Contents lists available at ScienceDirect

Public Relations Review

ELSEVIER

When frames align: The interplay between PR, news media, and the public in times of crisis

Toni G.L.A. van der Meer*, Piet Verhoeven, Hans Beentjes, Rens Vliegenthart

Amsterdam School of Communication Research, University of Amsterdam, The Netherlands

A B S T R A C T

This study focuses on the frame-building process of organizational-crisis situations in the interplay between the domains public relations (PR), news media, and the public. The purpose of the study is to investigate whether the crisis frames of the domains align over time. To empirically analyze frame alignment, an automated semantic-network analysis is introduced to compare implicit framing among the domains. By examining press releases, news articles, and social-media manifestations of four Dutch crisis cases, the dynamic character of crisis framing became apparent. The study documents the rise of crisis-frame alignment among PR, news media, and the public over time. After frame alignment the domains' discourses move away from one another resulting in more variation between frames. This pattern of alignment is considered to be crisis specific as a necessity to collectively make sense of a complex crisis situation. The collective sensemaking might be crucial to solve organizational crises and to avoid uncontrollable crisis magnification.

1. Introduction

Societies are frequently confronted with disruptive organizational crises that have a significant impact. Because organizational crises are characterized by a rapid succession of emotional and stressful events in combination with high media attention, they are often complex (Weick, 1988). Moreover, it is hard to decide how to act without intensifying the crisis, because small incremental organizational changes can easily magnify in an uncontrollable way (Seeger, 2002; Weick, 2001).

In organizational-crisis situations, communication is generally acknowledged to play a crucial role (e.g., Coombs, 2007; Schultz, Kleinnijenhuis, Oegema, Utz, & Van Atteveldt, 2012). Crisis research is primarily approached from an organization-centric perspective (Coombs, 2006). However, in a media-saturated society, media coverage of crises should not be overlooked (e.g., Cornelissen, Carroll, & Elving, 2009). Additionally, the public can be considered of vital importance in crisis communication due to their social-media empowerment (Castells, 2007). The key objective of this study is to investigate communication about organizational crises within three domains: organizational public relations (PR), news media and the public, and the mutual relations, or interplay, between these domains.

In order to analyze communication about organizational-crisis situations, this study uses the well-established concept of framing, extrapolated from political communication (e.g., Vliegenthart, Schuck, Boomgaarden, & De Vreese, 2008) and mass communication (e.g., Scheufele, 1999). In the context of a crisis, when time passes, the interplay between the domains PR, news media, and the public might result in what can be labeled 'crisis-frame alignment'. This alignment implies an increase

* Corresponding author at: University of Amsterdam, Kloveniersburgwal 48, 1012 CX Amsterdam, The Netherlands. Tel.: +31 20525352.
  E-mail addresses: G.L.A.vanderMeer@UvA.nl, tonivandermeer@hotmail.com (T.G.L.A. van der Meer).

in frame linkage, congruency, and complementarity between the domains (Snow, Rochford, Worden, & Benford, 1986). The overall research question reads as follows: *Does the organizational-crisis framing of the domains PR, news media, and the public align over time?*

To answer this question, the study introduces and applies a method innovation of semantic-network analysis (Hellsten, Dawson, & Leydesdorff, 2010) on three types of communication about several organizational crises: Organizational press releases, media coverage, and public's social-media messages.

2. Theoretical framework

2.1. Framing approach

The dynamic process of meaning construction is commonly investigated through the key theoretical concept of framing. During organizational crises, the frame-building processes are of fundamental importance for the formation of an organizational reputation (Coombs, 2007), the prevention of crisis escalation (e.g., Seeger, 2002), and the avoidance of public confusion or panic (Liu & Kim, 2011; Van der Meer & Verhoeven, 2013). Because issues can be viewed from different perspectives, frames of an organizational crisis are likely to differ between the domains of organizational PR, news media, and the public.

Considering the ambiguous and complex interrelations and communications between domains (Holmström, 2005, 2010; Luhmann, 1995), framing can be approached as a set of discourses that interact in complex ways within and among domains. This perspective to communication and framing can be labeled as a 'semantic-network approach'. This approach emphasizes the changing distributions of words, their co-occurrence, and the variance in meanings and relations (Leydesdorff & Hellsten, 2006). The meanings of the words, that form the basis of a frame, are found in the word network they are part of. In this context, a distinction is made between sets of words (vocabularies) and repertoires, or underlying contexts, which provide meanings to the words (Hellsten et al., 2010). This approach builds upon the analytical distinction in which a frame can either be explicit or implicit (Hellsten et al., 2010). Explicit frames are observable in the words that are chosen in communication utterances, whereas implicit frames refer to latent patterns of words that co-occur in communication about, in this case, organizational crises. The majority of frames are not explicit (Hellsten, 2002). Additionally, the analytical approach to frames as implicit carriers of specific meanings enables to highlight frame development over time and indicates the contextualization of communication (Jonkman & Verhoeven, 2013; Leydesdorff & Hellsten, 2005). The current study tracks how implicit frames change in the communication about organizational crises in the domains of organizational PR, news media, and the public.

2.2. Frame alignment over time

In organizational-crisis situations, sensemaking activities rapidly emerge, resulting in frames that help to understand what is going on (Cornelissen et al., 2009; Schultz & Raupp, 2010; Weick, 1988). Various interested parties or domains are likely to differ in their initial production of frames of a crisis situation. Therefore, initially, meaning and frame variation is the norm (Leydesdorff & Hellsten, 2005; McCammon, 2012) and frame alignment is not to be expected (Snow et al., 1986). The initial frame-building processes of PR professionals and journalists will be based on their respective professional identities and beliefs about the issue based on external cues (Cornelissen et al., 2009; Scheufele, 1999), whereas the public will make sense of a crisis situation based on their personal identities and interpretations of the crisis. In other words, each domain may use the same information or codes, but they differ in terms of their criteria which underpin the selection of relevant information and meaning provision to words (Leydesdorff & Hellsten, 2005).

After the domain-specific frame-building processes, the frames will meet on platforms provided by the media. In order to solve organizational crises and to avoid uncontrollable crisis magnification, it is crucial to arrive at collective sensemaking of the complex situation (Seeger, 2002; Weick, 1988). Therefore, in a complex nexus of competing frames, inherent to organizational crises, there will be a need to provide coherence to the issue (Hellsten et al., 2010; Snow et al., 1986) and reduce ambiguity and uncertainty (Leydesdorff & Ivanova, in press), resulting in mutual borrowings and frame alignment among the domains. The need for meaning coherence may urge domain-specific discourses to open up, move toward one another, and eventually overlap, instead of remaining isolated. This domain rapprochement does not imply total fusion of the domains' perspectives. However, the interplay between the various domains' meaning provision and framing may lead to frame alignment regarding the meaning of the crisis among the domains of PR, news media, and the public.

The notion of frame alignment in organizational crises relates to several empirical findings. First, some evidence of frame crystallization (i.e., consensus in framing), among several newspapers in different countries, was found over time with regard to the French riots in 2005 (Snow, Vliegenthart, & Corrigall-Brown, 2007). Second, similarities were observed in the general framing of the 2009 H1N1 flu-pandemic crisis among several organizations of different industry types (Liu & Kim, 2011). Third, corporate and economic domains were found to develop a common narrative regarding the financial crisis, whereas their initial sensemaking differed (Schultz & Raupp, 2010). Fourth, PR and news media were found to differ in associative framing in the initial phase of the BP oil spill crisis, whereas, afterward, their frames became more alike (Schultz et al., 2012). Fifth, after the public expressed skepticism through their framing regarding the fair-trade policy of Max Havelaar, they adopted the frame provided by the stricken organization (Van der Meer, 2014). Finally, a case study, related to the question of crisis-frame alignment, revealed the dynamic characteristics of initial crisis framing (Van der Meer & Verhoeven, 2013).

By analyzing the media coverage and social-media messages regarding the explosion of a Dutch chemical plant in Moerdijk, this study documented the implicit framing by the media and the public. The public was found to frame the situation based on personal speculation prior to detailed news-media coverage of the crisis. The public social-media messages linked the explosion of the chemical plant to a terrorist attack. However, during the extended media coverage the public framing was no longer based on personal assumptions. The public frame aligned with the frame provided by the media, in terms of information-sharing frames.

There is a wide variety of empirical cases available to support the theoretical assumptions of initial frame differentiation and frame alignment over time: the cases of the French riots (Snow et al., 2007), H1N1 flu-pandemic (Liu & Kim, 2011), financial crisis (Schultz & Raupp, 2010), the BP oil spill crisis (Schultz et al., 2012), Max Havelaar skepticism (Van der Meer, 2014), and the explosion of a chemical plant (Van der Meer & Verhoeven, 2013). Despite their differences, these cases point clearly in the same direction, namely that framing among domains aligns over time after initial differences in sensemaking and framing. Based on these coherent findings regarding crisis-specific frame alignment, the following hypothesis is formulated:

H1. *The implicit frames regarding specific organizational crises that can be found in the domains PR, news media, and the public will align over time.*

2.3. The phase after frame alignment

Framing is partly interest and goal driven (Entman, 1993; Liu & Kim, 2011). The selected interests and goals differ per domain, and so will the framing, as is normally the case (Hellsten et al., 2010; Leydesdorff & Ivanova, in press; Snow et al., 1986). The framing of the domains PR, news media, and the public has aligned due to external circumstances with a low-probability of occurrence; the emergence of an organizational crisis. The routine narratives and frames of domains are disrupted by a crisis situation (Schultz et al., 2012), producing crisis-specific frames and frame alignment. When those circumstances become less pressing, in terms of a decrease of crisis emergency and a mutual understanding of the crisis, domains have again space to select specific aspects of the crisis situation for their framing. Crisis literature acknowledges the time dimension in crises and that crises evolve in several phases (Coombs, 2010). In this sense, the domains move into a next crisis phase where mutual sensemaking of the crisis is completed and frame alignment is no longer a necessity. Thus, frame alignment is a temporal state that, once achieved, cannot be taken for granted as it is subject to reassessment. The alignment is periodically necessary for ameliorating the prospect of misframing or interpretative errors (Snow et al., 1986).

In the above mentioned case study regarding the explosion of a Dutch chemical plant in Moerdijk, the implicit frames of the media and the public were found to differ not only in the initial crisis phase but also in the last phase of the crisis (Van der Meer & Verhoeven, 2013). After the mutual sensemaking of the crisis, which resulted in frame alignment, the crisis framing varied across the media and public domain. In the third phase, the public personalized their crisis framing by focusing on criticism toward governmental crisis-related actions, rather than using their framing as an information-sharing resource as in the alignment phase. As opposed to the public, the media professionally framed the crisis in terms of safety.

The impermanence of frame alignment emphasizes that frame development is characterized by a dynamic process (Scheufele, 1999) and that frames are inherently unstable (Steinberg, 1998). In this regard, a crisis-specific pattern in the framing among the domains is assumed. The complex interaction of communications in the domains PR, media, and the public produces temporary alignment in the frames. After frame alignment and meaning coherence, the domain-specific discourses will shift away from one another, adopt new communicative aspects, and eventually become isolated again. This distancing in the final crisis phase results in variation across the domains' crisis framing, instead of frame-alignment persistence over time. Therefore, hypothesis two reads as follows:

H2. *After the alignment of the implicit frames regarding specific organizational crises among the domains PR, news media, and the public, the frames will de-align.*

Fig. 1 visualizes the hypothesized dynamic character of the frames of PR, news media, and the public and how they relate to one another over time. In the first period of the crisis the discourses of the domains are isolated (visualized at the top half of the figure). However, over time the discourses will move toward one another (visualized at the bottom half of the figure), resulting in frame alignment (H1). Finally, after the phase of alignment, the discourses move again away from one another and become isolated again, implying de-alignment in the framing of the three domains (H2).

2.4. Increase in the level of frame alignment over the years

The level of frame alignment is likely to differ from crisis to crisis. However, in general a pattern of increasing alignment over the years can be expected for several reasons. First, the media landscape has changed over time, resulting in a rising prominence of public discourses and in more public power to get their frames across. The public-framing power was often regarded as limited due to unequal distributed resources in a competitive environment. However, the Internet has empowered the public with a platform to engage in mass-to-mass communication (Castells, 2007), thereby considerably
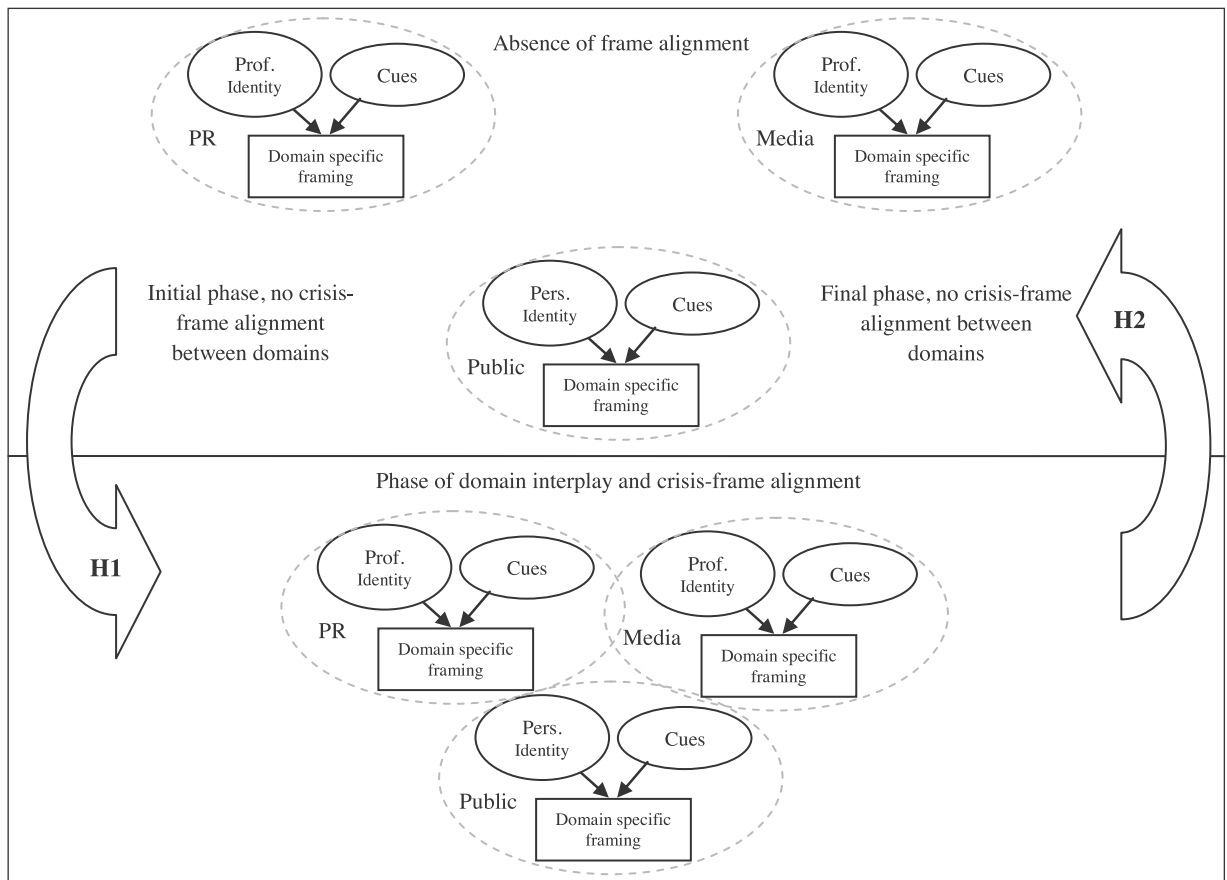
Fig. 1. Crisis-specific frame dynamic and movement of the domain-specific discourse of PR, news media, and the public (H1 and H2).

leveling the playing field. Besides, the advent of social media not only facilitates the increasing communication between PR, news media, and the public (Goolsby, 2010), it also requests for more communication in terms of the publics' increasing demand for responsiveness by organizations and news media (Liu, 2010). Along the line of Castells' (2007) mass self-communication theory, citizen journalism reflects the public empowerment. The public is not constrained by costs, time, and editorial processes, compared to journalists, allowing for faster, more frequent, and extensive mass distribution of (new) content (Lowrey, 2006). Additionally, the online crisis coverage by the public is assigned a higher level of credibility compared to the coverage by traditional mass media (Sweester & Metzgar, 2007). This empowerment enhances the public's collaboration in framing events, especially in crisis situations as a means of quick communication (Wigley & Fontenot, 2011).

Second, journalists increasingly reflect on social-media manifestations as sources for news generation (Waters, Tindall, & Morton, 2010) and organizational PR practitioners recognize that social media have changed the way organizations communicate with their publics (Wright & Hinson, 2009). In this regard, the rise of the reflective paradigm is relevant (Holmström, 2005, 2010), referring to an enhancing organizational-interdependent societal context. The reflective approach views an organization from the outside or public perspective (Van Ruler & Verčič, 2005) and sees the environment as something that needs to be respected instead of managed (Holmström, 2010). Rather than trying to control the flow of information, PR and news media are encouraged to use the Internet as a public-dialog tool (Schultz, Utz, & Göritz, 2011). With the advent of the reflective paradigm, PR professionals and journalist become more concerned with other domains like the public (Holmström, 2010).

Both the empowerment of the public domain and the rise of the reflective paradigm imply, for crisis framing, that the communication and interplay between PR, news media, and the public increases. With this increase it is argued that the level of frame alignment has progressed over the years, resulting in the following hypothesis:

H3. *Over the years, the level of frame alignment regarding specific organizational crises among the domains PR, news media, and the public has increased.*

Table 1
Selected Dutch organizational crisis cases.

Centered organization	Date	N press release	N newspaper	N Social media[a]	Description crisis
SE Fireworks	13/05/2000–20/05/2000	37	863	343 (F)	SE Fireworks, a fireworks depot located in the city Enschede, exploded, killing 23 people and injuring 947.
Dirk Scheringa Bank (DSB Bank)	01/10/2009–23/10/2009	24	1.345	6.021 (F)	The Dutch court declared the DSB Bank bankrupt, resulting in 400,000 deceived customers and 1400 fired employees.
Koninklijke Luchtvaart Maatschappij (KLM)	14/04/2010–23/04/2010	12	297	4.019 (F)	The eruptions of volcano Eyjafjallajökull in Iceland caused enormous disruption to KLM air travel due to the ash cloud.
Chemie-Pack	05/01/2011–08/01/2011	18	117	38.074 (T)[b]	Chemie-Pack, a chemical plant located in the city Moerdijk, exploded, injuring 170 people.

[a] F, data sourced from forum; T, data sourced from Twitter.
[b] The tweets were downloaded from the open source website www.twetrics.com.

3. Method

3.1. Data collection

By means of Dutch organizational-crisis cases, the implicit framing of the domains PR, news media, and the public will be explored. This empirical investigation tests the theoretical framework through automated semantic-network analyses of crisis-related organizational press releases (PR), newspaper articles (news media), and social-media manifestations (public). The cases were systematically obtained by complying with five criteria; it should concern a (1) Dutch (2) organization-centered crisis, which (3) set in motion a significant chain of messages that are (4) practically accessible, and (5) it should concern one crisis in the past and one crisis each year starting from 2009 to grasp development over time.

First, to determine which Dutch crises obtained high (media) attention national newspapers were systematically explored. Second, each selected case was assessed based on the availability of data. For press releases the websites of relevant organizations were consulted. To obtain newspaper articles, the academic online database LexisNexis was accessed using the name of the organization as search string while selecting all national Dutch newspapers. Public manifestations were sourced from Twitter or the largest Dutch forum 'Fok! Forum' using the name of the organization as search string. Twitter data were preferred to cover the rapid public reactions and exceeding characteristics of a crisis. Since only real time Twitter data is publicly stored, Twitter messages were searched for via external open-source websites. All texts were briefly scanned to ascertain the articles' topic.

3.2. Research units

The selection procedure resulted in four crisis cases: (1) explosion SE Fireworks, (2) bankruptcy DSB Bank, (3) limited KLM air travel, and (4) explosion Chemie-Pack. Table 1 schematically shows the duration of the crisis, the amount of collected data, and provides a crisis description.

The data were analyzed separately for several research periods to explore the development of implicit framing over time. To test the hypotheses, three consecutive periods per case were identified based on crisis theory. The first period is defined as the day(s) when a domain communicated about the crisis for the first time, to grasp the initial crisis phase. Hence, the selected dates may deviate between domains. The second period covers several days after the initial phase of the crisis to comprehend the congregation of the domain-specific frames (H1). These days cover the period of extensive crisis communication by all three domains. The final period represents the moment after the extended crisis coverage (H2).

3.3. Automated semantic-network analysis

Meaning construction of a situation is given by words and by the relative position these words get in word networks and repertoires (Hellsten et al., 2010). To reveal crisis meaning, automated content analyses were applied to determine the implicit crisis framing as word networks in the separate domains. This so-called automated semantic-network analysis maps a model of related words and distinguishes meaningful components in the communication spatially by applying an algorithmic and systems perspective. This analytical approach is a special form of social-network analysis, where connections are formed by the use of overlapping concepts (Podnar, Tuskej, & Golob, 2012). It looks to provide a structure to a network

based on shared meaning. More specifically, this method builds upon the similarity in occurrence patterns of words (Hellsten et al., 2010). The word (co-)occurrences mapped in semantic fields of related words specify the construction of crisis meaning and represent a higher-order structure of texts (Leydesdorff & Hellsten, 2006). Co-word analysis maps the strength of associations between key words in texts, which enables to compare implicit frames. Similar automated semantic-network approaches have been suggested by different scholars. For example, other studies have focused on the associations on the level of actors and the level of concepts or objects (e.g., Schultz et al., 2012; Van Atteveldt, Kleinnijenhuis, & Ruigrok, 2008). These objects and actors are based on a deductive or taxonomy-based coding strategy (i.e., a priori conducted wordlists which relate to e.g., certain objects or frames) which might result in overlooking meaningful concepts in the meaning construction and framing of a situation (Van Atteveldt, Kleinnijenhuis, & Ruigrok, 2008). By means of identifying frames based on word clusters, the current method avoids beforehand defining semantic structures and (implicit) frames. The current method has previously been successfully applied to analyses of discourse comparison on one topic (Leydesdorff & Hellsten, 2005), tracing the development of debates over time (Leydesdorff & Hellsten, 2006), tracing emerging implicit media frames (Hellsten et al., 2010; Jonkman & Verhoeven, 2013), and crisis framing (Van der Meer & Verhoeven, 2013; Van der Meer, 2014). Following the conceptualization of implicit framing as latent patterns of words that co-occur throughout text, the press releases, news articles, and social-media manifestations are analyzed.

In practice, the automated semantic-network analysis is divided in several steps based on the scientific publication which contains a manual for the construction of semantic maps using a set of computer-supported programs (Vlieger & Leydesdorff, 2011). First, a list of the 255 most frequently used words in the messages of each domain and each research period are constructed, using the software program *FrequencyList*. Stopwords were automatically filtered out with a standard stopwordlist. The remaining irrelevant words are manually removed. Second, these words, together with the units of analysis, constitute the input for the software programs *FullText* (press release, news articles, and forum messages) and *Ti* (tweets), which generate word/document matrices for each domain and research period. These matrices are based on the co-occurrences of words between sentences and paragraphs in one text and between texts. Third, the matrices are used to conduct principal-component factor analyses with varimax rotation, with a maximum of twelve components, to identify statistical correlations between words within components. The components represent the implicit frames of the analyzed texts. The component scoring highest on the portion of explained variance (R^2) and eigenvalue (EV) is usually considered the dominant frame, the remaining frames represent sub-frames.

Unlike traditional content analysis and other automated content analyses, the current semantic-network analysis inductively identifies implicit frames as word clusters, rather than provided on the basis of an a priori scheme, which reduces indexer effects. Not relying on pre-defined frames leaves more room for identifying new or unexpected frames. Commonly, the generated frames are interpretively and subjectively labeled based on factor loadings and word clusters, to facilitate the communication of results. This personal interpretation of factor patterns comes with the danger of the fallacy of misplaced concreteness. In the final step of this analysis, frames are usually visualized as semantic fields using Pajek software program (De Nooy, Mrvar, & Batagelj, 2011). This results in a (two-dimensional) word network where nodes represent words, lines the correlations between words, and the colors of the nodes represent the partitions (i.e., latent frames). In this sense, framing among domains can only be interpretatively compared based on the personal labeling of the frames and the word-network visualizations. Moreover, the automated part of the analysis allows for large amounts of text to be processed. In utilizing this potential advantage the use of word-network visualizations becomes problematic in terms of a high number of complex figures, possibly resulting in an incomprehensible and cluttered presentation of the findings. Therefore, the present study seeks to develop and apply a novel analytical approach that allows for statistical comparison of implicit framing among domains.

This study explores how implicit frames can be compared in a statistical manner. Hellsten et al. (2010) already related semantic-network analysis to factor analysis to identify the latent frames. To offer a new instrument of implicit-frame comparison, the application of factor analysis is further elaborated. Since by means of factor analyses latent constructs are inductively explored (Field, 2009), this approach is regarded applicable to grasp the latent character of implicit frames in terms of reducing complex (unsuspected) interrelationships, by inspecting the configuration, to measurable units of analysis. Factor analysis discerns the regularity and order in phenomena that co-occur in space or in time and empirically illuminates different concepts. These phenomena are independent patterns (of variation) or clusters which are identified by factor analysis based on numerous of measurements or observations (Rummel, 1967). The notion of pattern of variation relates to the operationalization of implicit frames by Hellsten et al. (2010) as repertoires or underlying contexts. Factor analyses resulted in several components (the implicit frames) in combination with unique factor loadings for the relevant variables (the words) per domain and research period.

The inductively identified implicit frames are never entirely identical among the different domains or time periods; i.e., the same words normally do not form exactly the same word clusters. Hence, the comparison of implicit frames and frame alignment cannot be done on component level but can only be done on the level of the words that form the components. Thus, for the purpose of statistical comparison (of the frames among the domains), the factor loadings of the individual words on the frames are selected as units of analysis. Factor loadings are indicators of the substantive importance of a given variable (word) to a given component (Field, 2009); it defines the degree and direction of the relationships of the word with the pattern (Rummel, 1967). The words involved in an independent pattern are defined based on the factor loading. Since this loading measures the degree of importance in implicit frames for separate words, it can be stated that the factor loading defines the extent to which a specific word represents a component, indicating its importance in meaning provision and framing. In this way, it is considered that the framing between domains and time can be compared on word level. Therefore,

the factor loadings of mutual-used words (Hellsten et al., 2010) by the separate domains are compared to enable statistical comparison of implicit framing. When the factor loading between separate domains of the same words highly correlate, they are considered to use these words, which represent certain (but possibly different) frames to a specific degree, in a comparable way, indicating frame alignment. Rather than focusing merely on the dominant frame, all the 255 words are included with their factor loadings on the factor they load the highest. In this way, the analysis obtains a more nuanced data set and avoids elimination of important words and word clusters. This newly developed analytical process results in a Spearman's Rho correlation, r_s, between each two domains (pairs: PR–media, PR–public, and media–public) for each time period. These correlation coefficients can be compared between periods or domain pairs. By focusing on correlations, instead of on asymmetrical relations, the analysis emphasizes reciprocal and complex relations.

Because this paper is the first to introduce this method innovation, it is necessary to validate the research process and findings and obtain detailed knowledge about what the findings actually represent. For this purpose, additional analyses were conducted. However, an extensive description of these analyses and findings goes beyond the scope of this paper. In short, the general research findings are validated based on confirmatory finding by comparing the results of factor-loading correlations with alternative analytical approaches; (1) correlation in word-frequency count, (2) word-betweenness correlations, and (3) Cronbach's alpha correlations.[1] All these analyses showed highly similar patterns which adds to validity. These validation analyses imply that the method innovation can be employed to automatically analyze the alignment in frames among domains and draw valid inferences from it.

4. Results

4.1. Example of generated results

In order to show how the descriptive results from such an analysis look, a more thorough result description of one case of frame alignment is provided as an example. This example addresses the comparison of the obtained word clusters as the implicit framing among the domains. This qualitative step is an important element and the foundation for findings based on semantic-network analysis. Moreover, in this way, this example strives to provide insights in what the statistical correlation of frame alignment actually represents.

As an example the framing by news media and the public in the first and second crisis phase of the Chemie-Pack crisis (one of the four cases) will be discussed. The analyzed texts resulted in 12 frames per domain. However, for a comprehensive and not too lengthy discussion, this example will focus on the most dominant frame (i.e., the first frame with the highest eigenvalue and explained variance). The dominant frame of the news media and the public are labeled in order to compare them between the domains and time periods.

The media frames were labeled as 'resident frame' ($R^2 = 15.63$) in the first period and 'information frame' ($R^2 = 12.65$) in de second period, and the public frames were labeled 'confusion frame' ($R^2 = 5.36$) in the first period and 'information frame' ($R^2 = 3.55$) in the second period. The labeling shows that the frames in the news media and the public are more comparable in the second period than in the first period, indicating frame alignment over time. In the first period the labels provided to the frames differ between these domains. The crisis frame in the media domain was formed by prominent words as 'residents' (.98), 'safety region' (.98), 'information-telephone number' (.98), 'city access' (.95), 'South of Holland' (.76), and 'drinking water' (.98), indicating that the news media initially focused on the safety and potential dangers for the residents of the crisis area. On the contrary, the initial framing of the public emphasized aspects of the crisis related to the lack of available information, and speculations of a terrorist attack. Words like 'inform' (.91), 'information gathering' (.98), 'press conference' (.84), 'danger' (.79), 'terrorist' (.87), and 'press agency' (.96) formed the dominant frame in the public domain. These differences in dominant frame indicate the absence of frame alignment among news media and the public in the initial phase. However, in the second period, the dominant frame of both news media and the public can be labeled as an 'information frame' related to the impact and consequence of the explosion of the chemical plant. In the media domain, words as 'investigation' (.73), 'fire-water' (.60), 'danger' (.75), 'sample' (.66), 'air' (.86), 'mayor' (.48), 'toxic' (.66), and 'soot' (.94) form the dominant word cluster. These words suggest a frame that emphasizes the consequence of the crisis in terms of investigating the toxic fire-water and substance that came free during the explosion and when trying to control the fire. Similarly, the public used similar words like 'investigation' (.62), 'fire-water' (.56), 'update' (.23), 'water authority' (.74), and 'calculation' (.77) to frame the crisis in an informative way. In sum, when comparing the first and second crisis period, the results indicate that the dominant frames of the domains align over time.

The documented absence (first period) and presence (second period) of frame alignment based on the analysis of the dominant frames is in line with the level of frame alignment based on the statistical approach, discussed below. In both analytical approaches it can be concluded that the framing of the domains is not aligned in the first period of the Chemie-Pack crisis, but aligns in the second period. Emphasizing the factor loadings of the words used in the dominant

---

[1] The complete appendix with validation and result-comparison analyses, including the frequency analyses, word-betweenness correlations, and Cronbach's Alpha correlations, can be requested from the authors. In this regard, this appendix serves the purpose of validating the described method innovation and accesses its performance for extracting the alignment of frames between the texts of different domains. This appendix also includes comparative analyses regarding the amount of words and frames used in analyses and use of correlation coefficient.

Table 2
Factor-loading correlations between domains for each case, indicating level of frame alignment.

Crisis	Frame alignment among domains	Period 1	Period 2	Period 3
SE Fireworks	PR–media	−.40	−.06	−.55
2000	Media–public	−.06	.09	−.14
	Public–PR	.13	.10	−.19
	Mean	−.11	.04	−.29
DSB Bank	PR–media	−.50	.15	.01
2009	Media–public	−.10	.23	−.55
	Public–PR	−.03	.19	.13
	Mean	−.21	.19	−.14
KLM	PR–media	.00	−.25	−.38
2010	Media–public	.16	.21	.00
	Public–PR	−.03	.23	−.38
	Mean	.04	.06	−.25
Chemie-Pack	PR–media	.15	.01	.18
2011	Media–public	−.30	.23	−.04
	Public–PR	−.14	.22	−.17
	Mean	−.10	.15	−.01
Total	PR–media	−.19	−.04	−.19
	Media–public	−.08	.19	−.18
	Public–PR	−.02	.18	−.15
	Mean	−.10	.11	−.17

frames is an option to connect and compare the findings of the more descriptive approach (based on the analysis of the dominant frames) with the statistical approach. The statistical approach compares frames on word level based on the corresponding factor loadings and assumes that words with high factor loadings are representative for the frame. The discussed findings provide a clear example of frame alignment in the second period. Namely, the prominent words 'investigation' and 'fire-water' can be found in the dominant frames of both news media and the public. Moreover, the factor loadings of these words are high in both domains. These words can be considered to represent the dominant 'information frame'. The importance of the words indicates that information regarding the investigation of the crisis and the pollution of water is an important element in the framing. In this sense, the high factor loadings indicate that these words are of comparable importance and have a prominent place in the framing across the domains.

The descriptive and qualitative step is an essential part of the analyses in order to better understand the direct content and make sense of the nature of the frame. However, this study strives to statistically analyze frame alignment without interpretative bias. For that reason, it is not the main focus to understand the nature of the frames. Hence, this study employs the semantic-network method in a more generic manner that is independent from the direct content of the frames. In this way, it is possible to statistically compare the level of frame alignment over time based on an extensive dataset, which is needed to test the hypotheses.

4.2. Statistical analysis of frame alignment

In total 51,170 messages were analyzed. The obtained results, as worked out via the enhanced semantic-network analysis, are presented in Table 2 and Fig. 2, documenting the Spearman's Rho correlation among the domain pairs for each time period in each crisis case. The statistical indicators represent the correlation between the factor loadings of the two domains, reflecting the level of frame alignment. The periodization is included in the results by distinguishing alignment among domains in the three periods. For hypotheses discussion the level and the pattern of frame alignment is emphasized. Additionally, the data will be qualitatively enriched by illustrating mutual-used words to provide some insights of crisis-meaning construction.

4.3. Frame alignment over time

To address hypothesis 1 the factor-loading correlations in the first period and second period between the three domains are compared to grasps the development of implicit-frame alignment over time. Looking at Table 2 and Fig. 2, focusing on the mean correlations of all the crises, the negative correlation (r_s −.08) in the first period indicates fundamental deviation in word importance (demonstrated by the factor loading). In the crisis-specific cases also a general course of low or negative correlations can be observed in the first period; SE Fireworks (r_s −.11), DSB Bank (r_s −.21), KLM (r_s .04), and Chemie-Pack (r_s −.10).

The low factor correlations among the domains indicate that the mutual-used words differ in their importance for meaning provision and framing of the crisis situation in the first period. Illustratively, in the SE Fireworks crisis the factor loading for the words 'person', 'asbestos', 'fireman', 'Twente' (crisis site), and 'victim' were for PR: .89; .87; .82; .22; .10, and for media: .30; .19; .40; .86; .52. Hence, the role of the first three words, were clearly prominent and determinative for the implicit
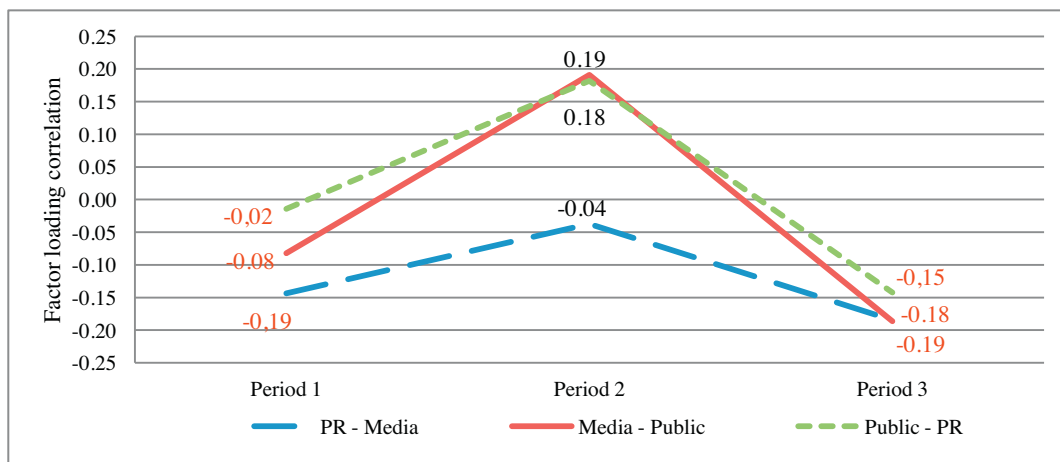
Fig. 2. Total mean of all crises, level of frame alignment among the three domains.

framing in the PR domain and not in the media domain. On the other hand, the last two words were more focal for the media framing than for PR. Thus, no crisis-frame alignment was documented in the initial phase among the domains.

Contrary to the first period, for the second period, Table 2 documents positive and relatively high average factor-loading correlations. The mean correlation (r_s .11) demonstrates comparable word importance among the domains, implying signs of crisis-frame alignment. Thus, a clear pattern of increment in frame alignment evolves by comparing the level of frame alignment between the first and second period (P1: r_s −.10; P2: r_s .11).

Emphasizing domain-pair level, this pattern can be observed for all pairs; PR–media (P1: r_s −.19; P2: r_s −.04), media–public (P1: r_s −.08; P2: r_s .19), and public–PR (P1: r_s −.02; P2: r_s .18). However, focusing on the correlation indicators, the results show a low correlation (r_s −.04) between PR and media, reflecting little frame alignment despite the increasing pattern over time. Also, the latter crises show a decreasing alignment for the PR–media pair: KLM (P1: r_s .00; P2: r_s −.25) and Chemie-Pack (P1: r_s .15; P2: r_s .01).

The general pattern of increasing factor-loading correlations among the domains demonstrates that the word importance, representing the frames, aligns over time. For example, in the second period for the DSB Bank crisis the factor loading for the words 'money', 'Scheringa', and 'people', were highly similar among media: .52; .60; .53, and the public: .54; .64; .53. Also, in the KLM crisis the factor loading of the public: .75; .63; .42, and PR: .71; .56; .58, for the words 'website', 'part', and 'flying' showed signs of frame alignment. Overall, hypothesis 1, predicting that implicit frames of PR, news media, and the public regarding specific organizational crises will align over time, could therefore be supported.

4.4. The phase after frame alignment

The absence of frame alignment in the last crisis period (H2) was tested by means of analyzing the third period. Table 2 documents an average negative factor-loading correlation (r_s −.17) among the domains in the third period. This negative correlation, together with the decreasing pattern of frame alignment noticeable between the second (r_s .11), and third (r_s −.17) period, indicates fundamental contradictory in word importance, and hence in implicit framing. Additionally, when focusing on the domain-pair level, a strong pattern of decreasing correlations among all pairs evolves: PR–media (P2: r_s −.04; P3: r_s −.19), media–public (P2: r_s .19; P3: r_s −.18), and public–PR (P2: r_s .18; P3: r_s −.15). The pattern of decreasing frame alignment and relatively low factor correlations among the domains can also be observed for the specific crisis cases; SE Fireworks (r_s −.29), DSB Bank (r_s −.14), KLM (r_s −.25), and Chemie-Pack (r_s −.01). Moreover, the correlations in the third period, for all the crisis cases and domain pairs, are lower than in the second period, except for the pair PR–media in the Chemie-Pack crisis (P2: r_s .01; P3: r_s .18).

The findings show a decrease in alignment in the third period, denoting a phase of reframing and de-alignment, where words and meanings no longer have comparable functions for framing among domains. For example, in the Chemie-Pack crisis the factor loading for the words 'chemical', 'measurement', and 'environment', poorly correlated among PR: .98; .93; .74, and the public: .05; .10; .11. Hypothesis 2, stating that after crisis-frame alignment, PR, news media, and the public framing will no longer align, could therefore be supported.

4.5. Increase in the level of frame alignment over the years

For testing hypothesis 3, the level of alignment over the years is compared. The magnitude of frame alignment, expressed in factor-loading correlations, in the second periods of the crises is compared, taking in account the years of crisis occurrence. The first noticeable observation, in line with H3, is that the factor-loading correlation (r_s .04) for the crisis in the past, 2000,

is substantially lower compared to the more recent years; 2009 (r_s .19), 2010 (r_s .06), and 2011 (r_s .15). However, no further increase between 2009 and 2011 is noticeable.

Along the lines of reflective management, it is especially interesting to compare the alignment of the public with PR and news media. Regarding the media–public alignment, an increasing trend in factor-loading correlations is observable over the years: 2000 (r_s .09), 2009 (r_s .23), 2010 (r_s .21), 2011 (r_s .23). Especially, the fundamental increase in alignment between 2000 and 2009 implies a substantial rise of frame alignment between media and the public over the years. Moreover, from 2009 to 2011 the level of alignment stays rather consistent. Analyzing the PR–public alignment a clear increasing picture evolves: 2000 (r_s .10), 2009 (r_s .19), 2010 (r_s .22), 2011 (r_s .18). Alignment among PR and news media can also be considered a form of reflective management. From 2000 (r_s −.06) to 2009 (r_s .15) an increase is noticeable in the alignment. However, in 2010 a decline was found down to r_s −.25. Afterwards, in 2011 (r_s .01) an increase in alignment is again noticeable. However, the level of alignment remains relatively low. Hence, hypothesis 3, stating that over the years the magnitude of crisis-frame alignment between PR, news media, and the public has risen, is partly supported.

5. Conclusion and discussion

The current study has been conducted to analyze the alignment in organizational-crisis framing of the domains PR, news media, and the public. Using an analytical innovation of semantic-network analysis, press releases, news articles, and social-media manifestations were analyzed, concerning four Dutch crisis cases.

This study detected a crisis-specific pattern of frame alignment over time among the domains PR, media, and the public. In general, the findings documented alignment in the implicit crisis frames of the domains PR, news media, and the public. To acknowledge the time dimension of crisis situations, three crisis phases were identified. First, in the initial phase of the crisis, the framing varied across the domains. This variation demonstrates the absence of frame alignment and indicates that PR, news media, and the public differently made sense of the crisis situations in their first communication. The rapidly emerging sensemaking, to understand what is going on, and initial production of frames might therefore be based on the domain-specific identities and beliefs about the issue (Cornelissen et al., 2009; Scheufele, 1999), as is normally the case (Leydesdorff & Hellsten, 2005; McCammon, 2012). Second, in the next crisis phase, after initial communication, the domains' initially produced frames interacted. In the domains' encounter and interaction, frame alignment or frame crystallization was observed among the three domains. In their interplay, the domains collectively made sense of the complex crisis situations, possibly to reduce ambiguity and uncertainty and to provide coherence to the issue by aligning in their frame communication (Hellsten et al., 2010; Van der Meer & Verhoeven, 2013; Weick, 1988). Third, in the final phase of the crisis, after mutual sensemaking of the crisis situation, the crisis framing by the PR, news media, and the public was no longer aligned. A process of reframing was found, resulting in de-alignment among the domain-specific frames. The impermanence of frame alignment among the domains, and the general norm of frame variation across domains (Hellsten et al., 2010; Leydesdorff & Ivanova, in press; Snow et al., 1986), implies that the alignment was a temporal necessity forced by external circumstances, namely the emergence of an organizational crisis. With the meaning coherence to the situation and the decrease in crisis emergency, the domains had again space to base their framing on their specific interests and goals.

The temporal alignment advances the sensemaking of the complex crisis situation and potentially avoids uncontrollable crisis magnification and ameliorates the solving of the crisis. Especially the collective character of the process of frame alignment, in terms of the interplay and communicative input of all three domains, may avoid misframing by certain domains and helps the domains to decide how to communicate and act appropriately without intensifying the crisis (Weick, 1988). Along this line, the results generally document a rise in the level of frame alignment over the years. This increase can possibly be explained by the online empowerment of the public (Castells, 2007) and the rise of PR professionals' and journalists' reflective approach (Holmström, 2010) to crisis communication. However, between 2009 and 2011 no further increase has been found, denoting stagnation.

The current study enriches the PR literature in the context of crisis communication and framing. This study theoretically extends the field by proposing a framework that describes the complex dynamics of crisis-meaning construction and framing by the domains PR, news media, and the public. By applying a semantic-network approach, this study builds on a more advanced and complex understanding of communication and framing processes in the interplay of several dominant domains. The empirical contribution enlarges the body of crisis communication literature by analyzing the well-established concept of framing with the use of automated semantic-network analyses. A novel analytical expansion is developed to advance semantic-network analyses. This innovation enables to quantitatively assess the alignment of implicit frames among domains or research periods. This theoretical approach and novel method may stimulate empirical investigation of framing and frame alignment by applying a semantic-network approach in related fields, such as mass and political communication.

Despite the methodological contribution to research into frame alignment in crisis communication, this extension of the semantic-network analysis faces certain limitations. Instead of presenting the results in the form of word-network visualizations or frame labeling, the emphasis in this study lies on the aggregated level of statistical correlation. First, specific words and their individual correlations remain invisible in the results presentation. Second, and foremost, the qualitative description and interpretation of the frames (as discussed in the example in Section 4) remains invisible as well. The statistical extension presented here approaches frame comparison in a generic manner that is independent from the direct content of the frames. Hence, the content basis on which frames are aligned or de-aligned remains unaddressed in the reported findings. In this sense, a qualitative analysis is necessary to determine if the lack of alignment concerns conflicting frames (Chong &

Druckman, 2007) or frames that are simply different but can co-exist with one another. Hence, in this paper frame alignment means that similar frames are being used and no conclusions are drawn about whether frames are conflicting or not. However, by focusing on the statistical comparison based on factor loadings this approach is in line with the paper's theoretical aim, namely to statistically compare the level of frame alignment over time among domains for multiple crisis cases.

References

Castells, M. (2007). Communication, power and counter-power in the network society. *International Journal of Communication, 1*, 238–266.
Chong, D., & Druckman, J. N. (2007). A theory of framing and opinion formation in competitive elite environments. *Journal of Communication, 57*, 99–118.
Coombs, W. T. (2006). The protective powers of crisis response strategies: Managing reputational assets during a crisis. *Journal of Promotion Management, 12*, 241–260.
Coombs, W. T. (2007). Protecting organization reputations during a crisis: The development and application of situational crisis communication theory. *Corporate Reputation Review, 10*(3), 163–176.
Coombs, W. T. (2010). Parameters for crisis communication. In *The handbook of crisis communication*.
Cornelissen, J. P., Carroll, C., & Elving, W. J. L. (2009). Making sense of a crucial interface: Corporate communication and the news media. In C. Chouliaraki, & M. Morsing (Eds.), *Media, organisation and identity* (pp. 1–22). Hampshire: Palgrave McMillan.
De Nooy, W., Mrvar, A., & Batagelj, V. (2011). *Exploratory social network analysis with Pajek*. New York: Cambridge University Press.
Entman, R. M. (1993). Framing: Toward clarification of a fractured paradigm. *Journal of Communication, 43*(4), 51–58.
Field, A. (2009). *Discovering statistics using SPSS*. Sage Publications Limited.
Goolsby, R. (2010). Social media as crisis platform: The future of community maps/crisis maps. *ACM Transactions on Intelligent Systems and Technology (TIST), 1*(1), 1–11.
Hellsten, I. (2002). *The politics of metaphor. Biotechnology and biodiversity in the media.* Tampere: Tampere University Press.
Hellsten, I., Dawson, J., & Leydesdorff, L. (2010). Implicit media frames: Automated analysis of public debate on artificial sweeteners. *Public Understanding of Science, 19*, 590–608.
Holmström, S. (2005). Reframing public relations: The evolution of a reflective paradigm for organizational legitimization. *Public Relations Review, 31*, 497–504.
Holmström, S. (2010). Reflective management: Seeing the organization as if from outside. In R. Heath (Ed.), *Handbook of public relations* (pp. 261–276). New York: Sage.
Jonkman, J., & Verhoeven, P. (2013). From risk to safety: Implicit frames of third-party airport risk in Dutch quality newspapers between 1992 and 2009. *Safety Science, 58*, 1–10.
Leydesdorff, L., & Hellsten, I. (2005). Metaphors and diaphors in science communication mapping the case of stem cell research. *Science Communication, 27*(1), 64–99.
Leydesdorff, L., & Hellsten, I. (2006). Measuring the meaning of words in contexts: An automated analysis of controversies about 'Monarch butterflies', 'Frankenfoods', and 'stem cells'. *Scientometrics, 67*, 231–258.
Leydesdorff, L., & Ivanova, I. A. (2014). Mutual redundancies in inter-human communication systems: Steps towards a calculus of processing meaning. *Journal of the American Society for Information Science and Technology* (in press).
Liu, B. F. (2010). Distinguishing how elite newspapers and A-list blogs cover crises: Insights for managing crises online. *Public Relations Review, 36*, 28–34.
Liu, B. F., & Kim, S. (2011). How organizations framed the 2009 H1N1 pandemic via social and traditional media: Implications for US health communicators. *Public Relations Review, 37*, 233–244.
Lowrey, W. (2006). Mapping the journalism–blogging relationship. *Journalism, 7*, 477–500.
Luhmann, N. (1995). *Social systems*. Stanford, CA: Stanford University Press.
McCammon, H. J. (2012). Explaining frame variation: More moderate and radical demands for women's citizenship in the US women's jury movements. *Social Problems, 59*, 43–69.
Podnar, K., Tuškej, U., & Golob, U. (2012). Mapping semantic meaning of corporate reputation in global economic crisis context: A Slovenian study. *Public Relations Review, 38*, 906–915.
Rummel, R. J. (1967). Understanding factor analysis. *Journal of Conflict Resolution*, 444–480.
Scheufele, D. A. (1999). Framing as a theory of media effects. *Journal of Communication, 49*, 103–122.
Schultz, F., Kleinnijenhuis, J., Oegema, D., Utz, S., & Van Atteveldt, W. (2012). Strategic framing in the BP crisis: A semantic network analysis of associative frames. *Public Relations Review, 38*, 97–107.
Schultz, F., & Raupp, J. (2010). The social construction of crises in governmental and corporate communications: An inter-organizational and inter-systemic analysis. *Public Relations Review, 36*, 112–119.
Schultz, F., Utz, S., & Göritz, A. (2011). Is the medium the message? Perceptions of and reactions to crisis communication via twitter, blogs, and traditional media. *Public Relations Review, 37*, 20–27.
Seeger, M. W. (2002). Chaos and crisis: Propositions for a general theory of crisis communication. *Public Relations Review, 28*(4), 329–337.
Snow, D. A., Rochford, E. B., Jr., Worden, S. K., & Benford, R. D. (1986). Frame alignment processes, micromobilization, and movement participation. *American Sociological Review*, 464–481.
Snow, D. A., Vliegenthart, R., & Corrigall-Brown, C. (2007). Framing the French riots: A comparative study of frame variation. *Social Forces, 86*, 385–415.
Steinberg, M. W. (1998). Tilting the frame: Considerations on collective action framing from a discursive turn. *Theory and Society, 27*, 845–872.
Sweester, K. D., & Metzgar, E. (2007). Communicating during crisis: Use of blogs as a relationship management tool. *Public Relations Review, 33*, 340–342.
Van Atteveldt, W., Kleinnijenhuis, J., & Ruigrok, N. (2008). Parsing, semantic networks, and political authority using syntactic analysis to extract semantic relations from Dutch newspaper articles. *Political Analysis, 16*, 428–446.
Van der Meer, T. G. L. A. (2014). Organizational crisis-denial strategy: The effect of denial on public framing. *Public Relations Review, 40*, 537–539.
Van der Meer, T. G. L. A., & Verhoeven, P. (2013). Public framing organizational crisis situations: Social media versus news media. *Public Relations Review, 39*, 229–231.
Van Ruler, B., & Verčič, D. (2005). Reflective communication management: Future ways for public relations research. *Communication Yearbook, 29*, 239–273.
Vliegenthart, R., Schuck, A. R. T., Boomgarden, H. G., & de Vreese, C. H. (2008). News coverage and support for European integration, 1990–2006. *International Journal of Public Opinion Research, 20*, 415–439.
Vlieger, E., & Leydesdorff, L. (2011). Content analysis and the measurement of meaning: The visualization of frames in collections of messages. *Public Journal of Semiotics, 1*, 28.
Waters, R. D., Tindall, N. T., & Morton, T. S. (2010). Media catching and the journalist–public relations practitioner relationship: How social media are changing the practice of media relations. *Journal of Public Relations Research, 22*, 241–264.
Weick, K. E. (1988). Enacted sense making in crisis situations. *Journal of Management Studies, 25*, 305–317.
Weick, K. E. (2001). Making sense of the organization. *Oxford, UK: Blackwell*.
Wigley, S., & Fontenot, M. (2011). The Giffords shootings in Tucson: Exploring citizen-generated versus news media content in crisis management. *Public Relations Review, 37*, 337–344.
Wright, D. K., & Hinson, M. D. (2009). An updated look at the impact of social media on public relations practice. *Public Relations Journal, 3*(2), 1–27.