

Wehrheim, Lino

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A mirror to the world. Taking the German news magazine Der Spiegel into a topic modeling/sentiment perspective

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Edited by Alexander Nützenadel and Jochen Streb



No 34 (2022, June)

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*Taking the German News Magazine Der Spiegel
into a Topic Modeling/Sentiment Perspective*

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A mirror to the world.
Taking the German News Magazine *Der Spiegel*
into a Topic Modeling/Sentiment Perspective

Lino Wehrheim*

June 9, 2022

Abstract

The importance of mass media is reflected, among other things, in the fact that their coverage on certain topics – contrary to findings from communication research – is often seen as a reflection of the topics that are discussed by society. In Germany, this can be observed especially for the news magazine *Der Spiegel*, whose self-declared claim is to “hold up a mirror to the world“. Accordingly, scholars from different disciplines frequently use its reporting, especially its cover stories, to support their own narratives, especially regarding general accounts on ‘the zeitgeist’. Based on this observation, I propose the following thought experiment: suppose we were to look not only at individual cover stories with their individual topics, but at all cover stories – which picture of German contemporary history would then emerge? To answer this question, I use methods from the digital humanities / digital history to retrieve the topics and tonality of all cover stories published between January 1947 and December 2017. This way, I identify the topics that have dominated the *Spiegel*’s front pages, which might be regarded as a trace or *abbild* of the narratives that shaped public discourse since the early days of the Federal Republic or even the zeitgeist itself.

Key words: zeitgeist, narratives, media analysis, topic modelling, sentiment analysis
JEL-Codes: N00, Z13, B40

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I. Introduction

In the last twenty years or so, scholars in the humanities and social sciences have shown an increasing interest in individual and social narratives. In general, we can observe a widespread surge in the use of the term ‘narrative’. Indeed, the term has been used so ubiquitously that it seems justified to speak of a ‘narrative turn’, or, to borrow an expression by Lawrence Stone dating back to 1979, a second “revival of narrative”.¹ This current surge in interest in the narrative is particularly strong among economists, whose attention is increasingly focused on stories, narratives, and moods and their impact on businesses, the economy, and society.² When we think, however, about the nature of large-scale narratives impacting whole economies, that is, narratives perpetuated by a large group of people or even society as a whole there seem to be several parallels to the somewhat ‘old-fashioned’ concept of *zeitgeist*.³ Both are rather elusive concepts and might be regarded as indicators of the topics that preoccupy a society at a particular point in time.⁴ When it comes – generally speaking – to proving the relevance of a social phenomenon or a (historiographical) narrative concerning post-war Germany, a common means is to refer to the news magazine *Der Spiegel*, and especially to one of its cover stories. Whether in lectures, essays, or books, this kind of reference is widespread among scholars from different disciplines. In this context, Frank Bösch and Annette Vowinckel provide a case-in-point of this generalization:

The term ‘media’, despite its diverse distribution today, is comparatively young and found public use in Germany only since the 1950s. Around 1950, the news magazine *der Spiegel* still used the term exclusively in the sense of spiritualist mediums or in reference to persons who were mediators.⁵

Meanwhile, referencing covers of *Der Spiegel* also takes place outside academic discourse. Some covers have achieved an almost iconic status; a well-known example is issue 33 from

¹ Stone (1979). Beyond the admittedly subjective impression by the author, this ubiquity can be illustrated using term frequency tools, such as the Google Ngram Viewer or news databases, such as ProQuest. The term ‘narrative’ has been used more frequently in recent years also in German historiography. Cf. Wehrheim et al. (2021). On the ‘narrative turn’ and narratives in (social) science, see, e.g., Goodson and Gill (2011) and Morgan and Wise (2017).

² See, e.g., Akerlof and Snower (2016), Akerlof and Shiller (2009), Akerlof and Rayo (2020), Andre et al. (2021), Ferguson-Cradler (2021), McCloskey (1990), Mongin (2019), Morgan (2014), Shiller (2019), Wehrheim (2021). See also the Special Issue “Narrative Turn and Business History”, *Business History*, Volume 59, Issue 8 (2017). It seems as if the concept of narrative has different business cycles in different disciplines, which poses the question of how the concept generally relates to other dichotomies, such as ‘social vs. cultural’. Is the ‘narrative turn’ nothing but a variant of the ‘cultural turn’, at least in the case of historiography? See Wehrheim et al. (2022). On the other hand, the interest in narratives among social scientists shows that the equation of ‘narrative’ and ‘cultural’ would be misleading.

³ According to Google’s Ngram Viewer, the term “Zeitgeist” has lost importance since the year 2000 or so. See https://books.google.com/ngrams/graph?content=Zeitgeist&year_start=1800&year_end=2019&corpus=31&smoothing=0, last access February 15, 2022. See Jung (2014) for an account on the concept.

⁴ One could also argue that common narratives are themselves influenced by the *zeitgeist*.

⁵ Bösch and Vowinckel (2012, p. 4), own translation.

1986, its cover showing the Cologne Cathedral standing under water – headline: “The Climate Catastrophe”.⁶ For obvious reasons, this cover has recently become a frequently used point of reference, for example in an essay by *Süddeutsche Zeitung* journalist Nicolas Richter on the “Generation Golf”⁷ or in an interview in *Die Zeit* in which Nobel Prize winner Klaus Hasselmann responds after being asked about this cover:

I think it's a shame that this was the only way to draw attention to the problem [of climate change, L.W.] in such a drastic way. At the same time, I also thought it was good that *Der Spiegel* put the issue on the front page, because we had been researching and discussing climate change in the sciences for a decade, but no one outside our cosmos was interested in it. We hadn't found the right language.⁸

This kind of reference is based on the assumption that *Der Spiegel*, especially in its cover stories, depicts the topics that are preoccupying German society at a certain point in time, i.e. that something like the *zeitgeist* can be read from it.⁹ *Der Spiegel*'s recent marketing claim “We hold up a mirror to the world”,¹⁰ introduced in 2020, can also be understood in this sense: “We provide background information and insights with which we hold up a mirror to society and confront the influential and powerful of this world with their actions”.¹¹

Based on these observations, I propose the following thought experiment. Suppose we were to look not only at individual cover stories with their respective individual topics, but at all cover stories published since the first issue in January 1947 – what kind of picture of contemporary German history would then emerge? Or to put it another way: What would happen if we were to take the assumption made for individual cases that *Der Spiegel* reflects the *zeitgeist* to its logical conclusion and systematically examine all its cover stories?

To operationalize this thought experiment, the focus will be on three specific questions: Which topics were in vogue and when? What tonality is expressed in the cover stories? And what continuities, shifts, and breaks can be observed regarding both aspects? As the corpus under investigation consists of nearly 3,700 stories with a text volume of more than 27 million words, I will use computational text analysis. Specifically, I will address two aspects of the cover stories: the content/themes and the general tone/sentiment. The main part of the analysis is based on so-called topic models – algorithms that allow us to retrieve the contents of large text

⁶ Own translation.

⁷ Cf. Nicolas Richter „Die Sorglosen“, in *Süddeutsche Zeitung*, December 11, 2021.

⁸ Cf. Interview with Klaus Hasselmann and Luisa Neubauer in *Die Zeit*, October 28, 2021, own translation.

⁹ This view of the media as neutral or passive mediators is indeed problematic and will be discussed below. As an alternative mirror of the *zeitgeist*, Apel (1991) has used baccalaureate essays.

¹⁰ „Wir halten der Welt den Spiegel vor“, own translation.

¹¹ <https://www.spiegel.de/backstage/der-neue-spiegel-gemeinsam-sagen-was-ist-a-c5e0263f-042a-4b18-b053-00584795fe8c>, last access March 25, 2022. Own translation.

collections. In addition, I apply a sentiment analysis to measure the tone expressed in the cover stories. Since both approaches are based on automated procedures, the cover stories can be examined without temporal or thematic restrictions.

Naturally, even with these methods, *zeitgeist* cannot be measured directly, which is not the aim of this paper. Rather, by quantifying content and sentiment, two tangible aspects are to be captured. It is, however, already a challenge to reproduce both aspects for a period of 70 years in the scope of a single essay. Therefore, the findings obtained by topic modeling and sentiment analysis will be evaluated descriptively. The indicators created in the process are to be understood in the narrow sense of the word as pointing to or indicating something, illustrating basic tendencies. They should not pretend false precision but form the basis of what Daniel Burckhardt et al. call “digital hermeneutics“, that is, the combination of close and distant reading, or, put differently, of traditional and quantitative text analysis.¹²

But first, some further methodological considerations and critical reflections on the procedure are in order. Strictly speaking, a single cover story only tells us that a certain topic was considered relevant by the Spiegel’s editorial team at a certain point in time. However, it seems reasonable to assume that the editorial staff of a leading news outlet such as Der Spiegel has a good sense of marketable topics, at least most of the time. Be that as it may, a single cover story, in the best case, merely shows the visibility of a certain topic. Returning to the example given above, the submerged Cologne Cathedral by itself only proves that the climate issue received a certain amount of media attention in the mid 1980s. This cover only becomes an expression of an environmentally conscious *zeitgeist* through the addition of further information or sources, i.e., through contextualization and historicization. The approach taken here, on the other hand, is somewhat different. The cover stories are not contextualized by other sources but by themselves, or rather, by their ‘peer group’. The resulting big picture, as will be shown, is greater than the sum of its parts and can be understood as a trace or *abbild* of the *zeitgeist*, which is created solely by the manifest and latent aspects of the cover stories.

Due to the open research design, the project is located at the intersection between contemporary history, media history, and media studies and – regarding the method used – digital history / digital humanities. Since the focus is on the content of the reporting, the project follows the literature on the journalistic output of Der Spiegel, which mostly takes a media studies perspective. This output has often been evaluated regarding specific topics, such as religion, racism, medicine, terrorism, transnationality, or AIDS.¹³ In addition, the sentiment of the cover stories

¹² Burckhardt et al. (2019).

¹³ See, e.g., Brinkmann (2015), Eissing (1995), Lösing (2014), Polownikow (2017), Prüll (2010), Schöne (2015), Stackelbeck (2009).

has also been examined.¹⁴ This literature has in common that it considers only certain topics and/or certain time periods. Contrary to this, the approach pursued in this paper does not require any such restrictions. Rather, the entire spectrum of topics covered in the front-page stories since 1947 are considered. Therefore, especially the literature on the period since World War II that uses grand narratives is relevant.¹⁵ Since the period under investigation extends into the recent past, particular attention was paid to the literature published under the cipher ‘after the boom’, which sheds light on current phenomena that have their roots in the 1970s.¹⁶ Finally, several works from the field of social and political sciences, which follow a similar research approach, were also helpful.¹⁷

The remainder of this paper is structured as follows. The second section presents the text corpus and the methods that were used. The third section provides a cursory overview of the long-term development of the cover stories. The fourth section is devoted to three time periods resulting from a data-driven periodization of the period under investigation. The fifth section summarizes the key findings.

II. Corpus and Method

An overview of the general workflow of this paper can be found in Figure 1. As the first step, I obtained all cover stories published between 1947 and 2017 from the online archive of Der Spiegel, which provides the texts in digital or retro-digitized form.¹⁸ Here, an important distinction should be noted. The cover stories often consist of several articles, for example, a main article, a side article, and an interview. The corpus amounts to nearly 3,700 cover stories, which are distributed over about 8,700 individual texts, which together form a text volume of 27.7 million words. Looking at the development of the text volume over time, we can see that Der Spiegel's cover stories became longer in the first decade after its founding and remained at the same level until the end of the 1990s. After a brief increase around the turn of the millennium, the volume declined to the long-term average.

¹⁴ Cf. Stockmann (1999).

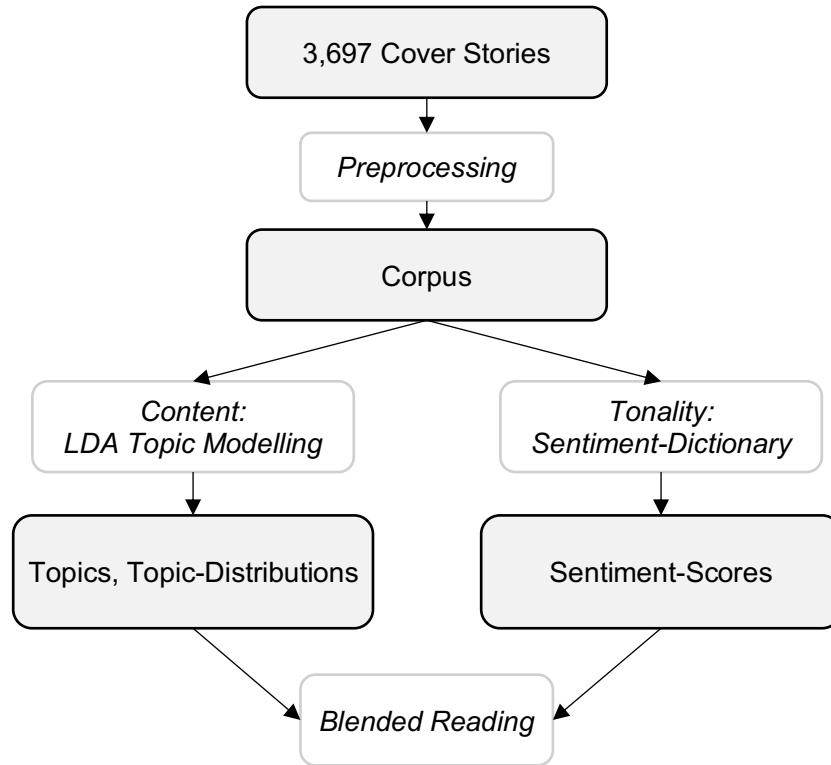
¹⁵ See, e.g., Berghoff (2019), Broszat (1990), Bouvier et al. (2012), Herbert (2014), Metzler (2002), Morsey (2007), Rödder (2004), Schildt (1999), Süß (2002, 1991), Wirsching (2021, 2006).

¹⁶ See, e.g., Doering-Manteuffel and Raphael (2012), Doering-Manteuffel et al. (2016), Reitmayer and Thomas Schlemmer (2014), Voigt (2021).

¹⁷ Lemke and Wiedemann (2016), Wiedemann (2016).

¹⁸ <https://www.spiegel.de/spiegel/print/index-2021.html>, last access October 26, 2021. For a few issues, the title story was missing at the time of data collection for unknown reasons, so in these cases the respective print edition was digitized separately. Some issues could not be digitized due to heavily damaged print editions.

Fig. 1 Workflow



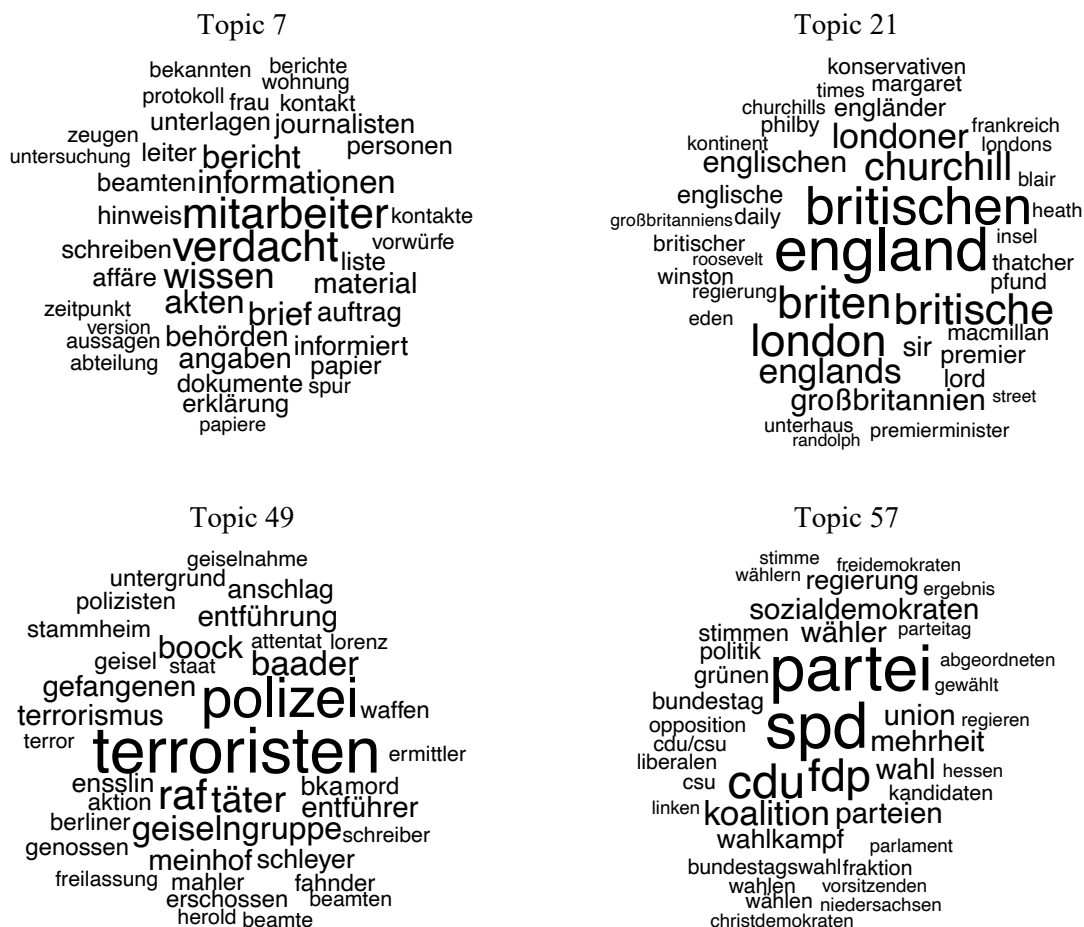
Source: Own illustration.

The analysis of the cover stories focuses on two dimensions: their content and their tonality. To capture the first aspect, I created a topic model. This approach has already been explained in various publications, which is why I will provide only a short description of the basic functionality and the specific model design in this paper.¹⁹ ‘Topic models’ is a collective term for different algorithms that automatically retrieve the content of a large amount of text based on statistical text models. Like an architectural model or a map, a topic model is an abstract representation of a real-world phenomenon, in this case a collection of texts, that helps us to examine certain aspects of the phenomenon. As any other model, topic models are based on certain assumptions. In this case, the basic assumption is that words that co-occur represent the topic of a text, while a single word can belong to different topics and texts can have multiple topics. For example, the words *prison*, *warder*, *inmate*, *cell* together could create a fictional topic *prison*, whereas *cell* could also belong a topic *data processing* in the context of words such as *row*, *column*, and *formula* or a topic *genetics* in the context of *nucleus*, *DNA*, and *genome*. Accordingly, compared to simple word frequencies, such as the Google Ngram Viewer, a major advantage of topic models is that they consider the context of a word, which can of course change over time. The goal of the quantifying model representation is to identify precisely such word

¹⁹ See, e.g., Blei (2012), Maier et al. (2018), Nickler (2018), Papilloud and Hinneburg (2018), Wehrheim (2019).

groups with the help of statistical methods, which then allow conclusions to be drawn about the content of the texts.

Fig. 2 Topic Examples



Source: Own illustrations.

The first component of a topic model, thus, consists of word groups, which are called ‘topics’. Figure 2 shows some examples extracted from the Spiegel corpus. We can see that the character of these word groups varies considerably. Examples such as topic 49 consist of a very coherent and concrete set of words that offer a straightforward interpretation. They can be understood as topics in a narrow sense. Others, such as topics 21 and 57, may also be very coherent regarding their word composition, but represent a more abstract theme, such as a geographical unit (e.g., topic 21) or a general reference to politics (e.g., topic 57). Other topics, again, have a very abstract word composition whose common denominator only becomes apparent upon closer inspection. Topic 7, for example, is mainly found in articles that report on the results of journalistic investigations, such as the revelation of a political affair. This last example shows that topics in the sense of a topic model are merely statistical representations of language patterns that must be interpreted by humans. Some patterns may contribute to the research question,

others may not. In this context, one central feature of topic models cannot be stressed enough. Topics are created agnostically by the algorithm, without any prior categorization on the part of the user. In other words, the algorithm knows neither the category ‘nation state’ nor the category ‘left-wing extremism’, to stay with the examples mentioned above. The topics are formed solely by the latent language structure of the corpus and depend primarily on the number of extracted topics, which must be determined by the user at the beginning of the analysis. This feature has the advantage that topic models do not require any ex-ante category formation, which always contains a subjective element. Rather, the categories immanent in a corpus can be extracted, so that the texts speak for themselves. However, the algorithm only assigns a number to the topics, that is, no kind of description or label. These are usually assigned manually by the user after a thorough evaluation, so that this step again introduces a subjective element into the analysis. The algorithm assigns each word instance in the corpus to a unique topic, whereby, as mentioned, one and the same word can be assigned to different topics in different instances. Thus, the word *cell* can theoretically be assigned to a – fictitious – topic *data processing* in sentence A, and to the topic *genetics* in sentence B. This assignment allows to calculate the distribution of each text over the different topics. The second component of the model, therefore, consists of the statistical distribution of the topics across all texts; we can, thus, determine the proportion of topic k in document d . If the texts have a time stamp, it is possible to study the development of these topics over time.

The procedure for creating the topic model was as follows. After collecting all front-page stories, a good 2,400 types of stopwords were removed. After treating frequent errors, such as missing line-breaks, the model was created using the open-source software MALLET that applies the Latent Dirichlet Allocation (LDA) model variant.²⁰ Besides some technical parameters, LDA only requires the number of topics to be extracted. After running multiple test models, the number of topics was set to 105.²¹ In general, it should be emphasized that there is not one ‘correct’ or ‘optimal’ model, but many reasonable representations. The selection of the right model depends on the research question. In order to look not only at details but also at larger trends, the topics were assigned to 14 categories, which – in distinction to the non-aggregated individual topics – are referred to as ‘mega topics’ in the following. This aggregation was carried out manually after carefully reviewing all 105 topics, their compositions, and relevant documents. This introduces a subjective element, which is why all further calculations were carried out on the basis of individual topics whenever possible.

²⁰ Cf. Blei et al. (2003), McCallum (2002).

²¹ Seed value 1234, 2,000 iterations, hyperparameter-optimization every 20th iteration.

The goal of the second approach used here is to capture the more complex aspect of sentiment.²² In its simplest version, a sentiment analysis covers a positive-negative distinction of words, sentences, or documents based on a sentiment-dictionary. Several challenges arise with this approach. First, in some cases it is necessary to distinguish between the *a priori* polarity and the contextual polarity of a word. For example, the word *cancer* is in itself a neutral medical term, which has to be evaluated differently depending on the context (“Fewer and fewer people die of cancer“, “A disease of cancer can cause psychological distress“). Second, as this example shows, the evaluation for homonyms may depend on the context. While the zodiac sign is usually to be evaluated as neutral, the disease cancer is more likely to have negative connotations. In addition, the evaluation of a word also depends on its domain, the classical example being the word *debt*, which is considered negatively in most domains, but neutrally or sometimes even positively in an economic context.²³ In addition, problems such as figurative speech, sarcasm and irony, or comparative statements (“Politician A does worse than Politician B“) complicate matters further.

While keeping these limitations in mind, I address some of them by using certain pre-processing steps to remove ambivalent expressions²⁴ and considering signal words. The latter relates to negations and so-called valence shifters, that is, words that increase or decrease the *a priori* tonality of a word in a concrete instance, such as *very*, *much*, *hardly*, or *little*. More serious in the present case is the problem of domain dependency, since the cover stories capture different subject areas, such as economics, culture, medicine, and politics. To address this problem, multiple German-language sentiment dictionaries were used as a starting point.²⁵ Every time an entry did not have a uniform rating across all dictionaries, its context was checked by means of a random keyword-in-context search and then adjusted accordingly. Additionally, corpus-specific words that are not included in any of the standard dictionaries were added in an analogous way. In total, the dictionary includes 27,506 negative and 20,221 positive words, 378 valence shifters, and 52 negation words.²⁶ The sentiment score of a text, story, or period was calculated as the difference between positive and negative sentiment (taking into account negations and

²² The following is based on Feldman (2013), Liu (2015), and Zhang and Bing (2017).

²³ Cf. Loughran and McDonald (2011).

²⁴ For example, I modified all instances of the word “gut” (good) that imply an approximation (e.g. “gut zehn Prozent“) instead of a positive evaluation (“ein gutes Ergebnis“).

²⁵ Remus et al. (2010), Ruscheinsky et al. (2018), Waltinger (2010).

²⁶ All numbers include inflections. The window size for negations and valence shifters was set to three words on both sides. Negation implies multiplication by -0.75 , increasing (decreasing) valence shifter imply a multiplication by 2 (0.5).

valence shifters) divided by number of words per reference unit. The latter was done to account for the sometimes very different text lengths.²⁷

Using the dictionary approach, it is hardly possible to capture the correct evaluation of specific events, persons or other entities. This and the problems mentioned above could lead critical readers to reject this method as too simplistic. This should be countered by the following thoughts. It is true that, under perfect conditions, one should distinguish conceptually whether an article reports, for example, quite objectively on a topic with a fundamentally negative connotation, such as crime, or does so with a subjective (positive or negative) evaluation; using a dictionary, this distinction cannot be made, so that such an article will be evaluated as negative on the basis of terms defined *ex ante* as negative, such as *crime*, *criminality*, or *assault*, even if it merely reports neutrally on crime statistics. However, objective facts can also implicitly contain sentiment, as the example “83 children were killed in the air raid“ illustrates. The sentence states an objective fact, which, however, is likely to trigger negative emotions among recipients. Consequently, the sentiment data presented below should not be understood as a precise measurement. Rather, the aim is to capture the basic tendency or tone of the cover stories. In his analysis on the Spiegel, Stockmann (1999) speaks of the “basic mood“.²⁸ But Stockmann’s study highlights also something else. He applies his own human assessment to quantify sentiment, whereas the dictionary approach follows transparent criteria and can, thus, be replicated. This transparency is one reason why, as Matthew Gentzkow and co-authors note in their seminal essay, the dictionary approach is the “most common method in the social science literature using text to date.“²⁹ Both approaches, i.e., topic modeling and sentiment analysis, are used in full awareness of their methodological limitations. Comparing both approaches with each other, topic modeling seems to produce more robust results than sentiment analysis. Therefore, in the following, the thematic aspect will be given more weight than the tonality aspect.

²⁷ To ensure that the dictionary is not biased towards a particular period, the proportion of dictionary entries included in the corpus was calculated for each year. It turns out that this value is very constant at about eight percent over the entire period. In other words, the dictionary consistently covers eight percent of the vocabulary contained in the corpus. To test the accuracy of the approach, random samples of articles with negative, positive, and neutral sentiment scores were selected and checked to see whether their score is plausible. According to this procedure, the sentiment score, apart from a few exceptions, provides a good approximation of the tonality of the texts. Also, its long-term development, which is I will present below, seems plausible from a historiographic perspective. As a second evaluation step, the sentiment data were combined with the data of the topic model. For this purpose, topic shares for texts with particularly high (low) sentiment scores were determined and compared with the shares for the entire corpus. The results seem plausible: topics that have a higher (lower) topic share in negatively scored texts compared to the overall corpus have a lower (higher) topic share in positively scored texts. In other words, if we calculate the deviation of the topic proportions between the overall corpus and particularly positive or particularly negative articles, we observe a strongly negative Pearson correlation coefficient of -0.8 .

²⁸ Stockmann (1999), own translation.

²⁹ Gentzkow et al. (2019).

First, we will turn to the sentiment of the cover stories. To give a visual impression of the drivers of the results, the two word clouds in Figure 3 show the words that occur most frequently in a positive and negative context, respectively. To determine the long-term evolution of sentiment, we can take either a continuous or discrete perspective. For the first one, we can calculate a sentiment score for the entire text published each year, which provides information about which tone is predominant overall in that year (line chart in Figure 3).

Positive Terms

gemeinsamen Unterstützung Möglichkeiten
Anhänger Lernen
Himmel stolze gewinnen Bedeutung
Einheitschaffen gemeinsam Vertrag
Nutzen Wissen großer Sieg Rat
Partner Kräfte Gute Sicherheit
schön verstehen Freund Recht Liebe Gefallen
Schrift Freiheit Große Einsatz durfte
Frieden Kraft besser Hilfe moderneren
Ruf Freunde gern richtig Kultur Lösung
Nähe Idee Erfolg bereit Interesse
Erfahrung guten erhalten Ideen leicht Jugend
verdient Hoffnungen Ergebnis Chance Schutz
überzeugt Interessen besten Gefühl Glück
Vertrauen stärker Möglichkeit unbedingt
Gelegenheit Erfahrungen entschieden
Wunsch Modell wichtigsten
Zusammenarbeit Chancen

Negative Terms

Arbeitslosigkeit schweren
Flüchtlinge Katastrophe
Front kämpfen Gefängnis
allenfalls Mißtrauen Debatte
nötig Streit Weltkrieg Angriff
Regime verlassen Gegner fehlt Schaden
Anti Kritik niemand ständig Konflikt
Krieges Druck Gefahr zweifel
Affäre Blut Opfer Tod schwer Verdacht
Terror entfernt Schuld Kritiker
Schicksal verziehen müssen Hass Risiko
Aufgabe Krieg Angst schlecht Toten
Feind hart Problem Probleme schlug
Schwierigkeiten verloren fiel forderte
Gegensatz Revolution Kosten fürchten
droht Versuch sterben Geist
Terroristen Krankenheit
Sorge verlieren warten
Konkurrenz Täter

Percentage of Positive, Neutral, and Negative Stories

The chart shows the percentage of positive (green), neutral (grey), and negative (red) stories from 1947 to 2013. The Y-axis ranges from 0% to 100%. The X-axis shows years from 1947 to 2013. The legend indicates: negative (red), neutral (grey), positive stories (green).

However, by taking this approach, the individual stories are lumped together, which leads to a poorly differentiated picture of sentiment. This can be countered by a second approach. First, we can calculate the sentiment score for each individual document. This score then serves as a feature for a discrete classification. Specifically, we can rate the title stories as negative (positive/neutral) if the score of all included texts together falls below a minimum of minus five

(exceeds plus five / lies between minus and plus five).³⁰ This second procedure provides the proportion of positive, negative, and neutral stories per year. To adjust the long-term trend for short-term fluctuations, I applied a centered three-year moving average. The first procedure results in a sentiment score for the entire corpus of minus 5.7, while the second results in a score of 45 percent negative, 26 percent positive, and 29 percent neutral title stories, respectively. In other words, the sentiment of the cover stories can be rated as rather negative. If we compare the values for the period examined by Ralf Stockmann, that is, June 1992 to July 1993, there might be slight deviations, but the overall picture of a predominantly negative basic sentiment remains.³¹

This preponderance of negative stories, however, is by no means observable for the entire period under investigation. Rather, as we can see from both representations in Figure 3, positive stories predominate until the end of the 1950s; in 1949, they even account for 57 percent of all stories. A similar finding emerges when we look at the annual sentiment scores, which, with two exceptions, take on positive values until the end of the 1950s, but negative values throughout thereafter. From the early 1960s onward, the sentiment of the title stories deteriorates almost continuously until the mid-1990s, when a short-term trend reversal sets in. The last two decades are characterized by a highly volatile development. Switching back to the level of the individual stories, a phase of particularly negative sentiment emerges from the mid-1970s to the mid-1990s. On the one hand, this confirms the now common image of the 1970s as a decade of crisis; on the other hand, however, it also shows that sentiment had already begun to deteriorate in the early 1960s, remained extremely negative into the 1990s, and brightened up again from the mid-1990s onward.

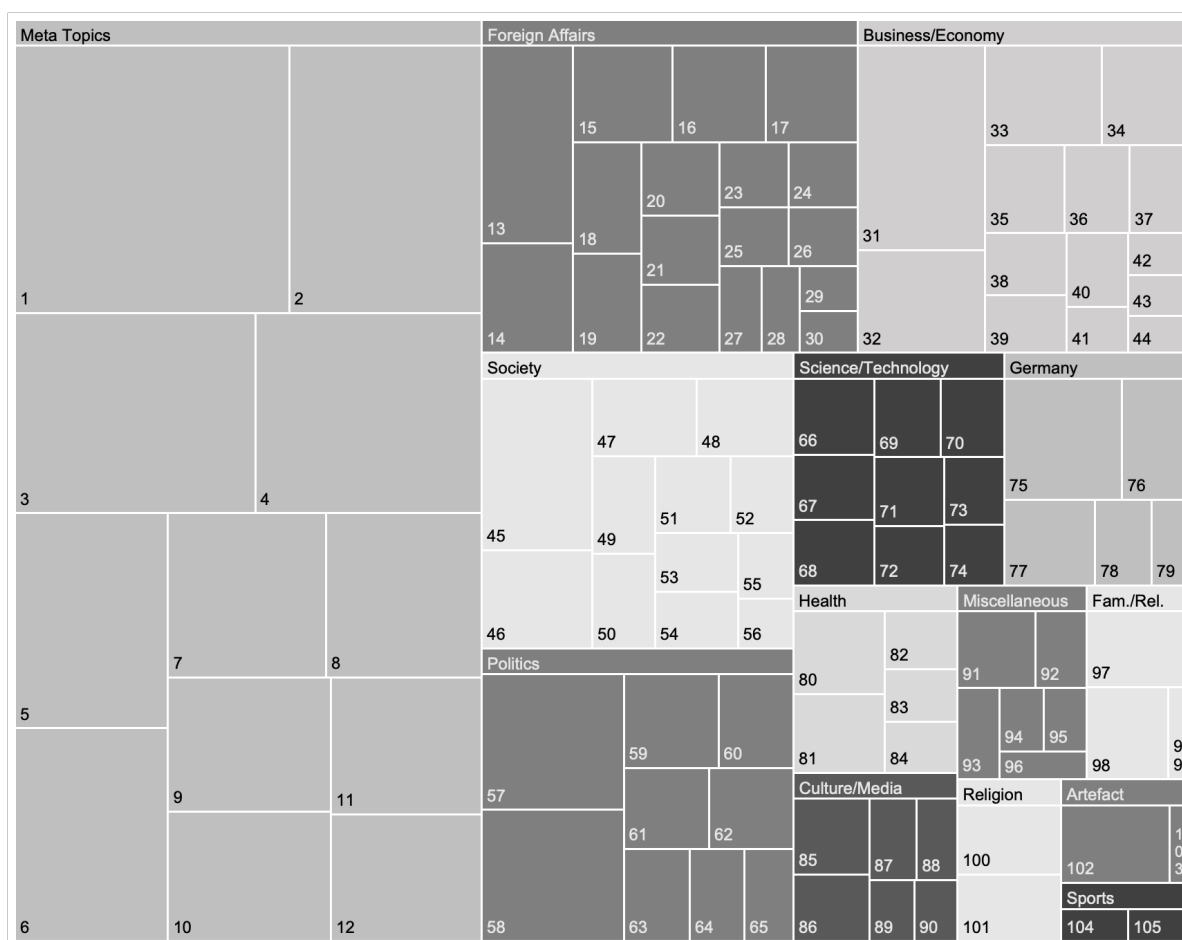
To examine this development more closely, we can take the topic data into account. For this, it is helpful to start with a brief overview of the topic model created for this purpose. This overview is provided as a treemap in Figure 4, which shows all 105 topics, their assignment to mega topics, and their relative weights. Some topics and their development will be discussed in more detail in the following section. For now, I will simply highlight the basic structure of the model and draw the reader's attention towards some distinct features.³² As we can see at first glance, the mega topic *Meta Topics* takes up the largest part of the corpus, covering almost 40 percent

³⁰ Specifically, the score was calculated for all texts that together build a story. This also accounts for the fact that a cover story can theoretically consist of texts with very different tonalities. The definition of a neutral range is intended to cushion the conceptual problems of the dictionary approach to some extent.

³¹ Stockmann (1999) arrives at a breakdown of cover stories for this period into 48 percent negative, 35 percent neutral and 17 percent positive. Based on the dictionary approach, the breakdown is 59 percent negative, 26 percent neutral and 15 percent positive cover stories.

³² An overview of all topics, their defining words, and their temporal development can be found in the appendix.

Fig. 4 Topic Map



- 1 Technology-/Figure-related Language
- 2 Negative Stories
- 3 People
- 4 Interviews
- 5 Culture-related Language
- 6 Life Stories
- 7 Investigative Stories
- 8 Reflection/Morals
- 9 Catastrophes
- 10 Family Relationships
- 11 Physical Appearance
- 12 War
- 13 Communist Countries
- 14 USA I
- 15 Soviet Union
- 16 Middle East I
- 17 Cold War
- 18 USA II
- 19 Islamist Terrorism
- 20 Middle East II
- 21 UK
- 22 France
- 23 Russia
- 24 Islamic World
- 25 Ibero-Amerika
- 26 China
- 27 Developing Countries
- 28 USA III
- 29 Italy
- 30 Asia
- 31 Money
- 32 Public Finance / Social Security
- 33 Monetary Policy / Economic Development
- 34 Large corporations
- 35 Financial Crisis

- 36 Unemployment
- 37 Real Estate/Construction
- 38 Banking/Finance
- 39 Labor Unions
- 40 Corruption
- 41 Inflation
- 42 Heavy Industry
- 43 Trade
- 44 Industry/Cars
- 45 Comparison, Networks, Future
- 46 Law
- 47 Armed Forces
- 48 Justice
- 49 Left-wing Extremism
- 50 Crime & Violence
- 51 Schooling
- 52 Migration
- 53 Secrets/Espionage
- 54 Universities
- 55 Narcotics/Crime
- 56 Opinion Polls
- 57 Party Politics
- 58 Ostpolitik
- 59 Schröder
- 60 Kohl
- 61 Merkel
- 62 Adenauer
- 63 Schmidt
- 64 Politicians / Political Affairs
- 65 Brandt
- 66 Genetics & Evolution
- 67 Aerospace
- 68 Universe
- 69 Environment/Nature
- 70 Automotive Industry

- 71 Nuclear Energy
- 72 Pollution, Environment Protection
- 73 Brain/Mind
- 74 Seafaring
- 75 Location References
- 76 GDR
- 77 National Socialism
- 78 Prussia/Austria
- 79 Bavaria/CSU
- 80 Diseases
- 81 Medicine
- 82 Mental Health
- 83 HIV/Viruses
- 84 Health System
- 85 Literature
- 86 Movies
- 87 Music
- 88 TV & Radio
- 89 Art & Design
- 90 Pop
- 91 IT
- 92 Expeditions
- 93 Food & nutrition
- 94 Monarchy
- 95 Displacement
- 96 Press/Animals
- 97 Sexuality
- 98 Parents & Children
- 99 Divorce
- 100 Faith & Religion
- 101 Church
- 102 Artefact I
- 103 Artefact II
- 104 Soccer
- 105 Sports (General)

Notes: Box sizes correspond to topic shares; I realigned topic numbers, which are assigned arbitrarily by the model, in order to provide a better overview. Fam./Rel. = Family/Relations. Source: Own illustration.

of the corpus.³³ This includes all topics with a rather abstract meaning. These topics do not tell us much about the content of the cover stories but rather something about the mode or the genre of the reporting. The most straightforward example of this, apart from topic 7 that was already mentioned, is topic 4, which can be found mainly in interviews or the “SPIEGEL Gespräch” section. Another example is topic 9, which appears mainly in stories on catastrophes. Taken together, the share of this mega topic is rather constant; however, if we look at the development of its components, a considerable change in the cover stories over time becomes apparent, which can be summarized as follows. In the first two decades, the cover stories are primarily characterized by a language pattern, or parlance, that indicates a strong focus on culture, people, and family relationships. From the mid-1970s, the proportion of terms associated with negative stories increases, while the frequency of terms that are associated with technology and quantitative statements declines. Since the early 1990s, there has been a sharp increase in the use of parlance related to personal ‘life stories’, suggesting a renewed personalization of reporting. The second largest mega topic is *Foreign Affairs*, which takes up 12 percent of the corpus and includes all topics that primarily refer to a foreign geographical unit, be it nation states, such as Russia, France, or Great Britain or specific regions, such as the Middle East or Asia. In addition, this category also includes topics that are at least indirectly related to foreign countries, such as topic 19 *Islamist Terrorism*. The mega topic *Business/Economy* takes up a good ten percent of the corpus, ranging from the rather abstract topic *Money* (31) to the very specific topic *Heavy Industry* (42). The mega topic *Society* is about the same size and combines very different socio-political topics. To be distinguished from this is *Politics*, which, with a good eight percent, is of a similar size but of a different nature. It contains topics that refer to specific political constellations, namely players at the federal level, as well as the rather abstract topic *Party Politics* (57), which has the character of a meta topic. In addition, the two topics *Politicians / Political Affairs* (64) and *Ostpolitik* (58) were located here. Of course, the latter could just as well have been assigned to *Foreign Affairs* or *Society*. The remaining mega topics are all less strongly differentiated and therefore occupy a smaller proportion of the corpus.³⁴

How do the topics and the sentiment contained in the cover stories relate to each other? There are various ways of combining topic modeling and sentiment analysis in terms of the model structure.³⁵ Another way is to use the data from the sentiment analysis as a filter for the topic data. For this purpose, I classified the stories as *negative*, *neutral*, and *positive*, as described

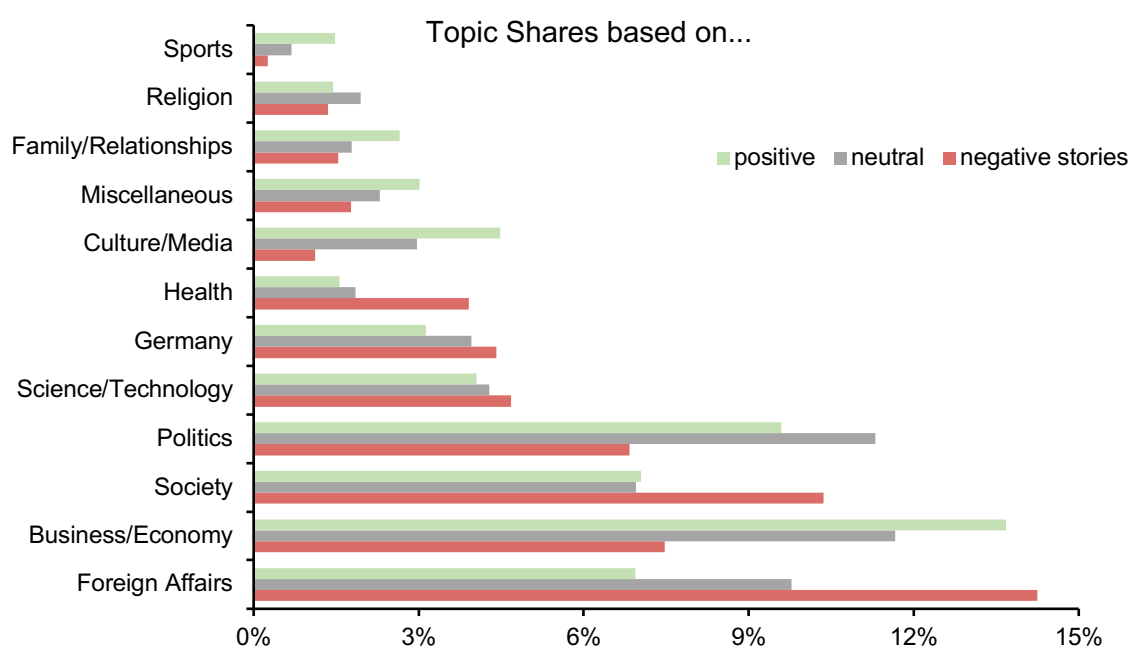
³³ This figure can be interpreted as follows. 40 percent of all words in the corpus were assigned to one of the twelve individual topics, which together form the mega topic *Meta Topics*.

³⁴ The mega topic *Artefact* contains two topics the meaning of which could not be determined even after a thorough examination of the relevant texts. They will therefore be omitted in the following.

³⁵ See, e.g., Lin and He (2009).

above, and then calculated the topic distributions for each of these three classes. This allows us to determine whether a topic is more likely to be found in positive, neutral, or negative texts. The result of this procedure is shown in Figure 5. Here we can observe that, in some cases, there are larger differences between the topic proportions. For example, the mega topic *Sports* is found particularly in positive texts. Here, the topic share amounts to 1.5 percent, while in negative texts it is only 0.3 percent. *Culture & Media*, *Politics*, and *Business/Economy* are mainly present in positive and neutral texts, while *Health*, *Society*, and *Foreign Affairs* appear more in negative texts. For the latter, the difference is particularly drastic. While the mega topic takes up only 6.9 percent of positive texts, it comes to over 14 percent in negative ones. Taking a closer look, this strongly negative tonality can be explained primarily by three individual topics, each of which appears disproportionately in negative texts: *Middle East I* (16), *Cold War* (17), and *Islamist Terror* (19), that is, three conflict-related topics. If we remain at the level of predominantly negative individual topics, we find particularly high topic shares for *Catastrophes* (9), *War* (12), and *National Socialism* (77). This result may seem rather trivial. From a methodological point of view, however, it shows that the chosen approach yields reliable results. In the case of positive texts, on the other hand, three rather surprising topics emerge. *Money* (31), *Comparison*, *Networks*, *Future* (45), and *IT* (91) each have a particularly high topic share in positive stories. At the level of mega topics, the topics *Science & Technology*, *Religion*, and *Germany* tend to be rather balanced.

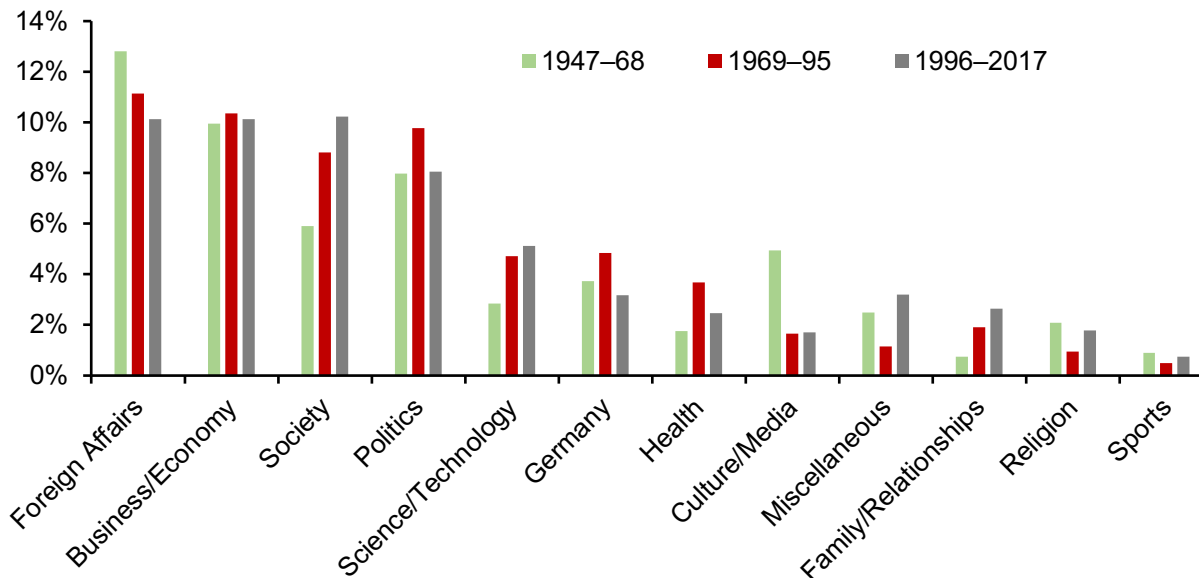
Fig. 5 Mega Topics / Sentiment



Notes: Topic shares based on positive, neutral, and negative documents. Source: Own illustration.

So far, I have provided a mostly static picture, whereas the guiding questions of this article are diachronic. This perspective will be explored in more detail in the next section by using another feature of topic modeling, that is, the data-driven periodization.³⁶ For this, topic distributions of all calendar years are compared to each other and then clustered by means of an algorithm based in their topic similarity. In this procedure, the number of clusters – or periods – is derived solely from the properties of the underlying distributions. Like the procedure of topic modeling itself, the result depends primarily on the characteristics of the data and not on criteria defined *ex ante*. In this specific case, first, the respective topic distributions were calculated for each calendar year. The 105 individual topics served as the basis for this calculation, to eliminate the effect aggregation. These distributions were then compared to each other by means of a cluster analysis, resulting in a division into the three clusters 1947 to 1968, 1969 to 1995, and 1996 to 2017. In other words, looking through the lens of cover stories, the period since the end of World War II can be divided into these three periods. Moreover, if we recall the development of sentiment from Figure 3, we can see that this division by and large mirrors the development of the sentiment scores.

Fig. 6 Periodization



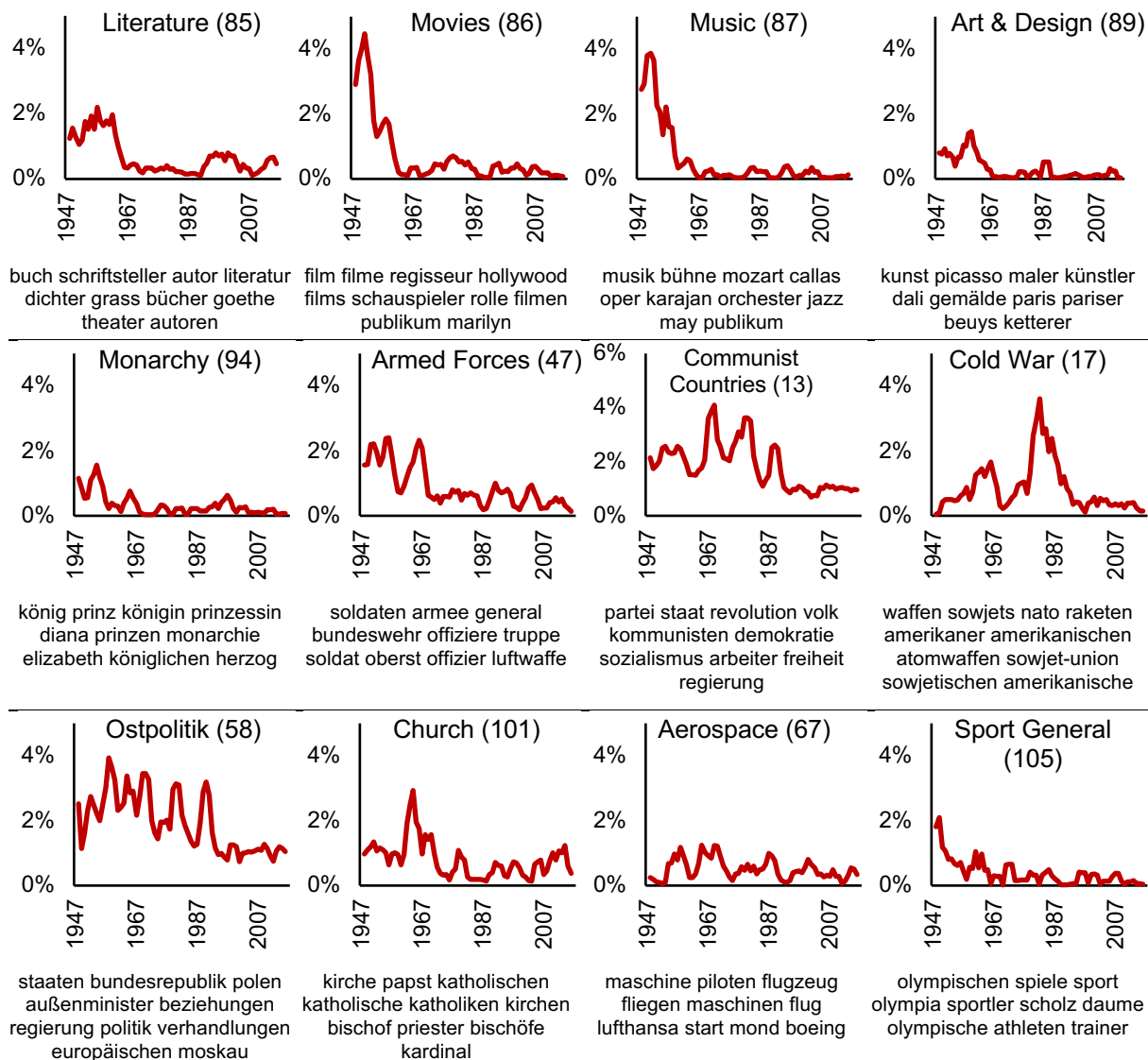
Notes: To account for the effect of aggregation into mega topics, the clustering was based on the individual topics. Source: Own illustration.

³⁶ Here, I follow Wiedemann (2016), although I use a distance matrix with non-squared values.

IV. Periodization

What exactly distinguishes these three periods? In the following, I will highlight certain characteristics of each period by taking Figure 6 as a starting point. In addition, I will describe some observations on the level of individual topics and story sentiment by referring to exemplary cover stories.

Fig. 7 Selected Topics Period I (1947–1968)



Notes: Annual topic shares, three-year centered moving averages, ten most important terms per topic in decreasing order. Source: Own illustrations.

Period I (1947–1968): Compared to the two subsequent periods, the period between 1947 and 1968 is primarily characterized by a focus on ‘light’, entertaining topics. This can be seen most clearly in the high proportion of the mega topic *Culture & Media* (five percent vs. two percent, respectively), which is found primarily in texts with positive sentiment. This strong focus on cultural topics is fed by several individual topics. First, there is topic 85 *Literature*, which has a topic share of 1.3 percent in this first period (compared to 0.3 and 0.5 percent, respectively)

and which, for example, refers to cover stories about William Shakespeare, Austrian writer Heimito von Doderer, or Pulitzer Prize winner Thornton Wilder. Topic 84 *Movies* has a similarly high importance. Examples include cover stories about Hildegard Knef, Italian film star Gina Lollobrigida, or Austrian-Swiss actress Maria Schell. At 1.2 percent, topic 83 *Music* also has a much higher share than in the two subsequent periods, resulting, for example, from cover stories about jazz musician Ray Nance or opera singer Maria Callas. At 0.7 percent, topic 89 *Art & Design* is smaller, but stories about art dealer Roman Norbert Ketterer or fashion designer Yves Saint-Laurent, for instance, frequently made it to the first page. The fact that entertainment was in the foreground at this time can also be seen in slightly higher proportions of the mega topic *Sports* and the individual topic *Monarchy*, both of which show rather positive connotations. For example, Der Spiegel reported on the accession of Carl Gustav of Sweden, on the financial problems of Rainier of Monaco, and the young Juan Carlos of Spain as well as on athlete Jutta Heine.

A second characteristic of the first period is the high proportion of the mega topic *Foreign Affairs*. Its main components, as well as their negative sentiment scores, point to the dominant theme of foreign reporting, that is, the unfolding Cold War. This is reflected not only in an explicit topic (17), but also in related topics such as *Communist States* (13), *Soviet Union* (15), *USA II* and *III* (18 and 28, respectively), and *Ostpolitik* (58), all of which reach their maximum in the first period. The highest shares of the mega topic are found in cover stories about John F. Kennedy, back then presidential candidate, Soviet defense minister Rodion Malinowski, and the overthrow of the First Secretary of the Central Committee of the Communist Party of Czechoslovakia, Alexander Dubček, during the ‘Prague Spring’. Regarding specific countries, there is a strong focus on France (22), Great Britain (21), and Italy (29). Topic 27 shows that developing countries were covered as well, for example in cover stories on diamond entrepreneur Ernest Oppenheimer or South African Nobel Peace Prize winner Albert John Luthuli. Another mega topic that reaches its peak in the period between 1947 and 1968 is *Religion*. The main driver here is *Church* (101), which results, for example, from cover stories about the Archbishop of Cologne, Josef Frings, or Pope Paul VI or an interview with theologian Michael Schmaus.

There are also some special features at the level of individual topics. For example, topic 47 *Armed Forces* has a fairly high share of two percent, which results, for instance, from a report of First Lieutenant Gerhard Philipp Humbert about his time on the Eastern Front during World War II or a story on the first Inspector General of the Bundeswehr, Adolf Heusinger.

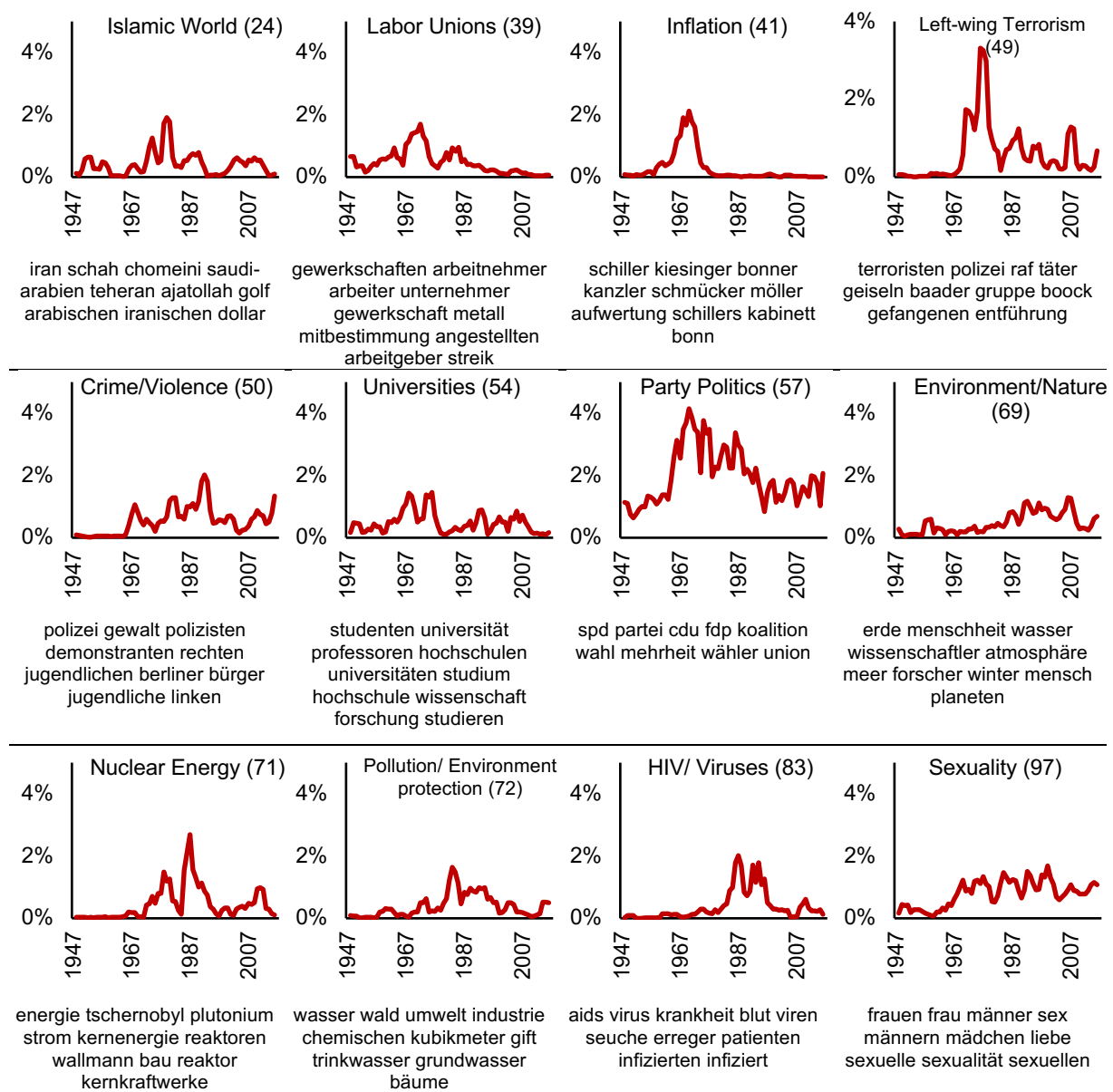
Furthermore, in the 1960s, legal topics were increasingly popular, as can be seen in topics *Law* (46) and *Justice* (48).

In business reporting, stories on coal trader Erich Nold, who championed the interests of small shareholders at general meetings, or the major shareholder of the Gelsenkirchener Bergwerks-AG Hermann Dietrich Krages lead to an increased share of the topic *Banking/Finance* (38). *Heavy Industry* (42) also has the highest share in this period, for example cover stories on the chairman of the Wirtschaftsvereinigung Eisen- und Stahlindustrie Hans-Günther Sohl or steel entrepreneur Alfried Krupp von Bohlen und Halbach. The same applies to topic 43 *Trade*, which results from stories on Werner Hagen, President of the Association of Retail Chains, or watch retailer Leon Weiß. Regarding the mega topic *Science and Technology*, topic 67 *Aerospace* stands out, a topic that can be found in a story on the pilots of Lufthansa or on several airplane accidents in 1966.

As the above-mentioned examples illustrate, in this first period from 1947 to 1968, people of public interest were often at the core of reporting or at least served as the starting points for the subsequent stories, giving them a touch of tabloid press. This is also indicated by topic 10, which appears as a meta topic above all in those texts in which family and kinship relationships are described. Further evidence for this finding can be seen in the fact that the covers almost exclusively featured portraits until the early 1960s.

Period II (1969–1995): The second period is characterized by an increasing relevance of political and, in the broadest sense, social topics. The mega topic *Politics* rises by 1.8 percentage points to just under ten percent and reaches the highest value of all three periods. Particularly, topic 57 *Party Politics* stands out. Its components indicate the character of a background topic that reflects the general preoccupation with party-political issues. Between 1969 and 1995, it accounted for almost three percent of the total corpus, while before and after it only accounted for about 1.5 percent, which indicates an increased politicization of reporting. Other political topics, such as *Ostpolitik* (58) or *Monetary Policy / Economic Development* (33), reach a high share as well. The mega topic *Foreign Affairs*, at a good eleven percent, has only a slightly smaller share than in the first period; for obvious reasons, there are certain continuities at the level of the individual topics connected to the Cold War. From the 1970s onward, however, a new emphasis in the coverage of foreign relations can be observed. As topic 20 shows, the Middle East might have been covered before; but together with topic 24 *Islamic World* and topic 16 *Middle East I*, this region is now more important, accounting for a total of 1.7 percent. The reason for this can be seen in the two oil price shocks, with the Iranian Revolution of 1979 and its consequences being covered in more often than the first oil price shock.

Fig. 8 Selected Topics Period II (1969–1995)



Notes: See Figure 7. Source: Own illustrations.

The energy crisis of the 1970s is also reflected in the mega topic *Science and Technology*. Its topic share is 1.8 percentage point higher than in the first period. This increase is due to topics from two fields. First, topic 71 *Nuclear Energy* jumped from almost zero to just under one percent, reaching its first peak at the end of the 1970s. Here, extremely negative cover stories reveal a critical attitude towards nuclear power after, but also before, the reactor accident in Harrisburg in 1979. The topic reached a second peak after the Chernobyl catastrophe. Secondly, the problem of finding a nuclear repository points to an increased sensitivity for nature and environmental protection. This is reflected in two further topics, *Environment/Nature* (69) and *Pollution/Environment Protection* (72), which reflect the discussion of several environment-related issues: water scarcity, *Waldsterben*, acid rain, various dioxin scandals, the disaster in

Bhopal, India, which resulted in significant pollution and numerous deaths, the ozone hole, and, of course, the ‘climate catastrophe’. A cover story from 1989 can be regarded as the culmination point of this field. Being headlined “Who is saving the earth? The battered planet”³⁷, the story reported on the G7 meeting in July that was held in Paris, when environmental issues were discussed for the first time among government leaders.

The increasing importance of socio-political issues can be seen in three topics from the mega topic *Society*. Topic 54 reflects the debate that took place between the late 1960s and late 1970s about the current state and the future of German universities, especially the discussion about the admissions system (*Numerus Clausus*). Naturally, Der Spiegel also dealt with the student movement whose violent excesses are reflected in a separate topic (49 *Left-wing Extremism*). Cover stories dealt, for example, with the Baader-Meinhof group, the kidnapping of CDU politician Peter Lorenz by a group called ‘Bewegung 2. Juni’ and, of course, the terror of the ‘Rote Armee Fraktion’. As topic 50 shows, *Crime and Violence* gained overall importance from the late 1960s onward. Here, too, the student protests can be cited as an example, which were discussed in 1969 under the headline “Violence against violence?”³⁸. In addition, the topic can be found, for example, in stories about violent protest, police violence, the overburdening of the police, and right-wing extremism among young people.

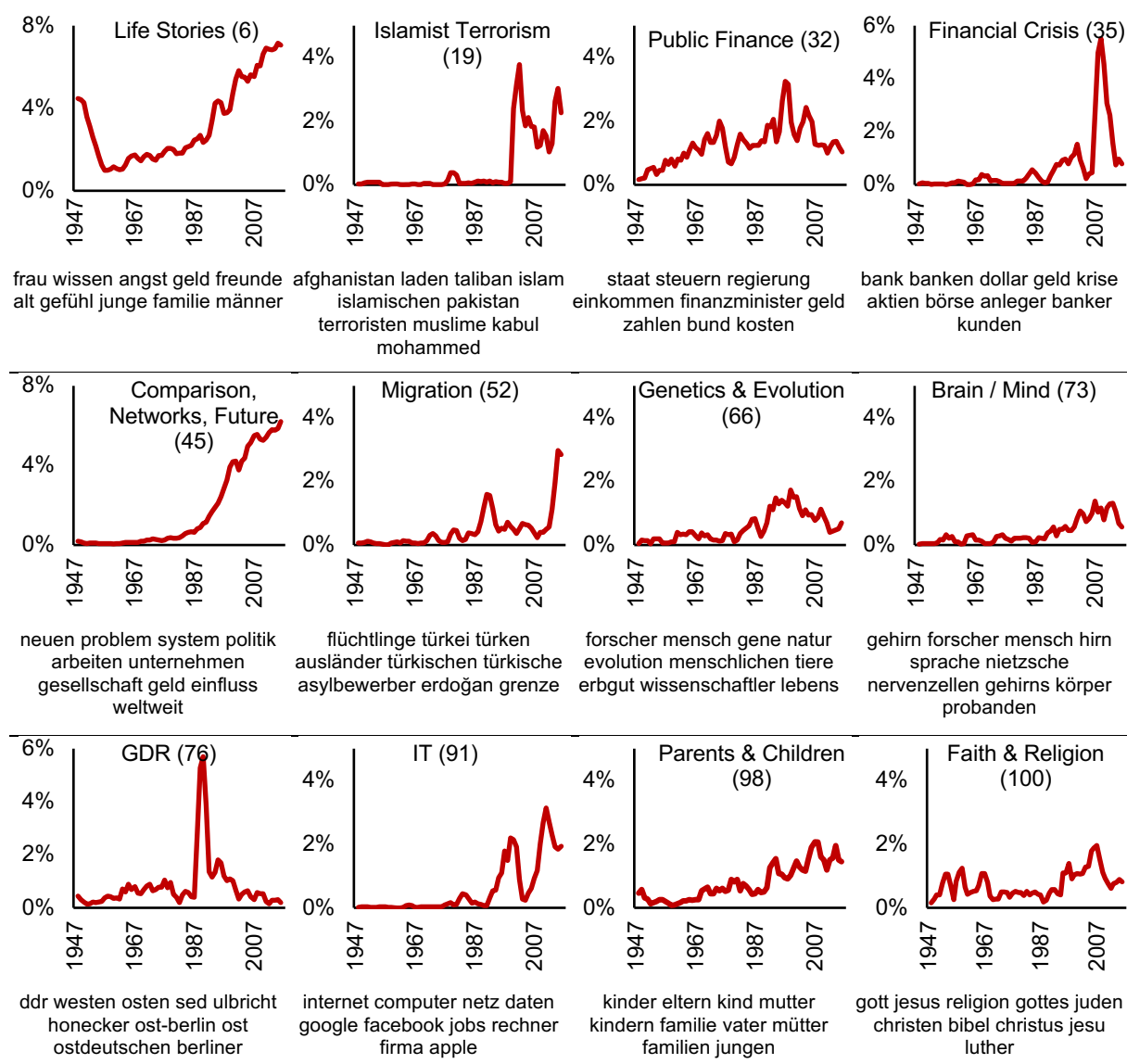
Another issue that gains importance in the second period is expressed in the mega topic *Health*. For example, topic 84 *Health Care System* reaches an all-time high in this period, which results, for instance, from cover stories about dentist fees or the quality of the German medical profession. Medical topics also received increased attention, from artificial hearts to immune therapies to acupuncture, which is reflected in topic 81 *Medicine*. Connected to this, topic 80 shows that diseases in general were repeatedly discussed, such as cancer, back pain, or venereal diseases. The latter touches on another medical topic with a high socio-political relevance: HIV and AIDS (topic 83). The first cover story on this disease dates from 1983, when the term “homosexual epidemic”³⁹ used by Der Spiegel to describe the illness reveals the contemporary view of the subject. The fact that HIV repeatedly made it on the front page in the following years can also be explained by the fact that sexuality had become increasingly present in the cover stories since the late 1960s. The corresponding topic (97), which was assigned to the mega topic *Family and Partnership*, refers, for example, to stories about the sexuality among young people, lesbian romance, affairs and sexism in the workplace, and pornography consumption among women. Regarding the cover stories published since the mid-1970s, it is striking that the

³⁷ Own translation.

³⁸ Own translation.

³⁹ Own translation.

Fig. 9 Selected Topics Period III (1996–2017)



Notes: See Figure 7. Source: Own illustrations.

corresponding illustrations show a particularly large amount of – predominantly female – naked skin. Particularly outstanding in this respect is the year 1978, when female nudity – specifically, breasts exposed on the beach – even formed its own cover story. The fact that the mega topic *Family and Partnership* rises in the second period is attributable not only to the topic *Sexuality* (97), but also to the topic *Parents and Children* (98), which can be found in cover stories that deal with family relationships, such as the importance of fathers for children of divorce. Regarding economic topics, the period from 1969 to 1995 is characterized by several shifts. For example, the rather abstract topic *Money* (31) reaches its maximum in this period, relevant cover stories dealing, for example, with taxation evasion or insurance and real estate agents. The rather general topic 33 *Monetary Policy / Economic Development* also reaches its climax in this period. This results mainly from the dollar crisis in the early 1970s, the rise in unemployment

caused by the first oil price crisis, the devaluation of the deutschmark in the early 1980s, and the economic upswing that began in the mid-1980s. The monetary turbulences of the late 1960s and early 1970s are reflected in topic 41 *Inflation*. Topic 39 refers to trade unions, for example in the context of co-determination and wage policy. Topic 34 is particularly present in documents dealing with large companies, such as the takeover of AEG by Daimler-Benz in 1985 or the tech-company IBM.

Topic 76 shows that the GDR played a relatively small role in Spiegel's cover stories; at just under 0.9 percent, the corresponding topic *GDR* (76) has a similar share as *Sexuality* (97) or *Diseases* (80). The GDR was occasionally present on the front page before the fall of communism. However, the topic is mainly present in the years between 1988 and 1991 (4.4 percent on average); between 1991 and 2000, it still averages a good one percent. The last major front-page story on the GDR dates from 2009, when the Spiegel featured a chronology of the events of November 9 to mark the 20th anniversary of the fall of the Berlin Wall.

Period III (1996–2017): In some respects, the third period can be regarded as a continuation of the second, at least at the level of mega topics. *Society* continues to gain in importance, as are *Science & Technology* and *Family & Partnership*. The mega topic *Foreign Affairs* continues to decline, *Business/Economy* being as present as in the previous period. The first impression thus supports the thesis that the “beginnings of the upheaval and transformation to our present”⁴⁰ have their roots in the 1970s and the subsequent period. On closer examination, however, there are some topics that are characteristic of the post-1996 period, suggesting that some current phenomena have a somewhat shorter run-up from the past than others. At the level of mega topics, the most striking is the high value of *Society*, which reaches its maximum here with a good ten percent (compared to just under six and just under nine percent in the first and second period, respectively). This is primarily due to topic 45 *Comparison, Networks, Future*, a rather abstract topic that is difficult to grasp at first glance. A closer look reveals that the topic represents three abstract aspects that are directly related to fundamental developments since the mid-1990s. The first aspect is that of comparison. Numerous cover stories have in common that they draw an either explicit or implicit comparison, often by means of a ranking. Examples include comparisons of the educational level of German districts or German universities, Europe's “hippest cities“, the distribution of wealth in Germany, or the “winners and losers“ of globalization. The latter leads to a second aspect that is frequently addressed in this period, either explicitly or latently. Many stories cover the phenomenon of *Vernetzung*, that is, networks and their emergence, not only at the abstract level of globalization, but also in terms of specific networks, such

⁴⁰ Doering-Manteuffel and Raphael (2016, p. 9), own translation.

as the tech elites of Silicon Valley, Germany's political elites, or female career networks. This aspect is particularly prominent in cover story No. 14/2000, which includes an interview with American sociologist Manuel Castells on the “network society”.⁴¹ The title of this cover story: “The World in the 21st Century. The explosion of science”⁴² leads on to the third aspect. Since 1996, there have been more and more cover stories dealing with modernity or, in general, the future, such as modern life, modern work, or the modern family image. Associated with this are numerous stories that deal with the future in one form or another, such as Germany in 2010 or 2030, or the question of whether Germans are ready for the digitized future propagated by US technology corporations. When reviewing these cover stories, one can also notice that the aspect of acceleration often plays a latent role. In some stories, it is explicitly addressed, for example in “Die Turbo-Uni” or a piece on mental burnouts.⁴³

The third period can be characterized by several further topics. A look at the components of the mega topic *Foreign Affairs* reveals that in the years following the attacks of 9/11, the Middle East again moved into the focus of the cover stories, which is expressed above all in topics *Middle East I* (16), *Islamist Terrorism* (19), and *USA I* (14). Regarding these topics, coverage was particularly intense in 2003, when a good 40 percent of all cover stories were linked to the war in Iraq or related issues, most of which relate to Islam. This focus on Islam coincides with a general comeback of religion, which can be observed in topic 100 *Faith & Religion*. This topic refers primarily to cover stories about Christianity, but also, for example, about the common roots of Islam, Christianity, and Judaism. Cover stories such as “Is God an Error? And Man Just an Accident?” or “Is There Anyone? The Future of Religion Faith Without God”⁴⁴ indicate that not only religion but faith in general experienced a comeback since the mid 1990s. In this third period, business and economic reporting is mostly characterized by the global financial and economic crisis of 2007ff and the subsequent European debt crisis, which are reflected in topic 35. Already in the 1990s, however, we can observe an increase in financial topics, for example in cover stories about financial speculation, the exploitation of small investors, the crash on the New Market, or the failed merger of Deutsche Bank and Dresdner Bank. Topic (32) relates to the desolate state of public finances at the turn of the millennium, covering a wide range of sub-topics. First and foremost, this topics results from reports on the German

⁴¹ Cf. Castells (2017).

⁴² Own translation.

⁴³ Readers might have noticed that topic 43 has received more attention than others. This is because with this topic, the third period takes a special position in the sense that it has some that we could call its own ‘zeitgeist topic’, which is not the case in the other two periods. At this point, we can only speculate about the reasons for this; it could play a role, for example, that the cover stories deal less and less with individuals and more with abstract issues over time.

⁴⁴ Own translation.

fiscal system, various tax reforms, and the general state of public finances, together with discussions of the German welfare system. As the social security systems were burdened by a record number of unemployed until the mid-2000s, it is not surprising that the topic *Unemployment* (36) also reaches its peak in the years before 2005, when the unemployment rate reached its all-time high.

The mega topic *Science & Technology* shows that science-related topics gained importance during the 1990s as well. After the founding of the Human Genome Project in 1990, science-related reporting initially focused on genetics and evolution. Topic 66 *Genetics & Evolution* reveals cover stories such as “The Secret of Shape. How Evolution Works“, “Who Owns the Human Blueprint?“ (a piece on the commercialization of genome research), or “The Divine Spark. What is the goal of evolution?”⁴⁵ Topic 73 *Brain/Mind* shows that genetics was replaced by neurology in its role as leading science in the early 2000s. The topic results from numerous articles that show a high attention for neurology and its influence on human action and feeling. Corresponding cover stories deal, for example, with the neurological foundations of compassion, emotional poverty, intuition, or the optimization of neurological performance.

In the second half of the 1990s, the topic *Cosmos* (68) also shows an increased topic share, revealing an interest in ‘extraterrestrial’ topics such as the Big Bang, extraterrestrial life, anti-matter, or the danger posed by comets. Other key topics in this last phase are *Information Technology* (91), *Education* (98), *National Socialism* (77), and *Migration* (52). In addition, Topic 6 *Life Stories* shows that a revival of personal reporting in this phase.

V. Conclusion

Based on the observation that the cover stories of *Der Spiegel* are regularly used as a reference point for describing research narratives or even some sort of *zeitgeist*, the aim of this paper was to systematize this kind of referencing by examining all *Spiegel* cover stories published between 1947 and 2017. In order to operationalize this project, I addressed three specific questions: Which topics were *en vogue* at which point in time? What sentiment is expressed in the cover stories? And what continuities, shifts, and structural breaks can we observe regarding both aspects? I proposed an answer to these questions using methods from the field of computational text analysis, specifically topic modeling and sentiment analysis. Based on a model consisting of 105 topics, I identified three periods. The first one (1947 to 1968) is characterized by a focus on entertaining topics, culture, and people of public interest as well as a rather positive tonality. The second period (1960 to 1995) shows the beginning of a politicization, which is also

⁴⁵ Own translation.

associated with a greater relevance of social issues as well as a rather negative tone. In the third phase (1996 to 2017), this trend continues, supplemented by a renewed focus on individuals and greater fluctuations in tonality. Additionally, the third period is characterized by three latent aspects: comparison, networks, and the future.

The aim of the paper was not to reconstruct specific media narratives or a particular zeitgeist. Rather, I tried to show which topics had media visibility at a certain point in time, inviting the community to take a more detailed look at certain topics and narratives. A systematic comparison of the results with corresponding historical diagnoses is also still pending. This applies in particular to the periodization of the period since the end of World War II. Here, some aspects, such as the temporal break at the end of the 1960s, fit into existing findings.⁴⁶ Others, such as the second break in the mid-1990s, require further attention.

⁴⁶ Cf. Rödder (2004).

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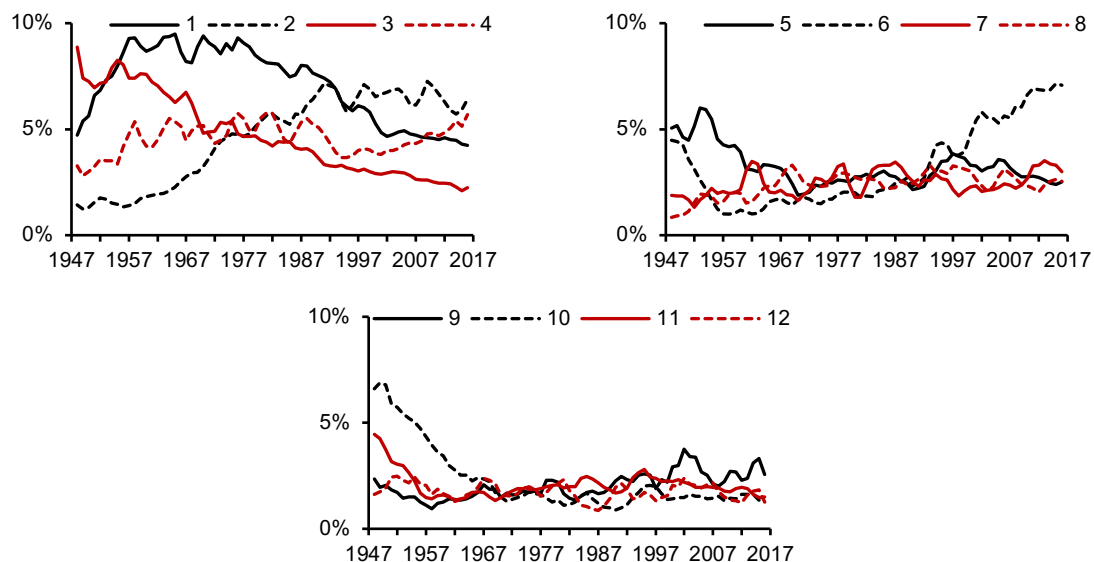
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Appendix

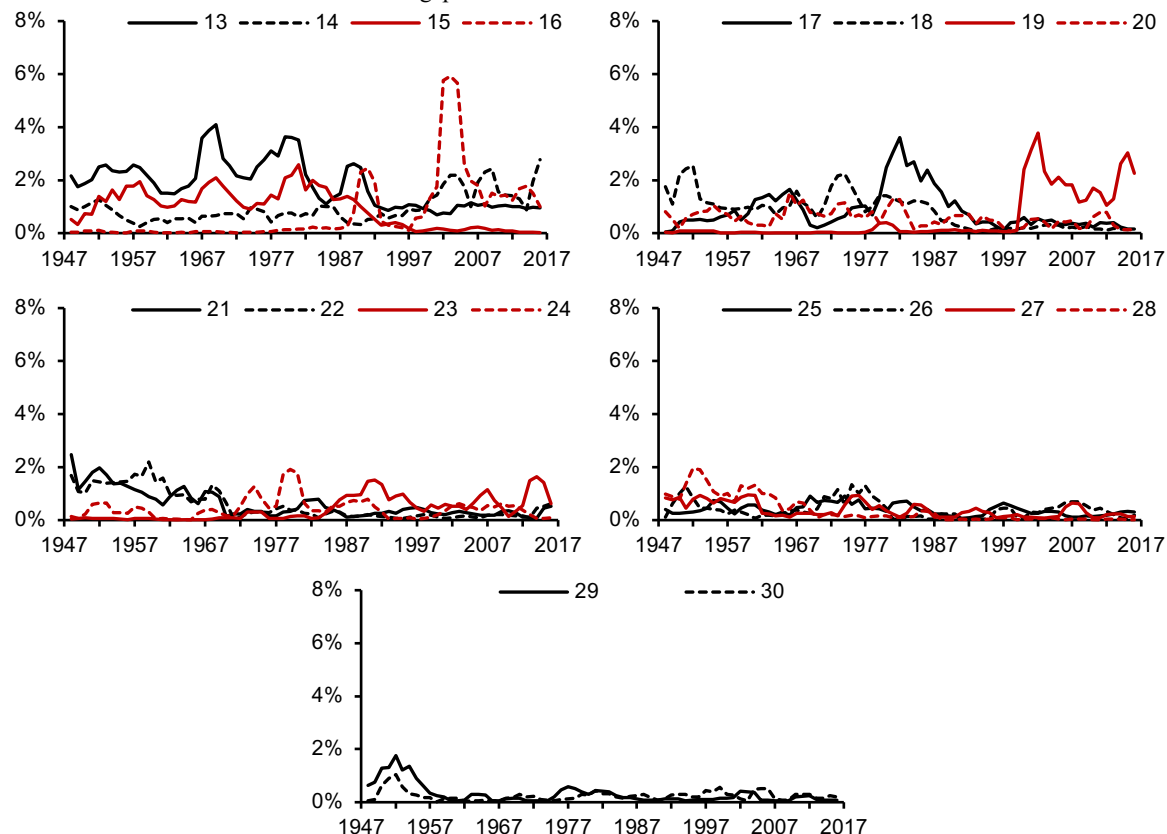
Tab. A–1 Topics / Mega topics

Meta Topics	Share (%)	Sent. Score	Top 10 Terms
1 Technology-/ figure-related language	7,0	-4,4	entwicklung neuen mittel entwickelt wissen system arbeiten ergebnis frei gleiche
2 Negative stories	4,9	-9,4	neuen politiker angst druck fürchten chance alte chef hoffnung fallen
3 People	4,6	-4,9	neuen chef alten amt freund nachfolger posten gelegenheit platz frühjahr
4 Interviews	4,3	-3,4	wissen glaube meinung politik rolle problem antwort kritik vorstellen wahrheit
5 Culture-related language	3,1	-0,8	geschichte blick licht geist neuen kunst wirklichkeit rolle werk gestalt
6 Life Stories	3,1	-4,7	frau wissen angst geld freunde alt gefühl junge familie männer
7 Investigative Stories	2,5	-12,5	verdacht mitarbeiter wissen akten brief informationen bericht behörden material angaben
8 Reflection/Morals	2,4	-3,6	gesellschaft freiheit mensch generation alten kultur vergangenheit angst jahrhunderts sozialen
9 Catastrophes	2,1	-21,2	männer tod toten tote wasser frauen boden polizei richtung polizisten
10 Family Relationships	2,0	-0,6	frau vater sohn mutter familie jungen tochter junge tod bruder
11 Physical Appearance	2,0	-0,4	schöne haut nase hals sucht beine roten arme rote publikum
12 War	1,8	-17,6	armee soldaten volk landes bevölkerung hauptstadt truppen sieg waffen staat



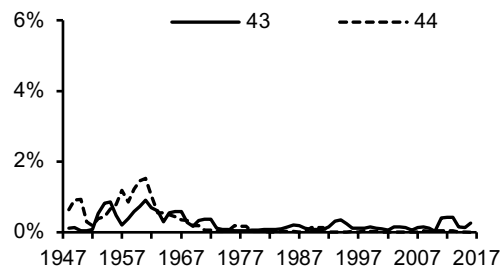
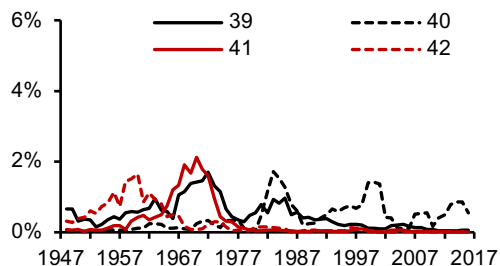
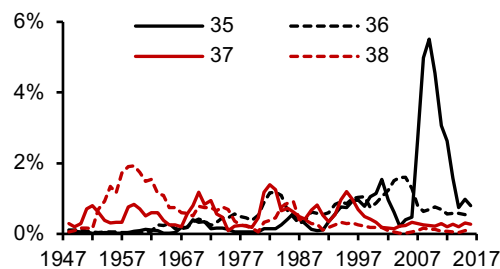
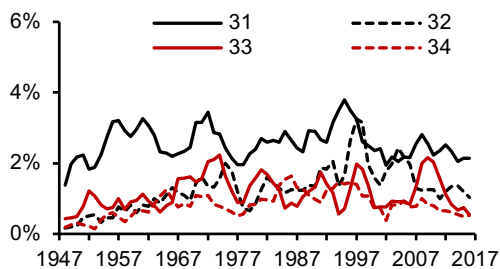
Foreign Affairs	Share (%)	Sent. Score	Top 10 Terms
13 Communist Countries	1,8	-8,5	partei staat revolution volk kommunisten demokratie sozialismus arbeiter freiheit regierung
14 USA I	1,0	-6,7	new york dollar amerika amerikanischen trump amerikanische clinton washington obama
15 Soviet Union	1,0	-8,2	moskau stalin sowjetischen sowjet-union sowjetische moskauer breschnew chruschtschow stalins russen
16 Middle East I	0,9	-20,9	irak saddam bush amerikaner bagdad washington hussein präsident irakischen soldaten
17 Cold War	0,9	-13,5	waffen sowjets nato raketen amerikaner amerikanischen atomwaffen sowjet-union sowjetischen amerikanische
18 USA II	0,8	-10,2	präsident amerikanischen präsidenten washington amerika amerikaner amerikas reagan nixon amerikanische
19 Islamist Terror	0,7	-22,4	afghanistan laden taliban islam islamischen pakistan terroristen muslims kabul mohammed
20 Middle East II	0,6	-13,6	israel arabischen israelis araber juden israelis ägypten israelischen israelische jerusalem
21 UK	0,5	-4,7	england britischen briten london britische churchill londoner englands großbritannien englischen
22 France	0,5	-5,3	frankreich französischen gaulle paris franzosen frankreichs französische pariser algerien general
23 Russia	0,5	-10,0	gorbatschow moskau russischen russland putin ukraine russische russen rußland jelzin

24 Islamic World	0,5	-12,2 iran schah chomeini saudi-arabien teheran ajatollah golf arabischen iranischen dollar
25 Ibero-Amerika	0,4	-11,3 spanien spanischen castro kuba touristen franco spanier spanische insel madrid
26 China	0,4	-5,9 china mao peking chinesen chinesischen chinas chinesische maos tschiang tschou
27 Developing Countries	0,4	-5,4 afrika weißen indien südafrika nehru afrikanischen weiße lama dalai uno
28 USA III	0,3	-3,7 kennedy johnson kennedys weißen roosevelt senator neger luce amerikanischen staaten
29 Italy	0,3	-10,6 italien italienischen italiener rom italienische italiens berlusconi mussolini mafia don
30 Asia	0,2	-10,5 japan japaner japanischen japanische tokio japans thailand asien indonesien singapur

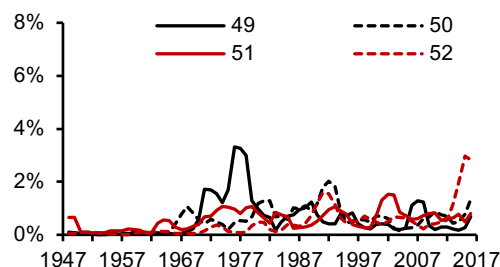
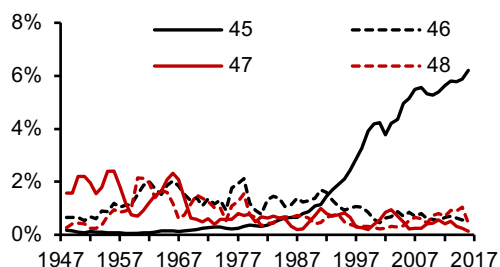


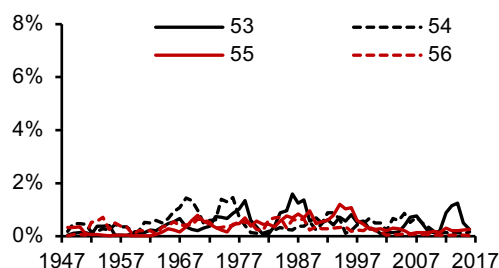
Business/Economy	Share (%)	Sent. Score	Top 10 Terms
31 Money	2,6	0,2	geld zahlen geschäft kosten firma preis markt hälfte million verkaufen
32 Public Finance / Social Security	1,3	-0,1	staat steuern regierung einkommen finanzminister geld zahlen bund kosten reform
33 Monetary Policy/Economic Development	1,2	-4,3	wirtschaft dollar regierung länder bundesrepublik preise wachstum investitionen währung inflation
34 Large Corporations	0,9	3,7	unternehmen firmen industrie firma manager siemens produktion konzern neuen konzerne
35 Financial Crisis	0,7	-6,8	bank banken dollar geld krise aktien börse anleger banker kunden
36 Unemployment	0,6	0,3	job arbeitslosigkeit arbeitsplätze arbeiten arbeitslosen arbeitsmarkt jobs unternehmen arbeitslose beschäftigten
37 Real Estate/Construction	0,5	-0,2	heimat wohnungen neuen berliner bau quadratmeter mieter schneider wohnung häuser
38 Banking/Finance	0,5	3,9	bank aktien unternehmen flick banken aufsichtsrat abs aktionäre herrhausen konzern
39 Labor Unions	0,5	-0,8	gewerkschaften arbeitnehmer arbeiter unternehmer gewerkschaft metall mitbestimmung angestellten arbeitgeber streik
40 Corruption	0,5	-2,1	geld staatsanwaltschaft flick brauchitsch staatsanwälte schweiz spenden schweizer ermittler firma
41 Inflation	0,3	-0,5	schiller kiesinger bonner kanzler schmücker möller aufwertung schillers kabinett bonn
42 Heavy Industry	0,3	0,4	krupp schlamm kohle beitz schlieker ruhr stahl bergbau burckhardt rezzori

43 Trade	0,3	6,1	kunden neckermann ware aldi werbung ikea umsatz verbraucher läden herstel- ler
44 Industry/Cars	0,2	7,9	oetker porsche grundig sade borgward firma rosenthal wagen nsu goergen

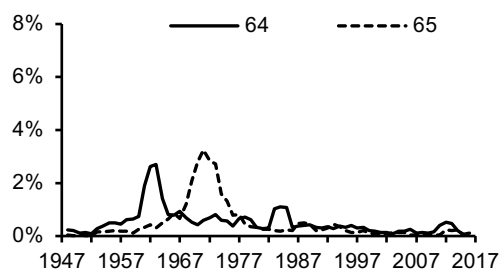
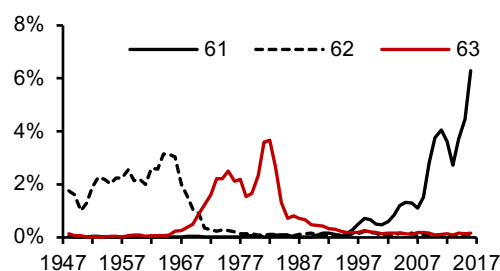
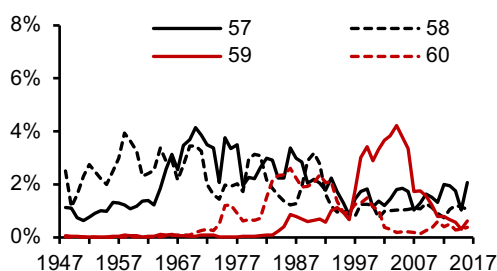


<i>Society</i>	Share (%)	Sent. Score	Top 10 Terms
45 Comparison, Networks, Future	1,9	0,7	neuen problem system politik arbeiten unternehmen gesellschaft geld einfluss weltweit
46 Law	1,1	-8,3	gesetz staat bundesrepublik bundestag grundgesetz bürger verfassung artikel ge- setze richter
47 Armed Forces	0,8	-13,7	soldaten armee general bundeswehr offiziere truppe soldat oberst offizier luft- waffe
48 Justice	0,8	-23,9	richter gericht justiz gefängnis urteil angeklagten verurteilt verfahren prozeß strafe
49 Left-wing Extremism	0,6	-26,9	terroristen polizei raf täter geiseln baader gruppe boock gefangenen entführung
50 Crime & Violence	0,6	-22,2	polizei gewalt polizisten demonstranten rechten jugendlichen berliner bürger ju- gendliche linken
51 Schooling	0,6	0,7	schüler lehrer schule schulen eltern kinder unterricht klasse lernen schülern
52 Migration	0,5	-17,2	flüchtlinge türkei türken ausländer türkischen türkische asylbewerber erdoğan grenze behörden
53 Secrets/Espionage	0,5	-9,0	bnd barschel verfassungsschutz pfeiffer agenten nsa geheimdienst traube geheim- dienste engholm
54 Universities	0,5	4,8	studenten universität professoren hochschulen universitäten studium hochschule wissenschaft forschung studieren
55 Narcotics/Crime	0,4	-19,9	polizei heroin drogen stoff kokain kriminalität haschisch prostitution kripo droge
56 Opinion Polls	0,3	-0,4	befragten bahn bundesbürger antworten umfrage meinung emnid mehrheit volks- zählung bundesbahn



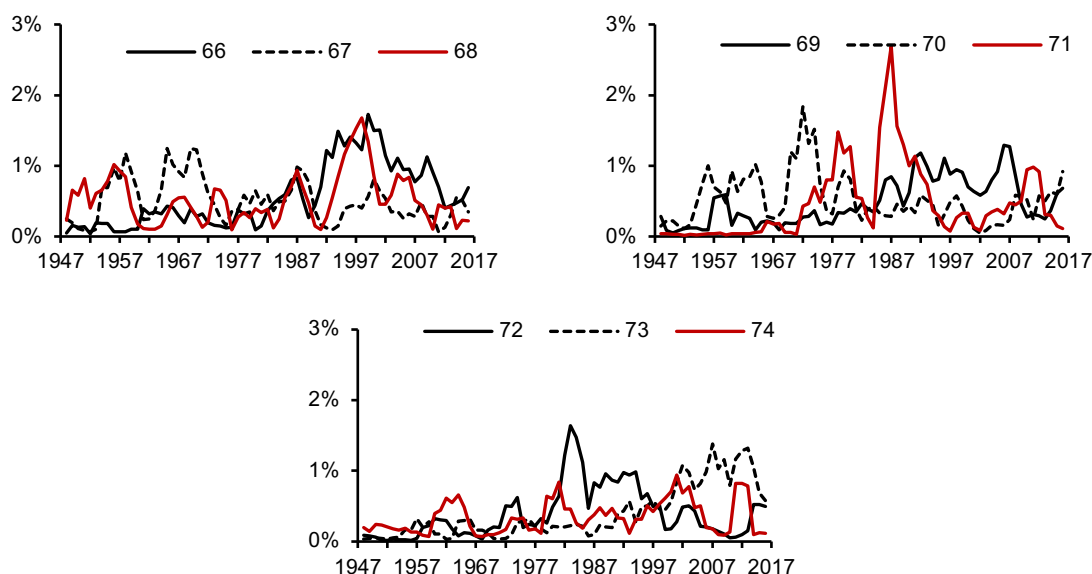


Politics	Share (%)	Sent. Score	Top 10 Terms
57 Party Politics	2,0	-1,1	spd partei cdu fdp koalition wahl mehrheit wähler union parteien
58 Ostpolitik	1,9	-2,2	staaten bundesrepublik polen außenminister beziehungen regierung politik verhandlungen europäischen moskau
59 Schröder	0,9	-1,7	schröder fischer lafontaine kanzler spd grünen stoiber müntefering schröders scharping
60 Kohl	0,7	-2,6	kohl kanzler bonner schäuble kohls bonn union genscher cdu bidenkopf
61 Merkel	0,7	-3,9	merkel kanzlerin schulz europäischen union griechenland politik brüssel merkels europäische
62 Adenauer	0,7	-0,2	adenauer kanzler bonn bonner adenauers mende bundeskanzler gerstenmaier schröder cdu
63 Schmidt	0,6	-1,7	schmidt kanzler genscher bonner brandt vogel bonn sozialdemokraten lambsdorff genossen
64 Politicians / Political Affairs	0,5	-5,6	minister bonner bonn beamten staatssekretär strauß ahlers amt augstein beamte
65 Brandt	0,5	2,7	brandt wehner barzel scheel brandts bonn kanzler bahr herbert bonner

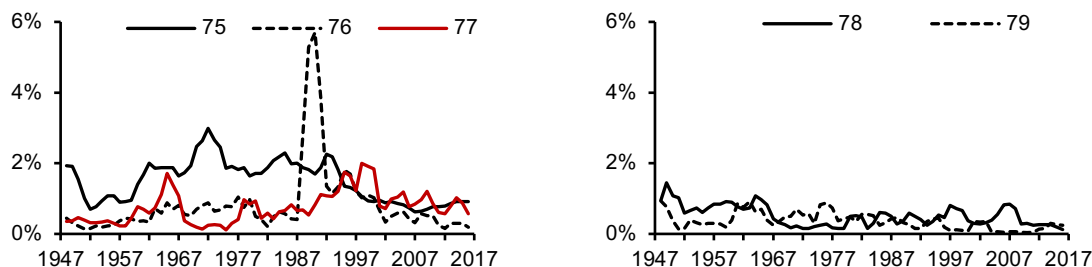


Science/Technology	Share (%)	Sent. Score	Top 10 Terms
66 Genetics / Evolution	0,6	-2,7	forscher mensch gene natur evolution menschlichen tiere erbgut wissenschaftler lebens
67 Aerospace	0,6	-9,7	maschine piloten flugzeug fliegen maschinen flug lufthansa start mond boeing
68 Universe	0,6	-2,0	erde physiker einstein planeten sonne wissenschaft universum wissenschaftler physik materie
69 Environment/Nature	0,5	-9,4	erde menschheit wasser wissenschaftler atmosphäre meer forscher winter mensch planeten
70 Automotive Industry	0,5	-4,3	autos wagen Autofahrer Opel Volkswagen Straßen Fahrer Porsche Nordhoff Verkehr
71 Nuclear Energy	0,5	-10,8	energie tschernobyl plutonium strom kernenergie reaktoren wallmann bau reaktor kernkraftwerke
72 Pollution, Environment Protection	0,4	-16,9	wasser wald umwelt industrie chemischen kubikmeter gift trinkwasser grundwasser bäume
73 Brain/Mind	0,4	1,5	gehirn forscher mensch hirn sprache nietzsche nervenzellen gehirns körper probanden

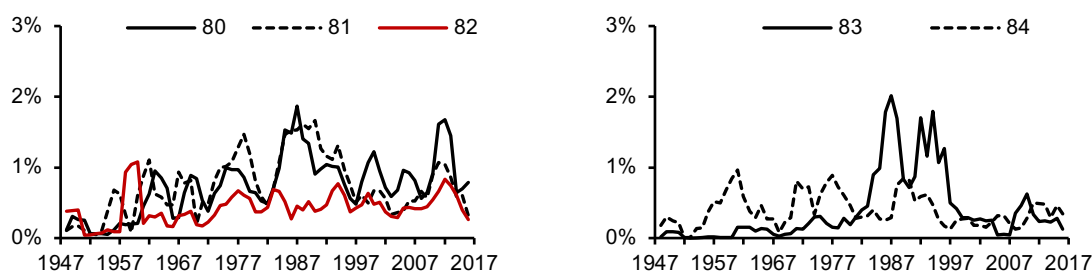
74 Seafaring 0,4 -14,5 schiff schiffe bord wasser titanic see meer kapitän küste marine



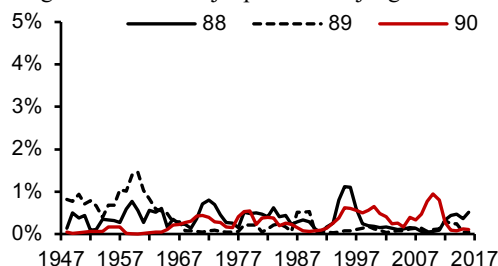
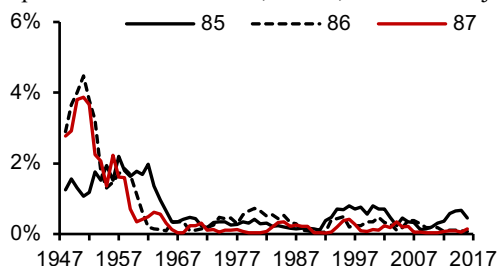
Germany	Share (%)	Sent. Score	Top 10 Terms
75 Location References	1,5	-10,6	hamburger hamburg bundesrepublik frankfurter bonner münchen frankfurt berliner münchner hannover
76 GDR	0,9	-1,5	ddr westen osten sed ulbricht honecker ost-berlin ost ostdeutschen berliner
77 National Socialism	0,8	-19,2	hitler juden hitlers führer auschwitz nazis goebbels serben kosovo adolf
78 Prussia/Austria	0,5	-6,8	preußen bismarck reich kaiser österreich könig preußischen preußische hitler wiener
79 Bavaria/CSU	0,3	-1,2	strauß bayern csu münchen strauss münchner bayrischen zimmermann stoiber bayerischen



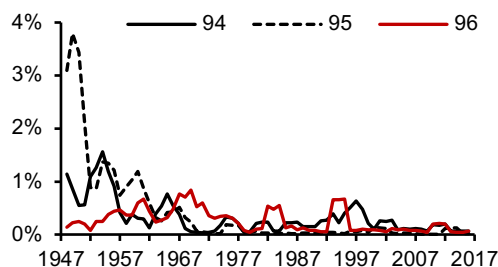
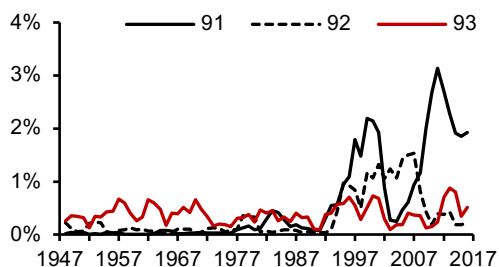
Health	Share (%)	Sent. Score	Top 10 Terms
80 Diseases	0,8	-13,1	mediziner körper frauen gesundheit rauchen wirkung wissenschaftler studien alter ärzte
81 Medicine	0,8	-14,0	patienten ärzte arzt tod krebs medizin herz patient operation sterben
82 Mental Health	0,5	-18,4	freud patienten psychiater depression krankheit freuds angst schlaf psychoanalyse leiden
83 HIV/Viruses	0,4	-25,3	aids virus krankheit blut viren seuche erregere patienten infizierten infiziert
84 Health System	0,4	-7,6	ärzte patienten arzt krankenkassen krankenhaus ärzten medizinern kliniken ärztlichen kassen



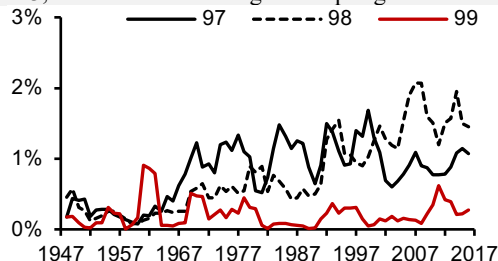
<i>Culture/Media</i>	Share (%)	Sent. Score	Top 10 Terms
85 Literature	0,6	-0,7	buch schriftsteller autor literatur dichter grass bücher goethe theater autoren
86 Movies	0,6	3,6	film filme regisseur hollywood films schauspieler rolle filmen publikum marilyn
87 Music	0,4	9,5	musik bühne mozart callas oper karajan orchester jazz may publikum
88 TV & Radio	0,4	0,6	fernsehen sendung zdf sender zuschauer programm ard rundfunk höfer fernse- hens
89 Art & Design	0,3	8,7	kunst picasso maler künstler dali gemälde paris pariser beuys ketterer
90 Pop	0,3	3,3	beatles love jugend jackson generation musik joop luxus sex jungen



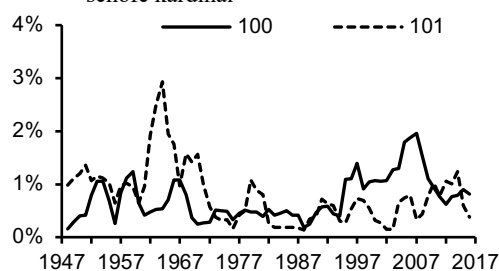
<i>Miscellaneous</i>	Share (%)	Sent. Score	Top 10 Terms
91 IT	0,6	4,5	internet computer netz daten google facebook jobs rechner firma apple
92 Expeditions	0,4	-5,0	christus forscher everest gipfel alten jahrhundert archäologen berg antike lebten
93 Food & nutrition	0,4	-4,4	bauern landwirtschaft fleisch lebensmittel hektar milch rehwinkel tiere verbraucher ewg
94 Monarchy	0,3	0,0	könig prinz königin prinzessin diana prinzen monarchie elizabeth königlichen herzog
95 Displacement	0,3	-2,4	wagner berliner oberländer bayreuth hellwege npd thadden seeger westberlin pitt
96 Press/Animals	0,3	0,4	springer stern verleger grzimek zeitung auflage springers zeitungen blatt presse



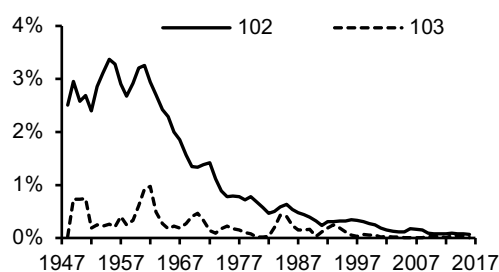
<i>Family/Relationships</i>	Share (%)	Sent. Score	Top 10 Terms
97 Sexuality	0,8	-3,5	frauen frau männer sex männern mädchen liebe sexuelle sexualität sexuellen
98 Parents & Children	0,8	-3,2	kinder eltern kind mutter kindern familie vater mütter familien jungen
99 Divorce	0,2	-3,4	ehe wulff scheidung frau kapfinger schloß käßmann kaul chefrau unterhalt



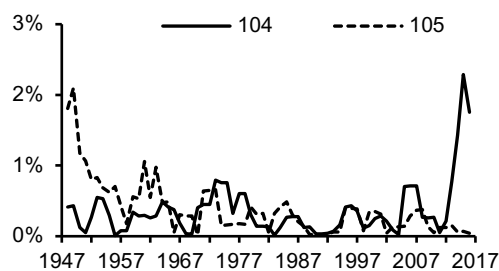
<i>Religion</i>	Anteil (%)	Sent. Score	Top 10 Terms
100 Faith & Religion	0,8	-3,8	gott jesus religion gottes juden christen bibel christus jesu luther
101 Church	0,8	-4,2	kirche papst katholischen katholische katholiken kirchen bischof priester bischöfe kardinal



<i>Artefact</i>	Share (%)	Sent. Score	Top 10 Terms
102 Artefact I	1,0	5,7	amerikanischen westdeutschen bundesrepublik amerikanische westdeutschland schweizer deutscher schweden westdeutsche modernen
103 Artefact II	0,2	-2,8	pornographie wein alkohol promille hauptmann bier rajk trinker stübingen trinken



<i>Sports</i>	Share (%)	Sent. Score	Top 10 Terms
104 Soccer	0,4	2,2	spieler fußball becker mannschaft beckenbauer schumacher graf hoeneß spielen trainer
105 Sports (General)	0,3	6,2	olympischen spiele sport olympia sportler scholz daume olympische athleten trainer



Notes: Topic-share relating to total corpus; sentiment-score based on articles cointaing a share of the respective topic of at least five percent; centered moving three-year average. Source: Own illustrations.