emotional experience of the performers becomes even stronger and the interaction is expanded to a large scale.

Conclusions

Taken altogether, the results of this work provide evidence that stardoms are fostered by a social process of sharing the emotional experience of performers fuelled through a snowball effect. However, the size of the market plays an important role in the strength of the snowball effect: the bigger the market size market, the stronger the snowball effect. We showed that the structure of the social process of sharing experience changes according to the stage of performers' popularity. We proposed a Big Bang Theory of popularity to explain the process of changing the structure of the social process of sharing experience. At first, the structure of the social process is formed by isolated individuals related to many low connected individuals with few interactions. Eventually, the interaction is centralized by a few individuals with dense interactions with many other individuals, changing the structure of the social network of interactions. According to this findings popularity is fuelled by the audience' strong emotional experience: being the first performer to initiate the social process of stardom, the more chances the performer has to become popular. Therefore, it is of paramount importance that actors get their initial market as big as possible in order to stimulate the snowball effect of the social process of sharing the emotional aesthetic experience which facilitates the formation of central communicators interacting with many other individuals.

VI CONCLUSIONS

Anyone who has never made a mistake has never tried anything new

Albert Einstein

General conclusions

This thesis aimed to provide a detailed account of global audiences' experiences and behaviour when consuming foreign media products from non-western countries through new media called social TV. In order to capture the audiences' behaviour, we had to scrape real-time comments typed by viewers while watching TV series through social TV. We employed new quantitative methodologies for big qualitative data to describe and interpret emotions, topics, and the networks of interrelations among the audiences.

The data stemmed from actual audiences' comments that express their experience while watching Korean TV series broadcasted through online TV streaming platforms. A large set of viewers' textual data (i.e. real-time comments) was explored in order to describe the emotional reaction of audiences, the topics dealt with in their comments, and the networks that described the interaction among them through a social TV platform. This research represents a novel attempt to capture, describe and interpret audiences' real-time experience by adopting big data analysis methods. To explore the potentialities of the proposed research methods, viewers' real time comments in three different languages, English, Spanish and French namely, were considered.

First, we employed *sentiment analysis* to identify audiences' emotions expressed in their comments during TV viewing and to measure their intensity. The results showed a positive correlation between the emotional intensity and the media popularity even though the emotions expressed in the three linguistic groups' comments differ in intensity.

Next, we moved our attention to the content of the viewers' comments. We used *topic modelling* to identify words clusters in which the large body text of comments can be divided. We identified twelve topics. Remarkably, six topics were found to be directly related to different media characters of the Korean TV series, suggesting the possibility of assuming real time comments as actual expressions of parasocial interaction between the viewers and the main characters. The other six topics were interpreted as different sub-dimensions of parasocial interaction.

Network analysis helped us to describe and identify the presence of multiple conversations among the audience while watching TV series, which could strengthen the parasocial interaction with the media characters. Remarkably, audiences watching popular series seemed to be systemically interacting through a few big hubs that favour the development of parasocial interaction with popular actors. On the

contrary, the structure of the network interactions among audiences of non-popular characters was not based on a few hubs of central communicators.

The proposed methodologies were eventually combined to predict the success of media products and the popularity of their main characters is social TV based on the viewers' experiences and interactions. For the case of study analysed in this work, the results showed that successful media products were the ones capable of: 1) stimulating viewers' emotional reactions; 2) increasing viewers' awareness about their media characters; 3) stimulating audiences' opinions and judgments; and 4) changing the structure of the network of interactions among the audiences.

The research effort expressed in this work represents an example of an innovative methodology to analyse and quantify the consumers' experiences and behaviour in the new emerging environment of social TV by employing big data analysis tools. The approach can be applied not only to media products, as TV series on online platforms, but it can be also extended to different business sectors such as e-commerce.

Concerning the different aspects of digital audiences' behaviour covered in this work, the following specific conclusions are drawn. For each of the contributions, specific limitations are also outlined.

Emotion intensity and media success

The emotions expressed by real-time commenters of Social TV series were measured by sentiment analysis. In this work, we introduced this new methodology of *sentiment analysis* which can provide meaningful information about digital audiences expressing their comments in three different linguistic domains, including English, French, and Spanish. We measured the intensity of the emotions linguistically expressed as well as the way they are expressed.

The results of the analysis provided the evidence of an association between the intensity of emotions linguistically expressed in the viewers' comments and the popularity of the series. This relationship held true for all the three western linguistic domains considered herein, English, Spanish, and French. These findings suggested that social TV audiences in a global context shared their emotions with strangers and interacted with others in a digital space. By so doing, they contributed to the popularity of those audio-visual products. In other words, the greater the intensity of the emotions triggered by the episodes and the series, the more the audiences shared their experience, and the greater the popularity of the media product. On the other hand, we found differences in the emotional intensity linguistically expressed across

languages. The results showed that the emotions expressed in English comments were less intense compared to French and Spanish comments. On the contrary, the variance among the individuals' emotions expressed in each linguistic domain was greater for the case of Spanish and French commenters than for the English. In detail, positive emotions expressed in the Spanish language were more intense than those expressed in English and in French. On the contrary, commenters in French expressed negative emotions at a higher degree than commenter using Spanish and English. These results suggested that audiences from different linguistic families might differ in the intensity of their emotional expressions. However, despite the differences found in the intensity of the emotions expressed in the three languages, we found a greater similarity in the bunch of words used to express emotions in all three linguistic groups. That is, the emotions-in-practice were expressed according to the situation or the event that triggered the emotion. Remarkably, the words chosen by audiences to convey their emotional reactions were in fact similar regardless of the languages.

Even though sentiment analysis presented in this work is replicable not only for English but also for Spanish and French textual data, there are still unsolved limitations. On the one side, information about the social properties of the viewers, such as age, gender, nationality, education level, and their job, is important to infer the background of the emotions expressed by audiences. However, such information was not available at the time of this work: privacy policies imposed by public authorities and the social TV platform denied access to this data. The second limitation is directly related to the sentiment analysis methodology used to measure the intensity of the emotions expressed in comments. So far, advanced analyses tools, such as Stanford NLP, can catch the ironic meaning of a sentence but they can only be applied to English text data. Due to this limitation, for a comparative purpose, the simpler sentiment analysis method based on Bing Liu's approach was used in this work.

Topic modelling and parasocial interaction in the new media

After the study about the viewers' emotional reaction, the research focus moved to the contents of real time comments of digital audiences of social TV. *Topic modelling* was applied to analyse a large set of qualitative textual data. The scant look of the result provided evidence that comments in social TV can be interpreted as a form of parasocial interaction in a systematic way. We used topic modelling to identify the dimension of the parasocial interaction in a systematic way. The results can therefore fill the gap of studying parasocial interaction in a set of media production available in social TV platforms.

Previous research into parasocial interaction, most of which focused on TV studies, targeted a single TV program and its media characters. Instead, this work extended the analysis from a single media persona to multiple media personae from nine Korean social TV series. This comparative setting gave us the chance of evaluating the association of parasocial interaction with the media success by comparing the audiences' parasocial interaction with the media personae. Our findings throw new light on parasocial interaction in the context of watching social TV series and with their media personae. We identified different dimensions of parasocial interaction with several TV series and analysed their association with series popularity. We were able to identify the distribution of parasocial interaction dimensions according to episodes and series, and their contribution on the overall series popularity, finding evidence of a link between parasocial components and series popularity. The findings emphasized the role of media personae in the popularity of media products. Media personae played a key role in the parasocial interaction with the audiences thus influencing not only their popularity but also the one of the TV series. As a result, when audiences developed a strong tie with the series' media personae, the media likelihood of success was higher. Additionally, we investigated a possible link between TV series popularity and the dimensions of parasocial interaction. The distribution of the topics differed according to the series popularity, suggesting that popular series were the ones capable of triggering the following parasocial interaction dimensions among the audiences: cognitive, referential and criticism. On the contrary, in our case of study, dimensions such as behaviour, empathy, and expression of emotion were the least influential components. As already outlined for the sentiment analysis, also, in this case, the main limitation relied on the impossibility of accessing the audiences' social properties in order to measure their influences to control the strength of the dimensions of parasocial interaction popularity.

Communication networks among digital audiences

The last research effort was devoted to providing evidence about the social process behind becoming a superstar, also known as the theory of stardom. If superstars are socially constructed because art consumption is not an isolated activity but, on the contrary, is a socially shared activity, then we should find that the social network of interactions among the audiences of popular media characters should differ from the social network of interactions among the audiences of non-popular media characters. From the interactions among audiences' comments, we uncovered the structure of the network of their interactions.

The structure of the interactions network showed that the actors who provided

viewers with highly emotional experiences, encouraged viewers to share the experience through a few hubs of central communicators. The structure of networks showed that a snowball effect favoured the concentration of interactions through a few central communicators. The comparison of the structure of the networks of interactions among the languages revealed that the snowball effect was mediated by the market size. Among the three markets here considered, whose size was measured by the viewers' comments expressed in the three languages (English, Spanish, and French), the English market had more commenters than the Spanish and the French market. For the English market, the number of commenters kept increasing along with all the TV series, episode by episode. On the contrary, evidence of snowball effects for the Spanish and French market was not observed as if their limited size made it difficult for the snowball effect to develop.

To further investigate how the snowball effect evolved during the social process of sharing emotional experience, we investigated the *interaction network* among English commenters. In this process, we focused our attention on the main characters of each TV series assuming that the popularity of the actors represented the popularity of the corresponding TV series. The structure of the interaction networks was different according to the popularity of the actors resembling the progressive stages of the snowball effect of becoming a superstar. As the interactions increased due to the sharing of audiences' experiences the structure mutated from a network with almost no central individuals to a network with many interactions but channelled through a few central communicators.

We named this process the *Big Bang theory of Stardom* that transformed the structure of the performers' social network of fans. Actors performing in low popularity series were not able to trigger strong emotions among the viewers. This reflected in the structure of their network of audiences characterized by a few conversations among isolated commenters. As performers got more popular, the interaction network transformed itself into a network with a structure with some central communicators. The interaction was channelled through several small groups of these central communicators. Finally, when actors became popular the structure of the network of interactions of their audiences mutated again giving birth to capillary interaction channels among the viewers. In this case, the network showed a clear and simple structure based on a few central communicators acting as the channels of the interaction among the remaining individuals. These central communicators took the key role of keeping the conversation active, attracting new commenters and eventually contributing to the growth of the community of fans. If in the past the role of central communicators was taken by traditional media with

one directional communication channel to promote artists, nowadays the audiences play this role. Central communicators with their interaction network contribute to promoting their favourite artists based on a two-way interaction with feedback and response from other viewers and commenters.

Limitations

Limitations always accompany research advances. This work is not an exception, with both conceptual and practical limitations. Practical limitations derived from the difficulty of scraping online data due to many privacy restrictions. Information related to the individuals of real time comments was limited to their nickname, ID and their language setting. Data about audiences' geographic information, nationality, and social properties were not available. Therefore these findings could not take into account precisely the social properties of the audiences. The only available indicator was to assume their language setting such as English, Spanish and French-speaking group as a proxy of their socio-cultural context. However, this does not fully guarantee a homogenous cultural background. For example for Spanish comments, a different sociocultural background may derive for Spaniard commenters and Latin American ones. With more data on the individual's background, the analyses and the results could have been enriched by performing more deeply cross-cultural comparisons and depicting the behaviour of the audience according to each sociocultural context. Since an accurate comparison between audience cultural groups was not allowed, in this work, it was not possible to determine how individuals' sociocultural context influenced their interpretation of Korean TV programmes. For example, it would be interesting to discuss the influence of audiences sociocultural properties on the emotions expressed while watching the Korean series. Furthermore, it is worth remarking that apart from the data scraping restriction, data from social media comments have a problem of anonymity regarding the user's identification. Even though a user sets his language like Spanish, he might speak in English during the real-time commenting. This kind of confusion is out of the researchers' control and introduce an inevitable noise in the data analysis.

Recommendations for future work

In his recent book, Yuval Harari (2018) illustrates that in the near future, TV might be not only a device we are watching but also watching at us. Through his high-technological sense, the TV will see what we are searching and how we make decisions. After a while even though we forgot what we have seen, the TV will

not. In this case, the TV and not ourselves, will recognize our cultural tastes and preferences by analysing our behaviour. This turning point will not be confined only to the TV. High-technology devices and behavioural algorithms that interact with humans' behaviour will be everywhere from online shopping, to even deciding the best-matched partner according to our data. The technology is rapidly changing and contributing to making better decisions in our daily lives. Despite this process being commonly recognized by our society, a basic but fundamental question remains to be answered: do these behavioural algorithms interpret humans mind while making decisions and choices?

Research efforts could be devoted to analysing different data of consumers' behaviour in different forms not only with textual data but also with emotional reactions capable of offering a deeper understanding of human's decision making. In this respect, the methodology developed in this work offers one of the multiple possibilities to analyse behavioural patterns through new digital platforms such as social TV, social media, and e-commerce websites. The cross-cultural comparison of users in terms of social properties may contribute to enrich and increase the representativeness of the results. Future audience-consumer research will need to develop models to predict personalized audience behaviour and consumption patterns.

APPENDIX

APPENDIX A

Sentiment analysis comparison in R coding

Sentiment analysis

Over the last decade, an increased interest in sentiment analysis has emerged. Liu (2010; 2012) provides one of the earliest discussion of sentiment analysis. He introduces an opinion mining procedure, a computational study on people's sentiments based on their language expression in texts. In his discussion, Liu (2010) examines the various aspects of sentiment analysis: identifying the *subjectivity* of a sentence; uncovering the valence of the *sentiments* expressed in a text —positive, negative or neutral; detecting the *sentiment of targets* expressed in comments about products, services, or events; noticing the *sentiment of comparative* of a sentence; analysing opinions by searching with a given keyword about the specific topic; and how to deal with the problems of sentiment analysis and opinion in spam. Drawing on the work of Liu (2010) the field of sentiment analysis has widened towards identifying and measuring people' sentiments and classifying emotions into categories as joy, fear and anger and so on (Kiritchenko, Zhu, and Mohammad 2014).

The study of the *sentiment classification* has become a key aspect of sentiment analysis. Sentiment classification is conducted at two levels; *document–level* and *sentence-level*. The former considers the whole document as the basic information unit and observes the overall sentiments, while the latter applies to individual sentences. Sentence-level classification is more advanced than document-level sentiment classification because it focuses more on the opinion of targets and the sentiment of the targets. Later, the *feature-based sentiment* analysis has been considered as the third level of sentiment classification, known as the *entity and aspect level*. This level of classification directly analyses the sentiment related to the chosen aspect (Liu 2010; Liu 2012).

The sentiment words, also called opinion words, polar words or opinion-bearing words (Liu 2010), are the most important indicators for the sentiment analysis. These words are used for expressing positive or negative sentiments and *sentiment lexicons* are the lists of these words. Some lexicons additionally provide a sentiment score for measuring the sentiment intensity (Liu 2012; Kiritchenko, Zhu, and Mohammad 2014). There are several approaches concerning the development of

sentiment lexicons such as 1) *dictionary-based approach* using a small set of seed opinion words and adding synonyms and antonyms or 2) *corpus-based approach* starting with a set of opinion adjectives as linguistic constrains and connecting to additional adjective words. Despite the large corpus of sentiment analysis studies, there are continuous debates about the absence of a proper sentiment lexicon on which all researchers might agree (Liu 2010). Regarding these critics to sentiment analysis, several studies have developed a set of sentiment lexicons based on different approaches. Below we introduce four methods of sentiment analysis that use their own sentiment lexicons.

- *BING LIU METHODS*

Liu (2010; 2012) is the first to coin the name of sentiment lexicon (or opinion lexicon). His lexicon is divided by two polar words, positive sentiment words expressing desired states or qualities and negative words expressing undesired states of qualities. Several researchers have applied Liu' algorithms and lexicons. The sentiment score for each sentence is measured by summing the valence of each emotional word in the sentence, awarding +1 for a positive word and -1 for a negative word and 0 for the neutral words. In this dissertation, we also use syuzhet package which is based on a general-purpose sentiment lexicon from Hu and Liu (Hu and Liu 2004).

- *AFINN METHODS*

Nielsen (2011) has manually labelled a list of sentiment words graded in scales from minus five (negative) and plus five (positive). This lexicon contains 2477 English words (including a few phrases). He develops the lexicon especially for examining microblogs such as Twitter. Nielsen's approach looks for matches in the lexicon. He includes the Internet slangs acronyms and strong obscene words which are used widely in short informal text from the internet community. In some cases, the words are determined by in the context of Twitter's comment and the words with variable sentiments, such as "surprise", are excluded.

- *NRC METHODS*

Mohammad and Turney (Mohammad and Turney 2010) build the NRC emotion lexicon with two sentiments polarity (negative and positive) as well as eight classes of emotions (anger, fear, anticipation, trust, surprise, sadness, joy, and disgust) based on Plutchik (1980). The NRC lexicon includes 14000 English words: nouns, verbs, adjectives, and adverbs. One of the main purposes of this lexicon is identifying and evaluating emotional words classified in Plutchik's (1980) eight categories.

- *STANFORD CoreNLP*

This procedure is based on the natural language processing, NLP, tools which use an annotation pipeline system implemented on Java API (Manning et al. 2014) and distributed under the Stanford's CoreNLP package. This complex system of language analysis provides a high quality of linguistic analysis. NLP can be applied to any text such as the whole document rather than one single sentence. It recommends setting the texts' encoding as UTF-8. It is developed for the English language but could be developed for languages as well including Chinese, French, Spanish, German and Arabic. However, the sentiment annotator is only available for the English language. The sentiment annotator is based on Sentiment Treebank models (Socher, Perelygin, and Wu 2013).

Process of sentiment analysis

1. Segmentation into sentence

All the cleaned text is divided into comments by commenters with punctuation mark dots. Most of the commenters wrote one sentence but some commenters also wrote two or three sentences. All sentences are aligned with the commenter who wrote the sentences. This study employs the quantitative techniques to analysis sentiments of qualitative data composed by a large number of short comments. Only English comments are used in this capture due to the language limitation of sentiment analysis tools. At the end of this process, we get a large data frame of a cleaned text of comment from each commenter.

2. Emotion detection

For the work of this dissertation, we used *R Environment and Language* for Data Analysis (R Core Team 2016) with *syuzhet* package (Jockers 2014) and *Stanford NLP package* (Arnold and Tilton 2016). *Syuzhet* provides R code for Liu, Afinn, NRC, and Stanford methods. However, Stanford methods in syuzhet needs to be performed in iOS system (MAC) therefore we ought to use Stanford analysis separately. All these R packages ("Syuzhet", and "Stanford CoreNLP") extract tokens from each sentence and then by using these tokens they detect the valence of sentiments expressed in comments.

3. Emotional intensity assignation into each comment

The next step consists of measuring the intensity of the emotions expressed in the comments according to the four procedures (Stanford, Bing, Afinn, NRC). As a result, each comment may have four different scores according to the sentiment analysis method applied.

4. Emotional intensity assignation into episode or Series

During this phase, we measured the intensity of emotions expressed in comments, episodes, and series. The intensity of the emotions expressed during the episode was computed using the sum of the absolute emotion value of each comment during the episode. We used the same process for determining the intensity of emotions expressed while watching a series.

Finding

Trajectory of sharing the emotional experience

The measurement of emotions express according to the four procedures are presented in Figure A.1, A.2, and A.3. These figures show the temporal pattern of the emotional flow along the watching time of the TV series. The four different computed measures of emotions are displayed individually in a different colour: red (Stanford), green (Afinn), blue (Bing), and orange (NRC). Since our data are big data (at the most 5335 comments in a single series), we draw a smooth trend line of each procedure. The data of timeline (x-axis) is determined by the chronicle order of comments. The yellow vertical lines on the graphs show the division of each episode. The comparison of the four patterns of emotional flow suggests a similar pattern but different intensity. It shows that the conclusions do not change dramatically by choosing one method over the others, but we do not know which one is biased. Especially NRC and Afinn methods represent closer results to each other, followed by Bing. However, Stanford draws distinctive figures.

An interesting interpretation of these findings is that there are similar patterns according to the popularity of the series. All three series in the most popular category show many humps during the whole series viewing, while series in the middle-popular category show a strong bipolar pattern at the start and end of the series, but the emotions remain moderate in between. The intensity of the emotions expressed in this series also has few humps and not as frequent as the most popular series. The series in the low-popular category shows mainly a decreasing pattern. Audiences express positive emotions at the beginning of the series, but then the valence of comments became negative, and series 22978c presents a unique pattern similar to middle popular series' sentiments.

The Figures A.4 to A.6 concern the temporal expression of emotions while watching TV series (positive and negative). These figures provide a visual summary of the intensity of emotions by the episode in each series according to the three categories of popularity (Figure A.4 popular series; Figure A.5 moderately popular series;

Figure A.1 popular series emotion reaction in four sentiment analysis

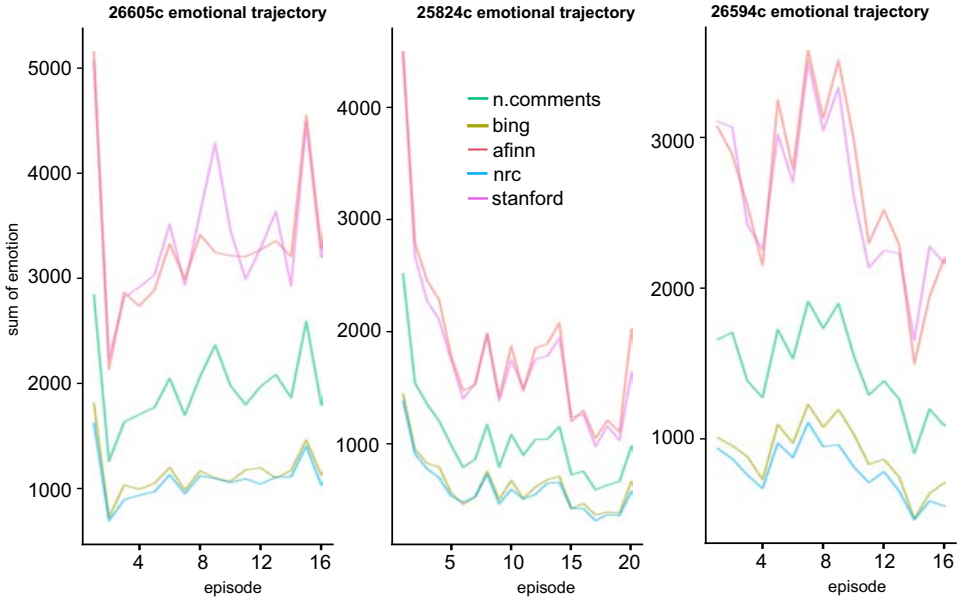


Figure A.2 mid popular series emotion reaction in four sentiment analysis

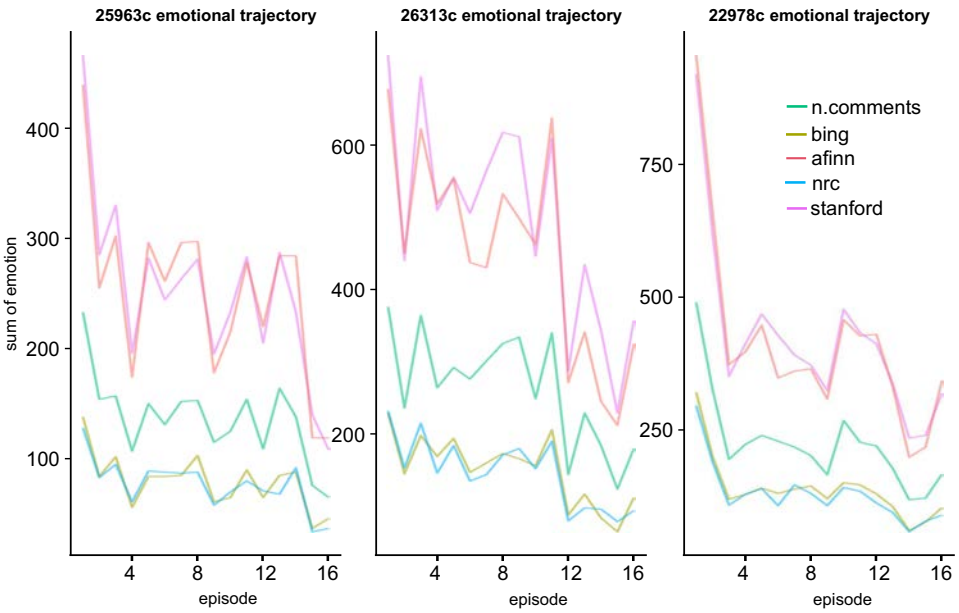


Figure A.3 low popular series emotion reaction in four sentiment analysis

Figure A.6 unpopular series). The intensity (sum) of emotion is defined as the sum of the absolute emotional value of each comment in the episode. Each graph has four lines with different colours according to the methodology applied: *Stanford (purple), Afinn (red), Bing (dark green)*, and *NRC (blue)*. Additionally, we show the *number of comments* of each series as the *green line*. Since Stanford and Afinn methods use a different range of emotional score (0 to 4 and -5 to 5, respectively) these two lines always score higher than Bing and NRC procedures. Hence, we are interested in the pattern shown not in the relative intensity of emotions. As expected, the patterns shown in Figures A.4 to A.6 display similar emotional intensity of episodes by series as the patterns shown in the previous figures.

Physical distance and emotion

Pennebaker, Zech, and Rimé (2001) reported that after sharing an intense emotional experience, the psychological distance between listeners and speakers is reduced. According to the authors, this interpersonal closeness allows the listener to show his/her sympathy with hugs or holding hands for example. Based on this concept, we tried to establish a correlation between nonverbal comforting behavioural words according to the popularity of a series. The results are reported in Figure A.7 for each language.

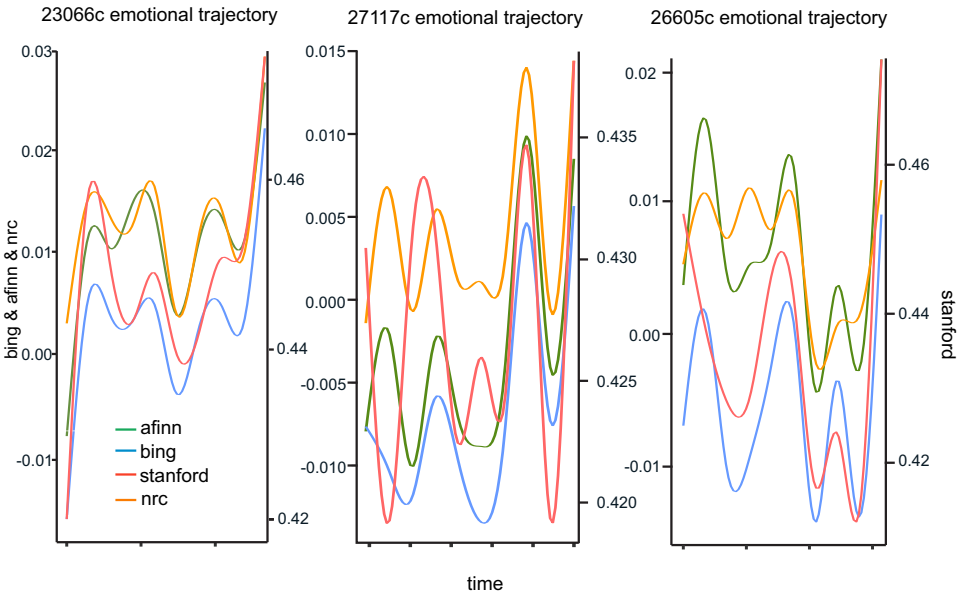


Figure A.4 popular series emotion intensity in four sentiment analysis

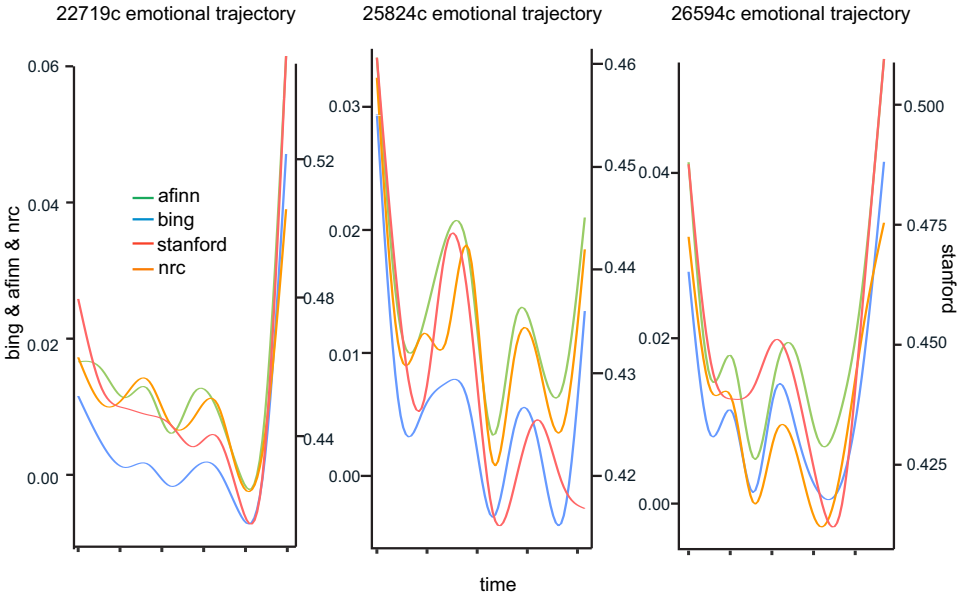


Figure A.5 mid popular series emotion intensity in four sentiment analysis

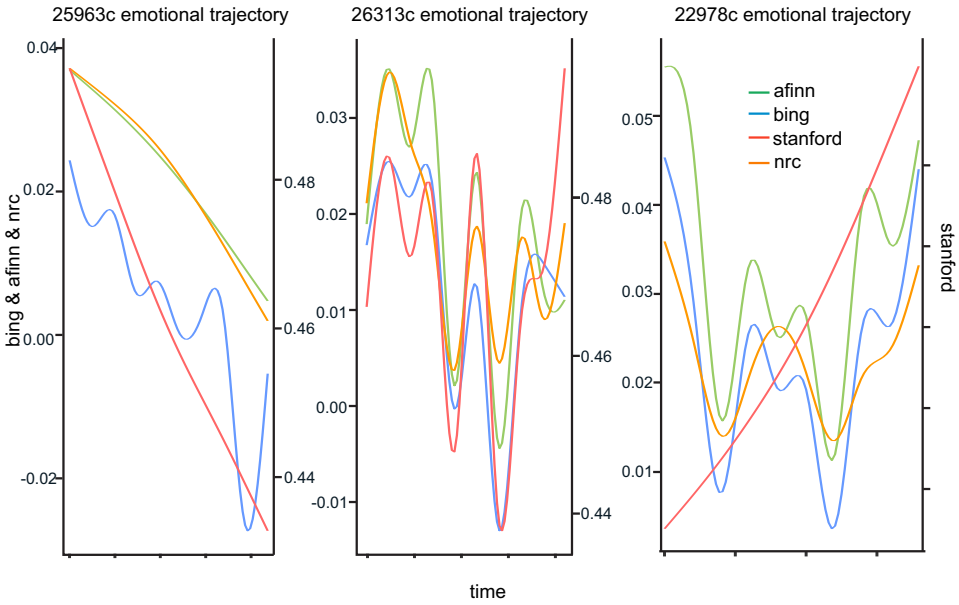


Figure A.6 low popular series emotion intensity in four sentiment analysis

Figure A.7 shows that nonverbal comforting words are more likely among popular series. This is highly linked to Pennebaker's (2001) explanation that emotional sharing boosts the interpersonal closeness with nonverbal comforting behaviours. These nonverbal comforting behaviours are present in three languages but with different proportions. For example, the word "besso" can be translated to "kiss" in English; however, its emotional load can be different.

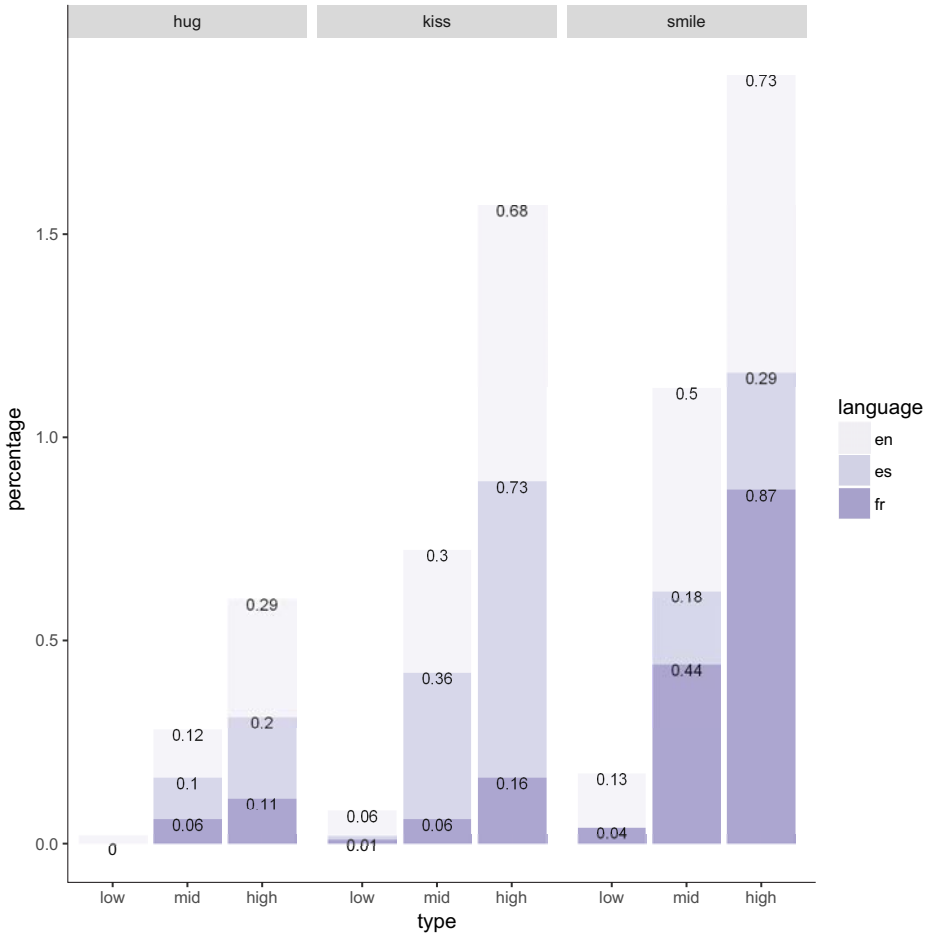


Figure A.7 Relationship between percentage of comments containing three nonverbal comforting behaviours words (hug; embesser; abrazar, kiss; besso ; bisou, smile; sonrisa; sourire) and TV series popularity

APPENDIX B

Following pages contain technical details and further discussion of topic modelling reported in chapter 4.

ANNEX 1

Table B.1 Legend of symbols

Notation	*Description*	*Value*
In LDA		
α	Dirichlet prior on the per-document topic distrubitions	
β	Dirichlet prior on the per-topic word distribution	
θ	Topic mixture dirichlet (α)	
θ_d	Topic distribution of document d	
θ_{dk}	Proportion of topic K in document d	
ϕ_k	Word distribution of topic K	
ϕ_{kw}	Probability of word W occurring in topic K	
W_d	Word collection of document d	
W_{di}	Word i in W_d	
Z_{di}	Topic assignment for word W_{di} from document d	
K	Number of topics	12
D	Number of documents	136
E	Number of episodes (1 to 16/20)	16/20
S	Number of Series	9
N_d	Number of words in document d	
N	$N = \sum_{d=1}^{D} N_i$ total number of words in all documents	
Indices		
d	Index of document	
k	Index of topic	
i	Index of words	
s	Index of series	
e	Index of episodes	
c	Index of category	
Derived		
e_d	Episode of document d	
S_d	Series of document d	
C_d	Category of document d	
$\theta_K^{[}e]$	Proportion of topic k at episode e	
θ_K^{s}	Proportion of topic k in series s	
$\theta_K^{s}[e]$	Proportion of topic k in series s at episode e	
$\theta_K^{(}c)$	Proportion of topic k in category c	
$\theta_K^{(}c)[e]$	Proportion of topic k in category c at episode e	

ANNEX 2.

4.1 Topic distribution over episodes

$$\theta_k^{[e]} = \frac{\sum_{d=1}^{D} \theta_{dk} \times \square(e_d = e)}{\sum_{d=1}^{D} \square(e_d = e)} \tag{1}$$

Where $\square(e) = 1$ if e is true and 0 otherwise

4.1.2 Hot / Cold Topic

$$r_k = \frac{\sum_{e=11}^{20} \theta_k^{[e]}}{\sum_{e=1}^{10} \theta_k^{[e]}} \tag{2}$$

$r_k > 1$ topic k has increased from episode 1 – 10 to 11 - 20, while $r_k < 1$ indicates a decreasing trend.

4.2 Series topic distribution

$$\theta_k^s = \frac{\sum_{d=1}^{D} \theta_{dk} \times \square(S_d = S)}{\sum_{d=1}^{D} \square(S_d = S)} \tag{3}$$

The similarity and difference between series by performing hierarchical clustering. Jensen-Shannon divergence (JSD) is employed for estimation of the difference between the signature (θ^u and θ^v) of two series (u and v) :

$$JSD(\theta^u, \theta^v) = \frac{1}{2} KLD(\theta^u, \overline{\theta}) + \frac{1}{2} KLD(\theta^v, \overline{\theta}) \tag{4}$$

Where $\overline{\theta} = \frac{1}{2}(\theta^u + \theta^v)$ and $KLD(\theta, \theta') = \sum_{k=1}^{K} \theta_k \log \frac{\theta_k}{\theta'_k}$ is the Kullback-Leibler divergence between two topic distributions θ and θ'.

In measuring the distance between two series, Jensen-Shannon distance, which is the square root of the Jensen-Shannon divergence as a metric (Endres and Schindelin 2003)

$$d_{u,v}^s = \sqrt{JSD(\theta^u, \theta^v)} \tag{5}$$

4.3 Series topic distribution over episode

$$\theta_k^{s[e]} = \frac{\sum_{d=1}^{D} \theta_{dk} \times \square(e_d = e, s_d = s)}{\sum_{d=1}^{D} \square(e_d = d, s_d = s)} \tag{6}$$

4.4 Category topic distribution

$$\theta_k^{(c)} = \frac{\sum_{d=1}^{D} \theta_{dk} \times \square(c_d = c)}{\sum_{d=1}^{D} \square(c_d = c)} \tag{7}$$

$$d_{u,v}^{c} = \sqrt{JSD(\theta^u, \theta^v)} \tag{8}$$

4.5 Category topic distribution over episode

$$\theta_k^{(c)[e]} = \frac{\sum_{d=1}^{D} \theta_{dk} \times \square(e_d = e, C_d = C)}{\sum_{d=1}^{D} \square(e_d = e, C_d = c)} \tag{9}$$

Cool/Hot topics

Cool /Hot topic analysis describes the temporal pattern of topic distribution according to the sequence of episodes (time) across all the series in order to describe how topics evolve along the span of episodes from the beginning till the end. A *hot topic* is defined as a topic whose distribution has increased from episode 11 to 20, while *cool topics* the ones showing decreasing distribution after episode 11 till the end. Both sets of topics are measured as follows: the sum of the distribution of topic k from the middle (episode 11) till the last (episode 20) divided by the sum of topics distribution from the beginning (episode 1) to the middle (episode 10). If the result is bigger than one it means topic k is a hot topic, otherwise, it is a cold topic (eq. 2).

Figure B.1 shows hot topics on the left side and cool topics on the right. Although two series have twenty episodes, Cool/Hot topics trend from episode 17 to 20 adds noise to the plot without adding anything meaningful for the interpretation. Thus, in Figure B.1 the results of Cool/Hot topics' pattern from episode 1 to episode 16 is presented. A noteworthy finding in the graph is that the *cognitive* topic (topic.6) increases at the ending part of the series, while in the graph of cool topics there is a gradual decrease of *expression of emotion* topic (topic.12) as well as the distribution of *referential* topic (topic.8) after episode 3. A possible explanation for the decreasing trend observed for topic 8 and 12 could be the higher tendency to talk about media personae as the time goes on. Also, the sharp drop of topic 12 can be affected by the rocketing increase of topic 6 at the end.

Figure B.2 displays nine graphs which represent the distribution of the probability of twelve topics in each series. The horizontal axis shows the sequence of the episodes, and the vertical axis, the probability of the topics. The findings are shown in Figure B.1 and point out that the most concerned dimensions of parasocial interaction in popular and middle popular series (series 1 to series 6) are their specific media personae (pointed with the black arrows). However, the results also provide a specific pattern which only appears in highly popular series. As shown in the first three graphs for series 1 to 3 distributions of the dimensions of *cognitive* (topic.6) and *referential* topics (#8) suddenly increase during along the series (indicated with red circles). On the contrary, for middle popular and unpopular series these two topics; *cognitive topic* (topic.6), *referential topic* (topic.8), are barely observed.

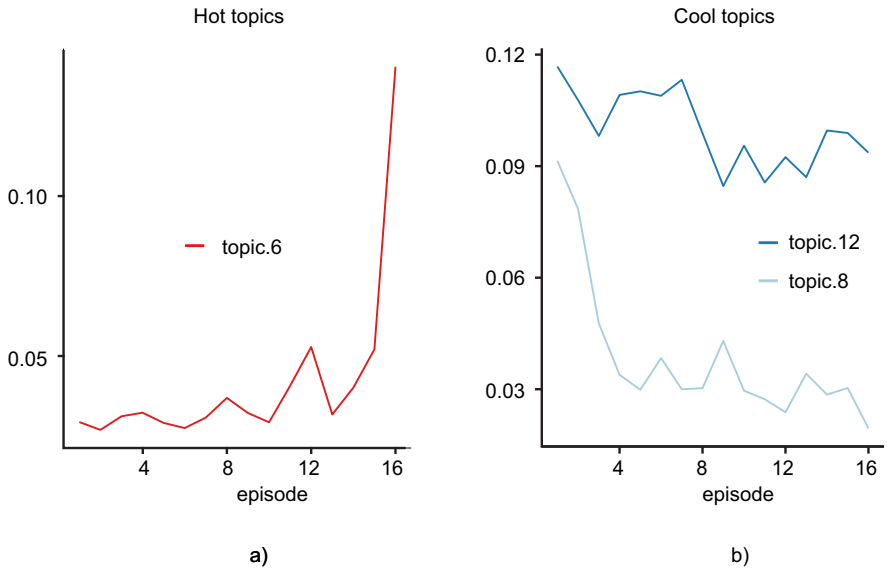


Figure B.1 Hot topics (left) / Cool (right)

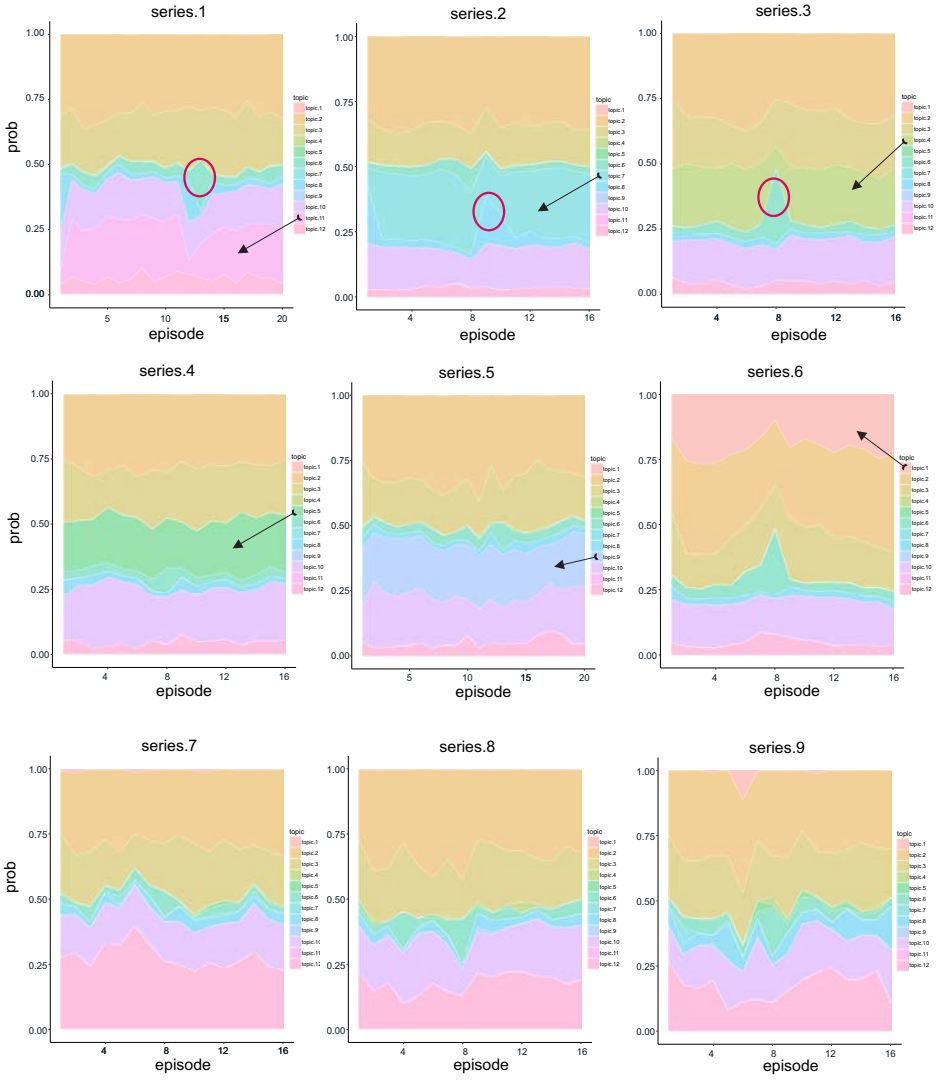


Figure B.2 Topics over episodes on series

EPILOGUE

Summary of my PhD

Science is organized knowledge. Wisdom is organized life _ Immanuel Kant

Now?

What would life be if we had no courage to attempt anything? _ Vincent Van Gogh

For?

The sole meaning of life is to serve humanity _ Leo Tolstoy

How?

Keep your eyes on the stars, and your feet on the ground _ Theodore Roosevelt

Curriculum Vitae

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Pulications

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Kim, Jinju and Lopez-Sintas, Jordi "Parasocial interaction in social media during screen viewing as a predictor of popularity of Korean TV series" (article is under review).

Kim, Jinju and Lopez-Sintas, Jordi "Big Bang Theory of stardom: The social process of sharing emotional experience of performers" (article is under review).

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