Article

Embitterment and Social Justice: Framing Changes in South Korea

Wonkwang Jo | Seoul National University*
Myoungsoon You | Seoul National University**
Dukjin Chang | Seoul National University

This research explores the social dimensions of embitterment by focusing on framings associated with embitterment and the framings' variation over time. Embitterment stems from the collapse of beliefs in social justice. Embitterment framings highlight and explain the causes of such collapse and vary across societies. We focus on embitterment framings in South Korea because many studies have reported prevalent embitterment among Koreans and the Korean society has seen the emergence of various embitterment framings during its rapid change since the 1960s. We identify the various types of embitterment framing in Korea by applying structural topic modeling to 9,309 news articles from 1990 to 2018. The results reveal two distinct Korean embitterment framings: a framing based on political justice and a framing based on system fairness. The latter is estimated to have increased in proportion over the period examined. It was inferred that this change in framing over time was caused by a change in people's views on the appropriate role of the state following the introduction of neoliberal values.

Keywords: *embitterment; mental health; social sentiment; social justice; South Korea; framing; structural topic model*

---

*First author
**Corresponding author

Introduction

This paper explores the sociocultural factors that interact with the emotion of embitterment. The feeling of embitterment, as shown in studies of post-traumatic embitterment disorder (PTED), has a great impact on individuals' quality of life, and is largely evaluated as negative. Embitterment can be produced by various social causes in various social contexts. This study explores these social backgrounds. In particular, we will examine the characteristics of embitterment framing in South Korea, that is, the form of social belief in justice associated with embitterment and the way it has changed over time in South Korea.

An increasing number of studies have been highlighting the importance of addressing negative emotions with destructive consequences on the health and well-being of oneself and others. Embitterment is one such emotion. According to Linden and Maercker, embitterment is a complex emotion which consists of "a sense of having been let down or been insulted and a feeling of being a loser, combined with a desire to fight back and, at the same time, a feeling of being cornered and helpless" (2011, p. 1). Linden et al. introduced traumatic embitterment as post-traumatic embitterment disorder (PTED), a subgroup of adaptive disorders. Like post-traumatic stress disorder, PTED patients can suffer from insomnia, hyperarousal, retreat from social encounters, and aggressive impulses toward others (Linden, Baumann, Lieberei, Lorenz, and Rotter 2011). PTED is not yet included in the 10th revision of the International Statistical Classification of Diseases and Related Health Problems (ICD-10), but PTED research has raised awareness of embitterment that can be experienced by the lay population in their daily lives, and how extreme embitterment can result in tragedy.

Embitterment is characterized by the strong involvement of sociocultural factors during its arousal. Existing literature explains that embitterment is brought about by negative life events which are considered unjust or unfair. The core of the experience lies in the violation of basic beliefs of justice (Dalbert 2011; Linden, Baumann, Rotter, and Schippan 2008). It should be noted here that, as pointed out by many sociological and historical studies, the basic beliefs of justice are socially formed and shared, not individually defined and held (Foucault 2002, 2013). Therefore, it can be assumed that beliefs of justice change depending on the type of society. For example, social justice in a neoliberal state differs in meaning with that in a developmental state. Active market intervention by the state may be seen as

justice in a developmental state, but it may be considered an injustice that disrupts the market order in a neoliberal state (Chang 2008; Hayek 2014a; Öniş 1991).

Given the above, it is presumable that, in principle, people's experiences of embitterment in a society may vary depending on the society's mainstream position on social justice and fairness and how it affects people's beliefs. For example, those who grew up in a society that values equality of opportunity would respond differently to the state's active welfare policies and market intervention compared to those who grew up in a society that values protection of the socially weak. That is, the former could respond with feelings of embitterment, while the latter may not. If so, it is imperative to track the specific characteristics of belief in a just world behind the experience of embitterment. Only then will the intervention to prevent embitterment and help recovery from embitterment be effective and efficient.

However, existing literatures on embitterment have mostly examined the concept through clinical perspectives, except for a few studies on workplace embitterment (Michailidis and Cropley 2017). In this regard, to the best of our knowledge, our research is the first attempt to empirically explore the sociocultural dimension of embitterment.

In delving into the sociocultural dimension of embitterment, we used the concept of framing to identify social justice concepts associated with embitterment and how they change over time. Framing refers to the process of selecting part of a phenomenon and making it more salient. This process diagnoses the core of the problem, identifies the cause, and presents value judgments and solutions (Benford and Snow 2000; Borah 2011; Entman 1993). As explained earlier, embitterment is the response to a violation of belief in social justice, hence, it must be accompanied by a particular framing, which pays attention to a particular concept of social justice among several candidates and explains why this sense of justice collapsed. Henceforth, we will call this particular framing, which is associated with the feeling of embitterment, the "embitterment framing." This framing process defines the nature of the experience of embitterment. As established by studies on framing, these are socially formed, exist in many forms in a society, and change historically as they compete with one another (Entman 2007; Lakoff 2006). We assume that embitterment framings also share these characteristics. This study seeks to shed light on the social background of embitterment by exploring embitterment framings and their social background.

Paying attention to the characteristics of framing associated with

embitterment is already being practiced in the medical field. The presence of a certain framing is already widely recognized and used in medical care. Wisdom treatment for PTED is a good example. Wisdom therapy is intended to encourage patients to change the way they view events that happen to them (Linden, Baumann, Lieberei, Lorenz, and Rotter 2011). The existence of this type of treatment and its effects demonstrate the existence of a particular framing behind the feeling of embitterment. What makes this study different from other patient analyses that have been conducted in the medical field is that we did not explore embitterment framings of only a small number of patients who are judged to have PTED; instead, we studied the embitterment framings of a whole society influencing the general population's feeling of embitterment.

More specifically, we endeavored to research the various embitterment framings observed in South Korea (Republic of Korea) and their dynamics, given that we believe South Korea is a suitable place for research on embitterment for two reasons. The first reason is that many studies have reported that embitterment is prevalent among Koreans. According to the study of Lee et al. based on a survey of the Korean population, 13.3% of all respondents had a PTED score higher than 2.5, the cutoff value of serious embitterment (Lee et al. 2017). The results are very high compared to the 2009 results of the measurements of Germans conducted by Linden et al. According to Linden et al., only 2.5% of the 158 samples collected from passengers aboard public trains, for an approximate measurement of the characteristics of the general population in Germany, had a PTED score of 2 and higher (Lee et al. 2017; Linden, Baumann, Lieberei, and Rotter 2009). The other reason is that we can assume that Koreans not only have high levels of embitterment, but also various kinds of embitterment. Korea has achieved economic growth in a very short time, and in the process, Koreans have experienced rapid changes in their social environment and values. Hence, an analysis based on the Korean experience has the advantage of vividly illustrating the dynamic change of the various embitterment framings as well as the consequent changes in the experiences of embitterment in a relatively short period of time.

We focused in particular on the social changes caused by the introduction of neoliberalism and the subsequent changes in embitterment framings in Korea. The International Monetary Fund (IMF) bailout system was one of the most dramatic social changes experienced by Korea since the 1960s. Since then, neoliberal values have been making their way into Korean society, thereby bringing about major changes in the concept of social justice

throughout various areas (e.g., role of the state and meaning of employment). Although there might be other social justice concepts and subsequent embitterment framings, this study will focus on the changes in embitterment framings due to the debilitation of the developmental state and the introduction of neoliberal values, considering that it was the most important social system change in South Korea and that it is a frequently observed global phenomenon. We believe our research will contribute to enhancing the understanding of embitterment in other societies undergoing similar changes.

In short, this study explores the feelings of embitterment existing in Korean society, the characteristics and changes of framings associated with embitterment, and its social implications. We think that research on the social context of feelings of embitterment is as important and necessary as research from a clinical perspective, such as the study of PTED. Examining the social context of the emotion will deepen the theoretical understanding of embitterment and present an efficient direction for intervening in social and clinical problems associated with embitterment.

We posit that our research has a different perspective from health communication studies that explore the media attitude on mental disorders (e.g., schizophrenia and depression) and the resulting social stigma therefrom (Houston, Spialek, and Perreault 2016; McGinty, Kennedy-Hendricks, Choksy, and Barry 2016; Wahl 1996, 2000). This study also uses newspaper articles as its main source of data. However, instead of focusing on attitudes relating to diseases that already exist, this study explores the nature of embitterment itself by delving into the sociocultural factors that contribute to its arousal, i.e., embitterment framings. Thus, beyond exploring social attitudes toward embitterment, this research is likewise focused on the social construction of embitterment.

Our research has a methodological advantage over studies that have previously dealt with similar topics. Several researchers have noted the sociocultural factors and their changes associated with the definition or treatment of diseases. David Armstrong, for example, explored how concepts that are taken for granted in modern medicine (e.g., human behavior and chronic diseases) have emerged historically (2009, 2014). However, previous studies have often relied on, using the concept of Kozlowski et al., "interpretivist text analysis, in which the researcher draws insights from a holistic deep reading of text" (Kozlowski, Taddy, and Evans 2018). Although many studies that adopt interpretivist text analysis have achieved meaningful results, the method cannot guarantee the research to be free from the

subjective bias of researchers. Our research, instead, utilized several text-mining methods, including topic modeling, to overcome such limitation and produce results in a more objective and reproducible way.

The key research questions are as follows.

(1) What kind of embitterment framings exist in the Korean experience, especially from the perspective of collective belief in the role of the state?

(2) How have the distinguished embitterment framings changed over time?

Data and Methods

Data

This research used newspaper articles that included the word "울분" (a Korean word for embitterment). We utilized text mining methods, including the Structural Topic Model (STM) (Roberts, Stewart, and Tingley 2014), to extract information from the news articles.

Newspaper articles about embitterment in Korea are suitable for studying embitterment framing in the Korean society, given that the reports including the word "울분" (a Korean word for embitterment) show what people consider as a situation causing embitterment at a given time and place. In Korean, "울분" (embitterment) is not a commonly used word to express one's feelings in everyday conversation. For example, it is rarely said that "I am embittered" ("나는 울분에 차있다") in Korean. Instead, it is used to describe or assess a situation from a distance. Therefore, when news articles, whose main purpose is to describe various events, include the word "울분" (embitterment) in their title or body, they often contain the logic of why people consider an event to be a situation that causes embitterment, which enables us to identify how embitterment is framed. Furthermore, by using newspaper articles that came out over a long term as data, we expected to be able to detect changes in embitterment framings.

The news database website BigKinds (https://www.kinds.or.kr) allows users to search and collect keywords from the texts of major Korean dailies published since 1990. This study collected all news articles containing "울분" (embitterment) in the title or body from six major dailies during the 1990-2018 period. We analyzed the social and historical changes of embitterment

framings over time using this data. We collected a total of 10,223 articles from the *Kyunghyang Shinmun*, the *Hankyoreh*, the *Hankook Ilbo*, the *Segye Ilbo*, the *Seoul Shinmun*, and the *Kukmin-Ilbo*. Various pre-treatment procedures were applied; duplicate articles were removed, and plural words
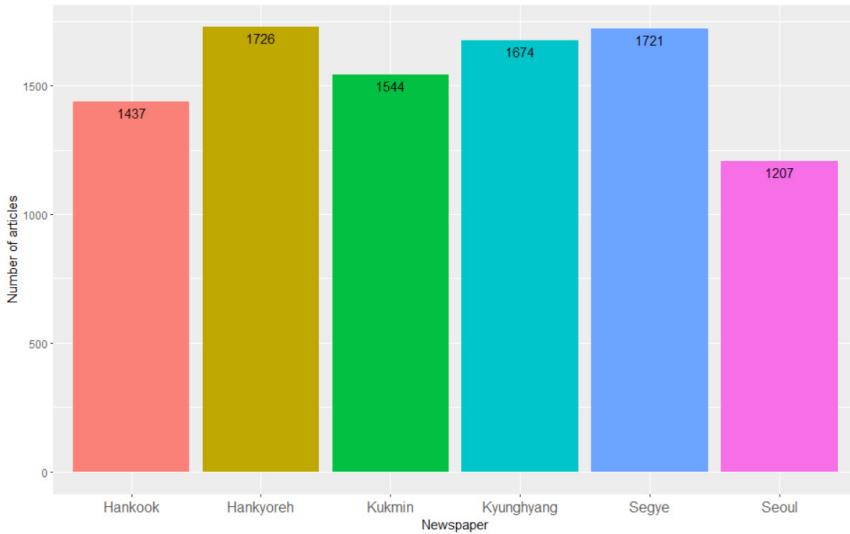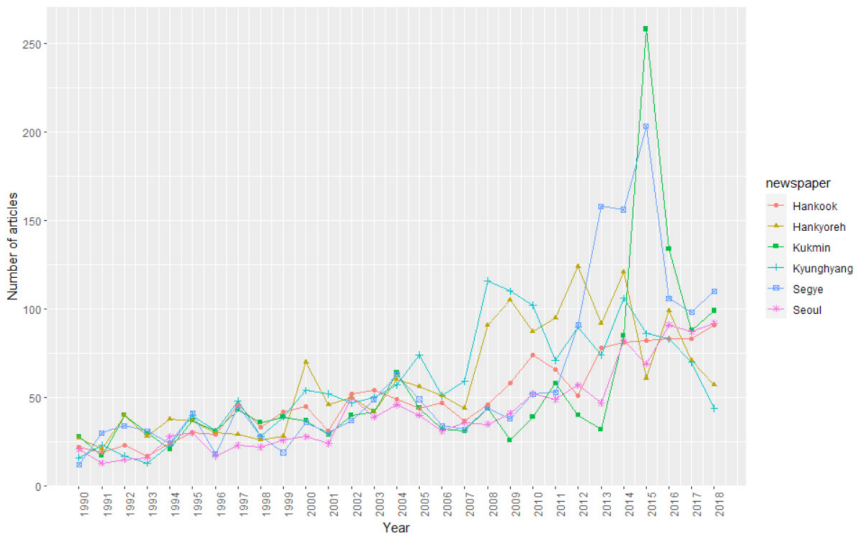

Fig. 1.—Number of articles by newspaper

Fig. 2.—Number of articles by year and newspaper

were converted to singular form. A total of 9,309 news articles were used for analysis. The number of articles per newspaper and the number of articles per year are shown in the graphs below (figures 1 and 2).

Methods

We endeavored to answer the research questions by applying the structural topic model (STM), a topic modeling method. STM is an adequate method for extracting framings from a large volume of text data in a relatively objective and reproducible way because it is essentially a statistical method and measures the key information on framing. The keys to framing are (1) selecting and highlighting certain aspects of a phenomenon, and (2) connecting them to form a specific meaning. These two key points of framing are expressed in language data as (1) frequently appearing words and (2) their networks. STM automatically detects these two features; therefore, it was chosen as our main method.

STM estimates multiple topics and distributions of topics in each document in a large collection of documents using statistical model (Roberts et al. 2014). A topic in STM means a probability distribution of words which is most likely to generate a text collection given as data. We can infer the framing from a topic because the probability distribution of words demonstrates which words frequently appear and which words are likely to appear simultaneously in a document. For example, let us assume there is a topic (a probability distribution of words) extracted from embitterment articles as follows: [opportunity – .05, equal – .05, justice – .03, employment – .03, privilege – .02, …] From this topic, we can see that "opportunity" and "equal" have high probabilities, which means that they are important aspects of embitterment in the document in which this topic is prevalent. In addition, we can see that "opportunity," "equal," "justice," "employment," and "privilege" form a cluster, from which we can induce the meaning of "equal opportunity in employment." It is rational to assume that the articles including this topic show a specific embitterment framing, or at least a hint of an embitterment framing. Thus, we can infer embitterment framings from topics.

Beyond estimating a single topic, STM extracts multiple topics from text collections and estimates a probability distribution of topics in each document. That is, STM assumes that each document is composed of multiple topics. This is a realistic assumption because a document usually has various themes or points. Using this information (probability distributions of topics in documents), we can find the proportion of each topic in an

individual document or set of documents. If the topic provides valid information on framing as mentioned earlier, the proportion of topics could be utilized for estimating the proportion of different framings in data.

From the perspective of the parameter estimating process, STM is a hierarchical Bayesian model. STM assumes prior probability distributions for the topics and topics' distributions. STM then takes into account the data and updates the prior distributions into a posterior probability distribution for topics and topics' distributions in each document, and it next determines the best topics and topic distributions from the posterior probability distribution. To be precise, many topic modeling methods developed after latent Dirichlet allocation (LDA), which is the most widely used topic modeling method (Gerlach, Peixoto, and Altmann 2018), share the above-mentioned process. Compared to other methods' estimation processes, like latent semantic analysis (LSA) or probabilistic latent semantic analysis (pLSA), this process has advantages in producing topics that are easy to understand and avoiding overfitting (Blei, Ng, and Jordan 2003; Hofmann 2013).

In addition to topic extraction, STM estimates how the proportion of topics in a document changes depending on the document's metadata (Roberts, Stewart, and Airoldi 2016; Roberts et al. 2014). Metadata refers to various types of information included in a document such as publication time or writer. It is possible that a specific topic's proportion in a document could increase or decrease depending on the document's metadata. STM estimates the relationship between a topic's proportion and the metadata. Since one of the purposes of this study is to identify changes in embitterment framings over time, STM is the appropriate method for our research, as it allows us to estimate the relationship between articles' publication time and topics' proportions in the articles. That is, this research estimated changes in the proportion of the discovered topics over time using STM.

The time variable included as a covariate in our structural topic model is the year (1990-2018) in which each article was published, and the model estimates the expected proportion of each topic in each year, in addition to estimating topics. This type of model allows us to measure the growth and decline of framing over time. For example, if a topic is estimated to increase in proportion in entire news articles over time and the topic can be interpreted as a particular type of framing, the result of the change in the proportion of the topic over time can be interpreted to indicate that the framing is emerging as mainstream over time.

Only words appearing at least 10 times in the entire set of documents were utilized in the construction of our model, and numbers were also

excluded. The total number of words utilized in our model is 21,144, and the number of documents is 9,309.

To summarize the results of STM and obtain additional information on embitterment framing, we categorized the extracted topics into relatively cohesive groups by applying the Walktrap algorithm, which is a community detection method in networks (Fortunato 2010; Fortunato and Hric 2016) (Walktrap's random walk step was four). While STM provides a great summary by extracting dozens of topics from thousands of documents, the dozens of topics are still a lot of information for a person to grasp the overall semantic structure of documents. We not only tried to obtain information about embitterment framing from the topics, but also tried to identify the grand themes that penetrate the topics and obtain additional information about embitterment framing from them. To this end, the correlation among topics was used to form several sets of topics.

One of the advantages of STM is that it estimates the correlation of topics. A positive correlation between topics indicates increased probability that one topic will appear when the other does. Assuming positive correlation is a link between topics, we can create an overall network between topics. If we identify a relatively more cohesive sub-community from this whole network using community detection algorithms, we can interpret these topics belonging to the sub-community as frequently co-occurring topics in the same document. We assumed that topics that frequently appear together constitute a grand theme, and deduced grand themes from the sets of topics. Then we tried to get additional information about the embitterment framings that exist in entire news articles.

We chose the Walktrap algorithm among many algorithms for network community detection because it is resilient to the resolution problem and shows competitive performance at the same time (Fortunato and Hric 2016; Yang, Algesheimer, and Tessone 2016). As a result, several sets of topics can be identified, which not only summarizes the topics once more, but also provides valuable additional information for interpreting embitterment framings. In fact, the meaning of individual topics is rather narrow in focus; they do not provide enough information on macro-level framing. Therefore, classification of topics into groups with relative cohesion becomes valuable additional information for interpreting embitterment framings.

In short, we use STM and Walktrap algorithm to extract topics and clusters of topics that provide information on embitterment framings in Korean society, from which we interpret the characteristics of the embitterment framing in Korean society. At the same time, we analyze how

these topics change in proportion over time using STM. Using the results, we estimate how the embitterment framings change over time in Korea.

We used R and several packages in R for analysis and data preprocessing, including the stm package (for STM), tidyverse package (for data wrangling and visualization), tidytext package (for data wrangling), igraph package (for network analysis), and ggraph package (for network visualization).

Results

First, we extracted 50 topics from 9,309 newspaper articles. The number 50 was determined on the basis of held-out likelihood (Wallach, Murray, Salakhutdinov, and Mimno 2009). See Appendix 1 for details. After a topic is extracted, it must be given a meaning by researchers since it does not have a meaning in itself. It is just a probability distribution of words. Therefore, the topic must be interpreted based on words considered to be important in the topic and documents in which the topic takes up a high proportion. Table 1 shows examples of topic interpretation.

TABLE 1
AN EXAMPLE OF TOPIC INTERPRETATION

Title of news article	Keywords	Topic interpretation
"Why didn't the rescue worker break through the window when my dead wife struggled so hard that her fingerprints were lost?"	Highest Prob: accidents, civil servants, sites, outbreaks, fires, buildings, safety, verification, subways, work FREX: Fire, firefighter, fireman, civil servant, accident, dead body, Daegu subway, homeless, electric car, Sampoong department store	Embitterment about safety accidents and safety management systems
The fire safety check which had held a month before the fire was useless.		
The perforated life-saving system has been confirmed once again. Accidents are repeated in every major accident.		
Another terrorism, safety numbness.		
The blaze, which started from the fourth floor, quickly spread to the 38th floor on the outer wall of the central passage.		

The actual interpretation of the topics was based on the titles of 10 documents judged to be of high importance for each topic and 40 words judged to be important for that topic. Important words for each topic were judged based on high probability (20 words) and a high FREX (frequency-exclusivity) score (20 words). A FREX score is an index determining importance of words considering exclusivity of the words. For example, a word which has high probability in every topic could not give useful information and could not have high FREX score. Table 2 is the result of repeating this interpretation process for 50 topics.

TABLE 2
TOPIC INTERPRETATION AND CLUSTER

Topic	Interpretation	Cluster
8	Embitterment in the context of sports game (1)	1
18	Embitterment in the context of sports game (2)	1
22	Embitterment in the context of sports game (3), especially baseball	1
4	Embitterment related to judicial judgement (e.g., dissatisfaction with sentence)	2
10	Tragedy and embitterment involving low-income families and separated families	2
11	Embitterment of victims of various incidents and accidents (sex violence, tyranny of professors, humidifier disinfectant accidents)	2
21	Micro and personal relationships, and related embitterment	2
23	Social problems related to children and adolescents (e.g., child abuse, bullying), and related embitterment	2
24	The sorrows and embitterment of the young generation in Korean society	2
41	Social problem related to education system (e.g., university entrance exams), and related embitterment	2
43	Infectious disease (e.g., MERS) control system, and related embitterment	2
44	Embitterment mentioned during a Christian sermon	2
7	The determination and enforcement of government policies, and related embitterment	3

15	Clashes between civilians and police forces, and related embitterment	3
26	Candlelight protests, and related embitterment	3
27	The Movement for Democracy, including the 5.18 Democratic Uprising in Gwangju, and related embitterment	3
31	Death of a celebrity, and related embitterment	3
36	Embitterment about safety accidents and safety management systems	3
49	Conflicts created by government intervention or nonintervention in the market, and related embitterment	3
50	Embitterment mentioned in the middle of a food description, and embitterment related to the restaurant business	3
1	Embitterment mentioned during the introduction of literary works	4
17	The tragic historical events of the Joseon Dynasty, and related embitterment	4
28	Anti-Japanese Movement during the Japanese colonial period, and related embitterment	4
29	Memories of buildings and space, and related embitterment	4
35	Embitterment mentioned in stories about Korean history-related works (e.g., historical novels)	4
39	Embitterment mentioned in description of paintings and art exhibitions	4
46	Embitterment mentioned in explanations of literary works	4
3	Political strife in the political arena, and related embitterment	5
12	Conflicts and embitterment within the National Assembly	5
32	Embitterment related to the prosecutor's investigation and prosecutor's office	5
33	Political conflicts related to elections (e.g., conflicts over nomination), and related embitterment	5
37	An ordeal of a nation or a national economy, and related embitterment	5
38	The power of the press, and related embitterment	5
45	Government corruption, and related embitterment	5

9	Diplomatic issues with China and North Korea, and related embitterment	6
42	The tragic incident involving the US military forces, and related embitterment	6
47	Social issues related to refugees, immigrants, and foreign workers, and related embitterment	6
48	International issues, and related embitterment	6
6	Conflict between labor and management, and related embitterment	7
13	The social movement for distribution of justice, and related embitterment	7
34	Power trips and embitterment	7
2	Japanese military sexual slavery, and related embitterment	8
30	Experience of Japanese colonial rule, such as forced labor, and related embitterment	8
16	Local war battle with North Korea at sea, and related embitterment	9
40	Embitterment about a tragedy that a nation is responsible for, and related embitterment	9
5	Embitterment mentioned in introductions of pop music or pop culture	10
19	Embitterment mentioned in introductions of plays and acts	10
20	Embitterment mentioned in descriptions of films	10
14	Embitterment mentioned in an article on entertainment programs	11
25	Embitterment mentioned in TV drama descriptions	11

As mentioned, we divided these 50 topics into 11 clusters using Walktrap algorithms, whose random walk step was four. The third column of Table 2 displays the corresponding information, and Figure 3 is its visualization as a network image using the Fruchterman Reingold layout.

We assigned an interpretation to each cluster, penetrating the topics belonging to the cluster. As a result, more than 9,300 documents were summarized into 11 themes. The results are shown in Table 3.
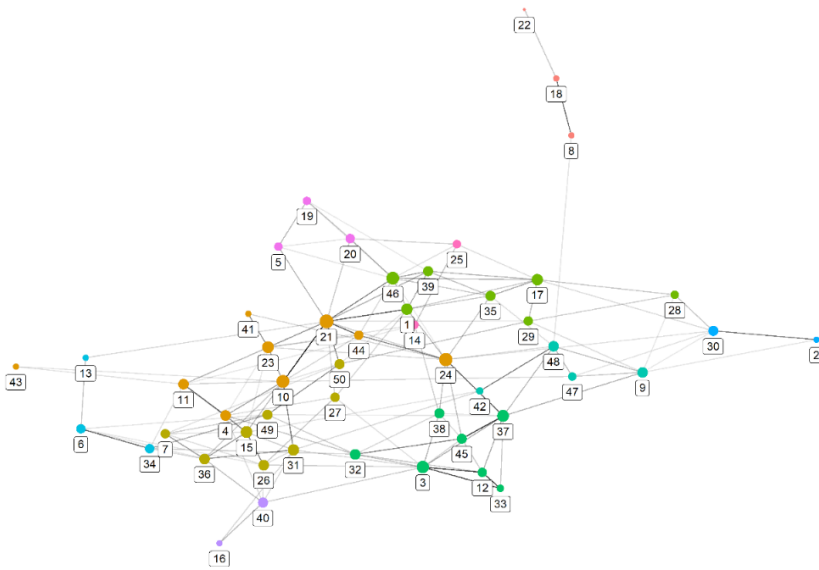
Fig. 3.—Topic network visualization

TABLE 3

Topic cluster interpretation

Cluster 1	Embitterment related to sports
Cluster 2	Embitterment or damages experienced by individuals or vulnerable groups in the face of society and state which are defined as a set of rules or system
Cluster 3	Embitterment and tragedy resulting from the state's policy decisions and active governmental interventions
Cluster 4	Embitterment related to art and historical events
Cluster 5	Embitterment expressed in political conflicts or national embitterment
Cluster 6	Embitterment related to another country's social problem, or foreign affairs with other countries
Cluster 7	Embitterment related to labor-management relations and work life
Cluster 8	Embitterment related to experiences under the Japanese colonial rule
Cluster 9	Embitterment related to the *Sewol* ferry disaster, and embitterment related to the engagement with North Korea
Cluster 10	Embitterment expressed or mentioned in popular culture (art, pop music)
Cluster 11	Embitterment in entertainment programs and TV dramas

When referring to extracted topics and clusters, the word "울분" (a Korean word for embitterment) is widely used in news articles in two main ways. The first is the purpose of observing and describing virtual experiences and emotions, such as those in artworks or TV dramas. The second is the narrative and expression of a tragedy experienced by people. Clusters 1, 4, 10, and 11 fall into the first category, while clusters 2, 3, 6, 7, 8, and 9 fall into the second category. Cluster 5 belongs to both categories.

Our interests lie in the second category because the category includes the embitterment that people actually experience. Among clusters belonging to the second category, cluster 2 and 3 deserve attention for two reasons. First, these clusters make up an overwhelming share of the total news articles examined. STM calculates the proportion of each topic among all documents analyzed, which could be combined into the proportion of each cluster. Figure 4 illustrates how clusters 2 and 3 of the second category of clusters account for an overwhelming portion of the total.

The second reason is that cluster 2 and cluster 3 demonstrate very different social justice concepts, and hence different embitterment framings. As mentioned, topics and clusters are important clues for measuring embitterment framings. Looking at these two clusters and the topics that belong to them, one can observe the different social justice concepts and
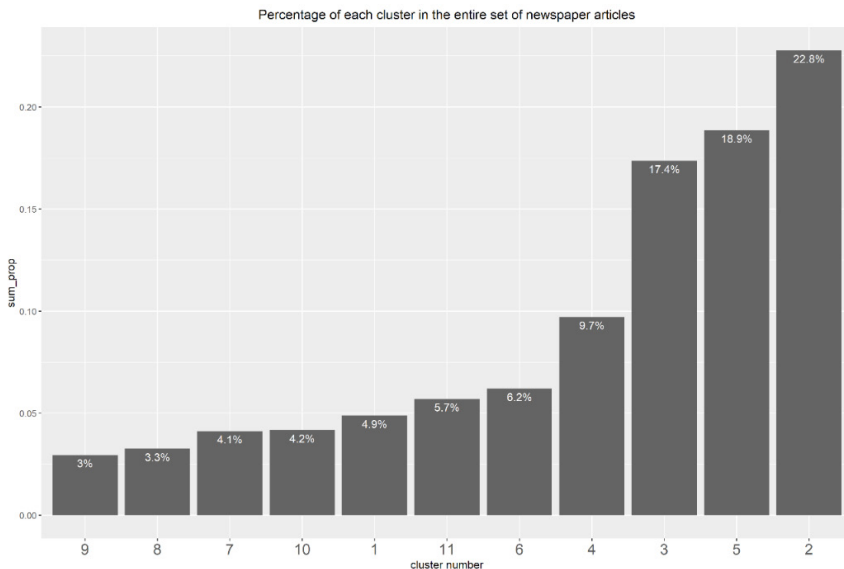

FIG. 4.—TOPIC CLUSTER PROPORTION

perspectives about the state. In many topics and clusters, emphases on different objects related to social justice are identified. In other words, there are different ways of explaining embitterment situations. Considering that embitterment is an emotional reaction to the collapse of social justice, it can occur for different reasons in different areas. This also means that there are different logics to explain embitterment and that there are different embitterment framings. In short, these two clusters demonstrate that multiple embitterment framings can exist and contain different logics and concepts of social justice and fairness.

Cluster 3 contains topics explaining the active policy interventions of the government, the tragedy this creates, and the resistance and embitterment it produces. The embitterment here is the anger over the nation's unjust or unjustifiable interventions. In this case, the state or government is considered an active entity that intervenes in people's lives or in the market with active policies, as demonstrated by topics of various rallies and demonstrations (topics 15, 26, 27) or government policy decisions and enforcement (topics 7, 49). According to these topics, the nation state's power is tremendous and greatly impacts people's lives, sometimes expressed as violence. In short, cluster 3 expresses the embitterment framing that finds the cause of the embitterment in the state's active unjust behavior and intervention. We will call this framing **"embitterment framing based on political justice."**

Cluster 2, on the other hand, is a collection of topics that assume the state and society as a set of rules or systems, not as an active actor. The embitterment described here refers to the tragedy experienced by powerless individuals, families, or vulnerable groups in the face of these systems and rules. Tragedy and resulting embitterment occur in areas where rules and systems are unreasonable or poorly managed. Examples include the issue of youth bullying (topic 23), the educational problem of entrance exams (topic 41), the problem of MERS (Middle East Respiratory Syndrome) quarantine system (topic 43), and various tragedies caused by the lack of proper regulations (topics 4, 11, 24). These are not caused by the state's active unjust actions as expressed in cluster 3. They are silent tragedies caused by the lack of adequate rules and systems. The embitterment framing expressed in cluster 2 finds the cause of the embitterment in the absurdity of the system, and highlights the void or irrationality of rules and systems. We will call this framing **"embitterment framing based on system fairness."**

These are surprising results, as each cluster consists of many logically consistent topics, even though the clusters and topics were all formed automatically. Topics and topic clusters were automatically extracted based

on data. Different concepts of social justice and the existence of different embitterment framings are not based on our prejudices or assumptions; they are the reflection of spontaneous discourse structure.

In addition, we estimated the changes in the topics' proportions over time, and based on these results, we estimated the changes in the topic clusters' proportions over time. As mentioned earlier, our structural topic model estimates proportions of topics considering the publication year of each document. We summed up the topics' expected proportions by year in each cluster to create clusters' proportion by year. Figure 5 shows the results of clusters 2, 3, and 5, which are the top three clusters according to proportion (Figure 4). Cluster 5 shows a decline over time. Clusters 2 and 3, which are the main focus of our analysis, show an interesting pattern. Cluster 3 first takes up a higher portion than does cluster 2, then decreases rapidly. Between 1997 and 2008, clusters 2 and 3 show similar slowly increasing tendencies. However, between 2008 and 2009, cluster 3 starts decreasing while cluster 2 continues to increase. After 2010, cluster 2 takes up a higher portion than does cluster 3.

Furthermore, we also attended to the proportion change of the main individual topics of clusters 2 and 3. Topic clusters effectively grasp the
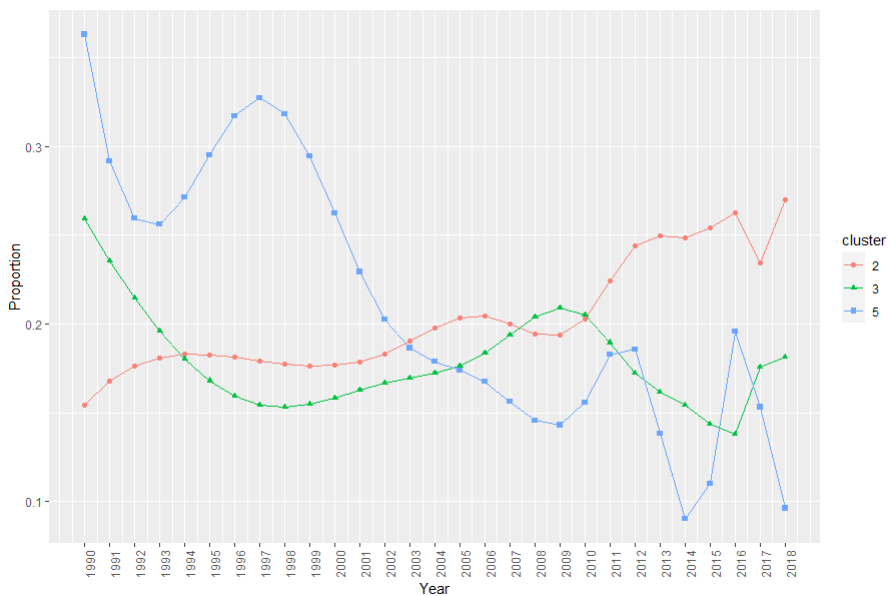

Fig. 5.—Cluster proportion change over time

overall discourse structure, but they also have a risk of errors. Topics with different meanings may be combined into a single topic cluster. In addition, when calculating the proportion change of a topic cluster by summing up the proportion of topics belonging to the cluster, variation patterns of individual topics may be lost. To avoid this kind of distortion, we analyzed the changes in the proportion of the major individual topics of each cluster, which we show above regarding cluster analysis.

We visualized the proportion changes of topics 7, 15, 26, 27, and 49 in cluster 3, which we used to analyze cluster 3. These proportions fluctuated over the study period (1990-2018). We calculated Pearson correlation coefficients between the year and the topics' proportion. Results show that the proportion changes for topics 7 and 27 have statistically significant negative correlations with years. See appendix 2 for details.

We also visualized the proportion changes of topics 4, 11, 23, 24, 41, and 43 in cluster 2 to analyze cluster 2. Many topics in this cluster show a trend of

topic

— 07: The determination and enforcement of government policies, and related embitterment

— 15: Clashes between civilians and police forces, and related embitterment

— 26: Candlelight protests, and related embitterment

— 27: The Movement for Democracy, including the 5.18 Democratic Uprising in Gwangju, and related embitterment

— 49: Conflicts created by government intervention or nonintervention in the market, and related embitterment
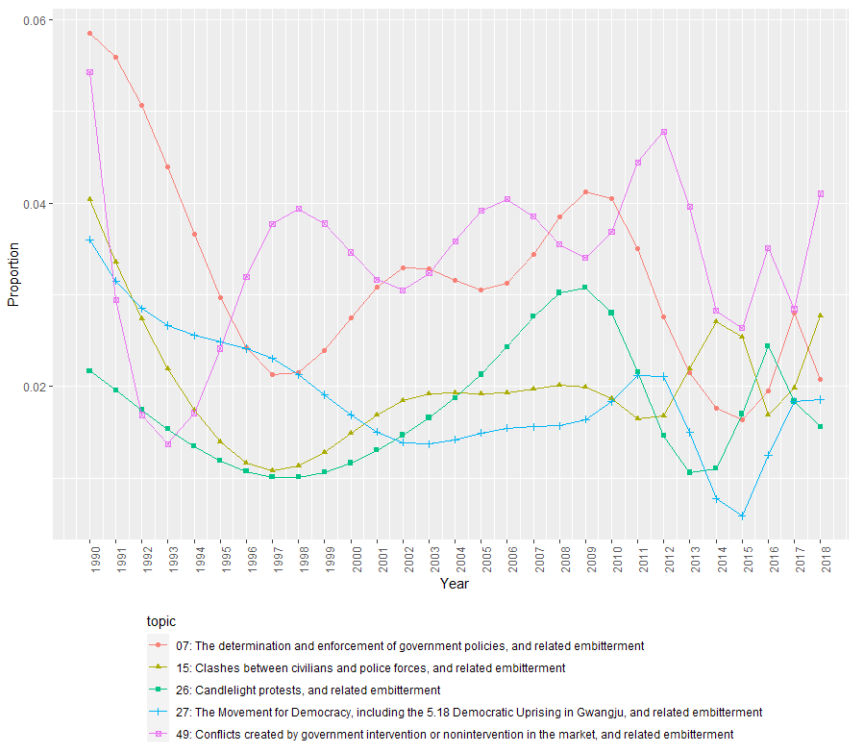
FIG. 6.—PROPORTION CHANGE OVER TIME OF THE MAIN TOPICS IN CLUSTER 3

increase. We calculated Pearson correlation coefficient between year and the topic's proportion. Results show that the proportion changes for topics 4, 11, 23, 24, and 43 have statistically significant positive correlations with years. See appendix 3 for details.
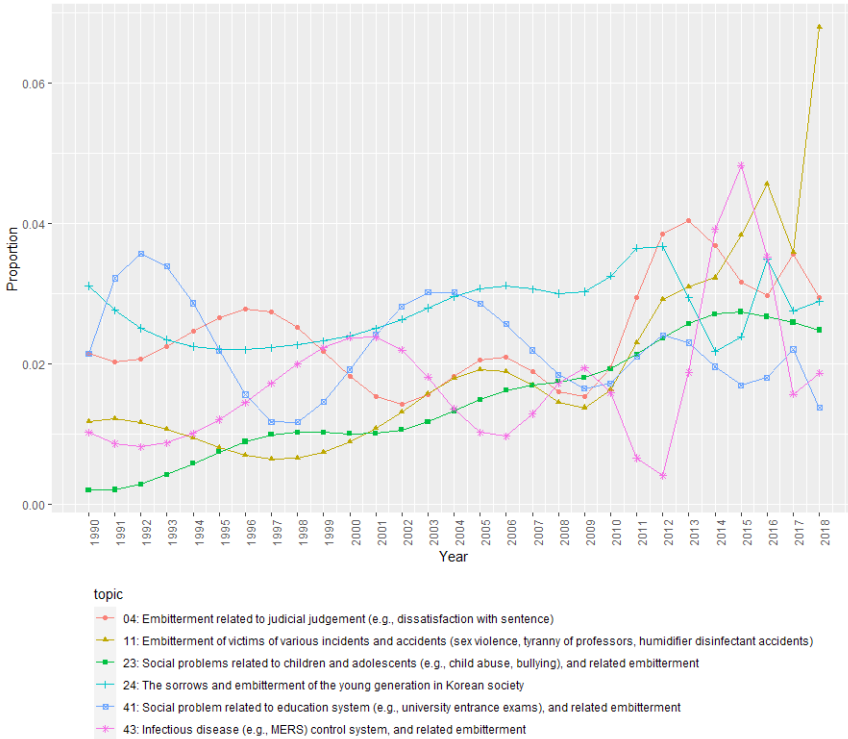

topic

— 04: Embitterment related to judicial judgement (e.g., dissatisfaction with sentence)
— 11: Embitterment of victims of various incidents and accidents (sex violence, tyranny of professors, humidifier disinfectant accidents)
— 23: Social problems related to children and adolescents (e.g., child abuse, bullying), and related embitterment
— 24: The sorrows and embitterment of the young generation in Korean society
— 41: Social problem related to education system (e.g., university entrance exams), and related embitterment
— 43: Infectious disease (e.g., MERS) control system, and related embitterment

FIG. 7.—PROPORTION CHANGE OVER TIME OF THE MAIN TOPICS IN CLUSTER 2

Discussion

We found two distinct embitterment framings from 9,309 newspaper articles: "embitterment framing based on system fairness" and "embitterment framing based on political justice." Topic clusters 2 and 3 reflect each framing. It is estimated that "embitterment framing based on system fairness" increased in proportion from 1990 to 2018. The proportion of topic cluster 2 exhibits an upward trend, and the proportions of the five main topics in the cluster also

show a growing pattern. However, "embitterment framing based on political justice" does not show a consistent increasing or decreasing pattern but instead fluctuates. Based on the proportion changes of topics and topic clusters, we found that "embitterment framing based on system fairness" has recently taken up a larger share of newspaper articles than has "embitterment framing based on political justice."

Why are these distinct embitterment framings observed? Why has embitterment framing based on system fairness recently taken up a larger share of newspaper articles than embitterment framing based on political justice? We would like to propose that this is deeply linked to the change in faith for the role of the nation state in South Korea.

According to the explanation of Chalmers Johnson, who invented the concept of the "capitalist developmental state," South Korea since 1961 is a prime example of such a state. Johnson explained the pattern of the state "leads economic development," "directly mobilizes and allocates capital," "licenses or subcontracts its projects to private entrepreneurs," and "plays the predominant role in controlling the organization of workers" is prevalent in capitalist developmental states (Johnson 1989). Since 1961, South Korea's economic growth process has been in line with this explanation, which is why other scholars besides Johnson have also pointed out the government's active role in Korea and have used the concept of a developmental state (Johnson 1999; Luedde-Neurath 1984; Pirie 2007; Kim, Park, Rhee, and Chang 2002). Moreover, the government of South Korea was exercising control over not only the market and business but also a wide area of people's lives. The government intervened in people's economic activities including regulating luxury or leading family planning to lower the birthrate (Shin 2005; Jo 2014).

The country began to change in the late 1980s. In June 1987, the pro-democracy uprising and the establishment of a direct presidential election system laid the foundation for the end of authoritarian governments and established checks on government power. The IMF bailout system in 1997 marked the official end of active intervention in the country's markets and the advent of neoliberalism. In short, authoritarian developmental countries began to crack in the 1980s and collapsed in the late 1990s.

Korea embraced neoliberal values instead of the developmental state's values. As Hayek and German ordoliberals point out, the core idea of the neoliberal state is to make the rules of the game and keep it fair and clean. In other words, state intervention is for creating and supporting the rules of the game that keep the market smoothly running, not for intervening in the market itself (Foucault 2008; Hayek 2014a, 2014b). Many scholars argue that

since 1997, Korean administrations have held this neoliberal belief and the corresponding "governmentality," at least in part.

It can be inferred that this change of faith in the role of the nation state had a great impact on the concept of social justice. When South Korea was a developmental state, or when the state was deeply involved in markets and the lives of people, social justice was judged on the basis of, among other things, the legitimacy and justice of state intervention. The embitterment at that time was the despair and anger over the nation's unjustified intervention and violence. However, since the neoliberal state has become the ideal concept of state, social justice is judged based on the reasonability and fairness of the rules and systems the state makes and maintains.

The distinguished embitterment framings in news reports reflect this change in the Korean society. The increase in **"embitterment framing based on system fairness"** and the fluctuation in **"embitterment framing based on political justice"** over time reflects the changes Korea has experienced (from authoritarian developmental state to neoliberal state). The pace of change is slightly slower than that of the major events described above (e.g., IMF bailout). We assume that there are two reasons for that. First, it is natural that the concept of the state's role in people's minds might have changed a little later than the actual changes themselves. Agreements on a new type of state role are bound to follow slightly later than actual changes. Second, the political position of the ruling party might have affected this trend. The presidents and the ruling party just after the IMF bailout had liberal political positions, which led them to implement social policies to alleviate the pain of neoliberal system changes. However, in 2008, a conservative political force came to power, which solidified the change of social justice and fairness in people's minds. At that point, the proportion gap between the two embitterment framings begins to widen (Figure 5).

Theoretically speaking, it is still a matter of debate whether post-1997 South Korea can be called a neoliberal state. No country can be a perfect neoliberal state. Some theorists have emphasized the non-typical nature of Korea. However, no one denies that the neoliberal values and policies have been rapidly introduced to Korean society since 1997. We assume that this tendency has at least partly influenced beliefs in social justice, and then affected the experience of embitterment.

This study presents the existence of different sociocultural factors that interact with the embitterment, i.e., embitterment framings. Our analysis results show that two distinct embitterment framings—one based on political justice and another based on system fairness— exist within the Korean

embitterment discourse observed in Korean news reports. Furthermore, this study demonstrates that the latter embitterment framing has shown an increase over time. It is assumed that this change is related to Korea's transition from a capitalist developmental state to a neoliberal state. Our research implies that embitterment, which has been examined mainly from the clinical perspective, needs to be studied in the context of sociocultural factors.

Declaration of interest statement

We have no conflicts of interest to disclose.

Acknowledgement

References

Armstrong, David. 2009. "Origins of the Problem of Health-related Behaviours: A Genealogical Study." *Social Studies of Science* 39(6): 909-926. doi:10.1177/0306312709104258.

_____. 2014. "Chronic illness: a revisionist account." *Sociology of Health & Illness* 36(1): 15-27. doi:10.1111/1467-9566.12037.

Benford, Robert D., and David A. Snow. 2000. "Framing Processes and Social Movements: An Overview and Assessment." *Annual Review of Sociology* 26: 611-639.

Blei, David M, Andrew Y Ng, and Michael I Jordan. 2003. "Latent Dirichlet Allocation." *Journal of Machine Learning Research* 3 (Jan): 993-1022.

Borah, Porismita. 2011. "Conceptual Issues in Framing Theory: A Systematic Examination of a Decade's Literature." *Journal of Communication* 61(2): 246-263. doi:10.1111/j.1460-2466.2011.01539.x.

Chang, Ha-Joon. 2008. *Bad Samaritans: The Guilty Secrets of Rich Nations and the Threat to Global Prosperity*. New York: Random House.

Dalbert, Claudia. 2011. "Embitterment—from the perspective of justice psychology." pp. 30-41, in *Embitterment: Societal, psychological, and clinical perspectives*, edited

by Michael Linden, and Andreas Maercker. Berlin: Springer Science & Business Media.

Entman, Robert M. 1993. "Framing: Toward Clarification of a Fractured Paradigm." *Journal of Communication* 43(4): 51-58.

_____. 2007. "Framing Bias: Media in the Distribution of Power. "*Journal of Communication* 57(1): 163-173. doi:10.1111/j.1460-2466.2006.00336.x.

Fortunato, Santo. 2010. "Community Detection in Graphs." *Physics Reports* 486(3-5): 75-174.

Fortunato, Santo, and Darko Hric. 2016. "Community Detection in Networks: A User Guide." *Physics Reports* 659: 1-44. doi:10.1016/j.physrep.2016.09.002.

Foucault, Michel. 2002. *The Order of Things: An Archaeology of the Human Sciences*. Psychology Press.

_____. 2008. *The Birth of Biopolitics: Lectures at the Collège de France, 1978-1979*. Translated by G. Burchell, Edited by M. Senellart, F. Ewald, & A. Fontana. London: Palgrave Macmillan.

_____. 2013. *Archaeology of Knowledge*. London: Routledge.

Gerlach, Martin, Tiago P Peixoto, and Eduardo G Altmann. 2018. "A Network Approach to Topic Models." *Science Advances* 4(7): eaaq1360.

Hayek, Friedrich A. 2014a. *The Constitution of Liberty*. Routledge.

_____. 2014b. *The Road to Serfdom: Text and Documents: The Definitive Edition*. Routledge.

Hofmann, Thomas. 2013. "Probabilistic Latent Semantic Analysis." arXiv:1301.6705. Retrieved from https://ui.adsabs.harvard.edu/abs/2013arXiv1301.6705H.

Houston, J Brian, Matthew L Spialek, and Mildred F Perreault. 2016. "Coverage of Posttraumatic Stress Disorder in the New York Times, 1950–2012." *Journal of Health Communication* 21(2): 240-248.

Jo, Wonkwang. 2014. (In Korean) "Hanguk sobisahoeui deungjanggwa misigwollyeogui byeonhwa [The Appearance of Korean Consumption Society and the Change of Micro-Power]." *Korean Journal of Sociology* 48(1): 133-172.

Johnson, Chalmers. 1989. "South Korean Democratization: The Role of Economic Development." *The Pacific Review* 2(1): 1-10. doi:10.1080/09512748908718795.

_____. 1999. "The Developmental State: Odyssey of a Concept." In *The Developmental State* (pp. 32-60).

Kim, Yong-hak, Chan-ung Park, Kyung Yong Rhee, and Dukjin Chang. 2002. (In Korean) *Hangugui saneopgujo byeonhwawa gieopjipdan dagakwa jeollyak [Changes in industry structure in Korea and diversification strategies of conglomorates]*. Seoul: Jipmoondang.

Kozlowski, Austin C., Matt Taddy, and James A. Evans. 2018. "The Geometry of Culture: Analyzing Meaning through Word Embeddings." *ArXiv e-prints*. Retrieved from https://ui.adsabs.harvard.edu/#abs/2018arXiv180309288K.

Lakoff, George. 2006. *Thinking Points: Communicating our American Values and Vision*. Macmillan.

Lee, Seung-Hoon, Sang Won Jeon, Seoyoung Yoon, Cheolmin Shin, Young Hoon Ko, Yong-Ku Kim, Sungdo Yoon, and Changsu Han. 2017. "Posttraumatic embitterment disorder in Korean population: demographic characteristics and relationship with depression." *Mood and Emotion* 15(2): 78-84.

Linden, Michael, Kai Baumann, Barbara Lieberei, Constanze Lorenz, and Max Rotter. 2011. "Treatment of Posttraumatic Embitterment Disorder with Cognitive Behaviour Therapy Based on Wisdom Psychology and Hedonia Strategies." *Psychotherapy and Psychosomatics* 80(4): 199-205.

Linden, Michael, Kai Baumann, Barbara Lieberei, and Max Rotter. 2009. "The Post-Traumatic Embitterment Disorder Self-Rating Scale (PTED Scale)." *Clinical Psychology & Psychotherapy* 16(2): 139-147. doi:10.1002/cpp.610.

Linden, Michael, Kai Baumann, Max Rotter, and Barbara Schippan. 2008. "Posttraumatic Embitterment Disorder in Comparison to Other Mental Disorders." *Psychotherapy and Psychosomatics* 77(1): 50-56.

Linden, Michael, and Andreas Maercker. 2011. *Embitterment: Societal, Psychological, and Clinical Perspectives*. Berlin: Springer Science & Business Media.

Luedde-Neurath, Richard. 1984. "State Intervention and Foreign Direct Investment in South Korea." *IDS Bulletin* 15(2): 18-25.

McGinty, Emma E., Alene Kennedy-Hendricks, Seema Choksy, and Colleen L. Barry. 2016. "Trends in News Media Coverage of Mental Illness in the United States: 1995-2014." *Health Affairs* 35(6): 1121-1129.

Michailidis, Evie, and Mark Cropley. 2017. "Exploring Predictors and Consequences of Embitterment in the Workplace." *Ergonomics* 60(9): 1197-1206. doi:10.1080/00140139.2016.1255783.

Öniş, Ziya. 1991. "The Logic of the Developmental State." *Comparative Politics* 24(1): 109-126.

Pirie, Iain. 2007. *The Korean Developmental State: From Dirigisme to Neo-liberalism*. London: Routledge.

Roberts, Margaret E., Brandon M. Stewart, and Edoardo M. Airoldi. 2016. "A Model of Text for Experimentation in the Social Sciences." *Journal of the American Statistical Association* 111(515): 988-1003. doi:10.1080/01621459.2016.1141684.

Roberts, Margaret E., Brandon M. Stewart, and Dustin Tingley. 2014. "stm: R Package for Structural Topic Models." *Journal of Statistical Software* 10(2): 1-40.

Shin, Won Chul. 2005. (In Korean) "1960~1970 nyeondae gigyesaneom nodongjaui yeoga min sobisaenghwal, geurigo nodongja jeongcheseong [The Leisure Time and the Daily Life as a Consumer, and the Workers' Identities: A Case Study on the Korean Workers of Machine Industry in 1960s~1970s]." *Economy and Society* 68: 44-70.

Wahl, Otto F. 1996. "Schizophrenia in the News." *Psychiatric Rehabilitation Journal* 20(1): 51.

_____. 2000. "Obsessive-Compulsive Disorder in Popular Magazines." *Community Mental Health Journal* 36(3): 307-312.

Wallach, Hanna M., Iain Murray, Ruslan Salakhutdinov, and David Mimno. 2009. *Evaluation Methods for Topic Models.* Paper presented at the Proceedings of the 26th annual international conference on machine learning.
Yang, Zhao, René Algesheimer, and Claudio J. Tessone. 2016. "A Comparative Analysis of Community Detection Algorithms on Artificial Networks." *Scientific Reports* 6, 30750. doi:10.1038/srep30750.

Wonkwang Jo is an assistant professor at the Graduate School of Public Health, Seoul National University. He received his Ph.D. in sociology from Seoul National University. His recent research interests are information circulation and collective emotional changes in the health care and public health sector [*E-mail:* thinker1@snu.ac.kr].

Myoungsoon You, the corresponding author, is a professor at the Graduate School of Public Health, Seoul National University. She received her Ph.D. in public health from UC Berkeley. Her research interest includes public outrage & embitterment, health & environmental risk perception, and crisis communication during public health emergencies [*E-mail:* msyou@snu.ac.kr].

Dukjin Chang is a professor in the Department of Sociology at Seoul National University. He received his Ph.D. in sociology from the University of Chicago. His research interests include social network analysis and comparative social models [*E-mail:* dukjin@snu.ac.kr].

Appendix 1.
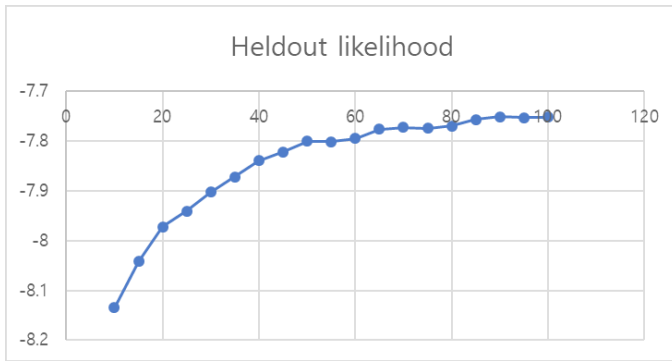
We chose 50 topics because the quality of the model did not improve significantly beyond this number, and it is reasonable to choose a small number of topics for the analysis, unless there is a significant difference in the quality of the model.

Appendix 2. Pearson correlation coefficients between year and proportion of main topics in topic cluster 3

Topic number	Pearson correlation coefficient
7	-0.567 (0.001)
15	-0.053 (0.786)
26	0.283 (0.137)
27	-0.736 (< 0.001)
49	0.283 (0.136)

*The number in the parenthesis is a p-value
*Every value is rounded to three decimal places

Appendix 3. Pearson correlation coefficients between year and proportion of main topics in topic cluster 2

Topic number	Pearson correlation coefficient
4	0.468 (0.010)
11	0.802 (< 0.001)
23	0.982 (< 0.001)
24	0.484 (0.008)
41	-0.356 (0.058)
43	0.440 (0.017)

*The number in the parenthesis is a p-value
*Every value is rounded to three decimal places