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# What can tripartite semantic network analysis do for media framing research?

## Abstract

**This study primarily aims to demonstrate how tripartite semantic network analysis can help us with media framing analysis. Predominant quantitative framing research has tended to focus on identifying salient frames and/or assessing their influences on public opinions. Also, semantic network analysis has been used to display relationships among frames, which complements conventional quantitative frame analysis for frequency and salience of frames. However, it needs to be advanced in the way that it can assess the dynamical relationships among actors, frames, and the actors' stances on an issue. In this vein, it is encouraging to find that Robert Entman has demonstrated the dynamics in framing and the complicated relationships between frames and actors in different social realms through his cascading activation model. Tripartite semantic network analysis is expected to contribute to systematically depicting the complicated framing relationships in the form of network. This research attempts to showcase how tripartite semantic analysis can complement framing analysis through a case study on a controversial local housing policy in Madison, Wisconsin, USA. While the descriptive statistical analyses show the overall differences in framing across the newspapers and the changes in framings over time, the tripartite semantic network analyses display delicate and significant differences and changes in framing, which is hard to be captured in quantitative framing analysis. It might also be valuable for not only research but also more effective engagement in public discourses.**

## Keywords
**Media framing, semantic network, tripartite network analysis, frame formation, textual framing analysis.**

## 1. Introduction

News is "not pure information but a portrayal of the contending forces in the world" (Carey, 1989, p. 20). The mass media has long been investigated as a primary source of frames (Entman, 1991; Friedland & Mengbai, 1996; Gamson, 2000; Gitlin, 1980; Riff, Lacy, Fico & Watson, 2019; Scheufele, 1999; Semetko & Valkenburg, 2000). According to media framing analysis, journalists come to create a frame by selecting "some aspects of a perceived reality and make them more salient in a communicating text, in such a way as to promote a particular problem definition, causal interpretation, moral evaluation, and/or treatment recommendation" (Entman, 1993, p. 52). In other words, media framing takes place when journalists cover and present some issues by focusing on certain aspects of the issues and by

defining, evaluating, and interpreting the issues with certain meanings (Entman, 1993). For instance, labeling a social issue is an act of framing (Gamson, 1992), and a frame refers to "an implicit organizing idea" (Gamson, 2000, p. 3).

Indeed, framing analysis has been derived from both psychology and sociology (Pan & Kosicki, 1993). While psychological framing research has been influenced by the experimental work of Kahneman and Tversky (1979), sociological framing research has been influenced by Goffman (1974). Therefore, the frame operates as both a micro-level and a macro-level construct (Scheufele, 1999). While frame analyses have produced a great number of research projects, multi-conceptual levels in framing have prevented the frame analyses from becoming a comprehensive theoretical prototype (Scheufele, 1999).

While a coherent paradigm of framing research has been encouraged (Entman, 1993), multi-methodological approaches to framing research have made it even more difficult to create a coherent research framework (D'Angelo, 2002). As a result, framing has become a theoretically and methodologically contestable conception (Scheufele, 1999). D'Angelo (2002) holds that framing research can be conducted according to three different paradigms in the field: cognitive, constructionist and critical. His edited volume with his colleagues, *Doing News Framing Analysis*, has showcased various framing research approaches and methods (D'Angelo & Kuypers, 2010).

When it comes to the research methods, most research has employed qualitative and/or quantitative ways. In qualitative research, frames are identified merely "from the actual language of the reported claim (direct and reported speech)" (Statham & Mynott, 2002, p. 10). Frames are detected simply after reading the materials without revealing concrete analysis processes (Cooper, 2010; McCaffrey & Keys, 2000; Meyers & Abrams, 2010; Triandafyllidou, 2002). Also, drawing on techniques from discourse analyses and sociolinguistics, some research has implicitly identified frames (Billig, 1995; Fairclough, 1995; Guzman, 2016; Kuypers, 2010; Reisigl & Wodak, 2001; van de Mieroop, 2005). Consequently, there might be different frames and effects according to different methods and approaches (Brewer & Gross, 2010).

On the other hand, quantitative frame research has produced more explicit analysis models where frames have been understood as parsimoniously identifiable attributes or devices (Ferree, Gamson, Gerhards & Rucht, 2002; Semetko & Valkenburg, 2000; van Gorp, 2010). Trained coders have been used to code the data material, so that there have been high inter-coder reliabilities (d'Haenens & De Lange, 2001; Semetko & Valkenburg, 2000). In addition, some researchers have used keywords as indicators (see Entman, 1993; Triandafyllidou & Fotiou, 1998). Furthermore, in order to avoid depending on the frame analysts' ingenuity and arbitrary authority (Tankard, 2001), some researchers have suggested that keywords should be generated by mapping the most recurrently repeated words or strings within the data (Koella, 2003; Miller & Riechert, 1994). Then, a collected set of data from a source such as newspaper articles are calculated and statistically compared by Chi²–Square method.

In addition, semantic network analysis has been used to display the relationship among frames, which can complement conventional quantitative frame analysis for frequency and salience of frames (see Baden, 2010; Kim, 2011; van Atteveldt, 2008). While such one-mode (frame by frame) semantic network analysis is beneficial to display frame clusters or the linkage among frames, it can't provide the connections between frames and actors. In the meantime, two-mode network analysis, built upon Galois lattice and order theory, has been applied for a framing analysis, to show the linkages between frames and actors simultaneously in a diagram (Kang, 2000). This two-mode network analysis enables us to investigate the structural duality such as social actors and social events.

However, as emphasized by Entman and his colleague (Entman, 2003; Entman & Usher, 2018), Nisbet (2010), and Reese (2010), frames are the product of actors' interactions and struggles; that is why it is crucial to identify how the media, including social media, establish

the relationships between frames and actors over time. Regarding this issue, Knüpfer and Entman (2018, p. 476) identify four ways how digital platforms and transnational information movements might affect the way framing competitions take place in existing and forthcoming media environments: "(1) fragmentation within media systems; (2) increasing transnational information flows that potentially create transnational publics; (3) altered framing processes and effects in the more complex networked environments; and (4) architectures and emerging logics of digital platforms." In short, given the growing influences of digital media platforms and transnational information flows on national politics, framing is getting complicated. Hence, framing analysis needs to be sophisticated in such a way we can detect the complicated linkages among actors, frames, and actors' stances over a specific issue.

In this vein, this study primarily aims to introduce tripartite network analysis and demonstrate how tripartite semantic network analysis can help us with mass media framing analysis. Tripartite semantic network analysis is expected to contribute to systematically depicting the complicated framing relationships in the form of network. This research attempts to showcase how tripartite semantic analysis can complement framing analysis through a case study on a controversial local housing policy in Madison, Wisconsin, USA.

## 2. The Implication of Entman's Cascading Activation Model for Multi-Mode Framing Analysis

As aforementioned above, Entman's framing research, particularly his cascading activation model validates the need for multi-modes framing network analysis. The cascading model, as implied in the word of cascading, explains how frames are flowed, deviated and salient through actors in various sectors. In the process of frame formation, as a cascade consists of multiple levels, each domain, such as the White House, Congress members, media, or the public, contributes to mixing and flowing ideas; moreover, as a cascade moves downward, the actors in higher levels are more able to promote their frames while the actors in lower levels need more energy to disseminate their frames (Entman, 2003).

For instance, the actors in the White House –the president and top advisor– have the strongest power to decide frames for an event such as a national crisis. Then, the members of Congress, their staffs and other opinion leaders, including policy experts and lobbyists, circulate the ideas from the White House, and decide their responses to the idea. Journalists, who consist of reporters, columnists, producers, editors, and publishers, also interact with their colleagues and other experts to produce interpretive conceptual schemes or frames for the public. The interaction between journalists and other elites function as "a key transmission point for spreading activation of frames" (Entman, 2003, p. 420). Finally, the flow of frames among the public can be both directional.

According to Entman (2003), the direction of public opinion depends on four factors: actors' motivations, power, strategy, and cultural congruence. With this model, Entman analyzed how President Bush had successfully promoted and dominated his administration's fame of "war against terrorism" for the attacks of September 11, 2001. In his analysis, he also assessed how two elite journalists created an alternative frame to change the attention from Afghanistan to Saudi Arabia, and demonstrated the process of frame deviation and the importance of "elite discord as a necessary condition for politically influential frame challenges" (Entman, 2003, p. 415).

Furthermore, Entman and his colleague have recently revised his model given the changing media environment in which social media is emerging as a strong communication and information platform while institutional mass media is losing its authority and power (Entman & Usher, 2018). They have offered five new "digital pump-valves," which change the flow of political information and frames in unconventional ways: "platforms (e.g., Google, Facebook, Twitter), analytics (data about audience behavior), algorithms, ideological media (Fox, Limbaugh, Breitbart.com), and rogue actors (hackers, bots)" (Entman & Usher, 2018, p.

299). In sum, based on the examples that elites possess more resources and abilities to control and manipulate political information and its movement in the digitized media environment, Entman and Usher (2018) point out that on the whole the hierarchy of controlling political information and political polarization might even be deeper through Entman's updated cascade model. Therefore, the updated cascade model also demonstrates the need to identify not only frames but also the complicated relationships between frames and the frame creators. In other words, we should be able to assess the dynamical relationships among actors, frames, and the actors' stances on an issue. Also, if we can define the three elements as a *tripartite media frame set*, we can juxtapose how each media varies according to its tripartite media frame set. In this way, we can serve the public by detecting and clarifying the contours of political information and the actors behind that on specific issues.

We can assess such media frame sets in not only national but also local news media coverage. This study attempts to use tripartite semantic network analysis to systematically depict the complicated framing relationships in the frame set in the case of a local housing policy, which was covered by three main local newspapers in Madison, Wisconsin. Particularly, it employs a Formal Concept Analysis, because this method, built upon Galois lattice and order theory, is a unique tool to show the linkages between frames and actors simultaneously in a diagram. To this end, a software program Concept Explorer was used.

First, in order to showcase the unique findings from tripartite semantic network analysis, this study will conduct descriptive frame analysis with two research questions as follows:

RQ 1-1: How do the three main local newspapers cover Madison's housing policy issue?
RQ 1-2: How are the frames different across the three newspapers' coverage?

After that, this study will conduct tripartite semantic network analysis by using Concept Explorer with the second sets of research questions:

RQ 2-1: How do the tripartite semantic network analysis show the tripartite relationships among frames, actors, and actors' stances over the issue?
RQ 2-2: What are the most significant findings in the tripartite network analysis?

## 3. Method

### 3.1. *A Brief Explanation of Madison's Low-Income Housing Policy Case*

The City of Madison enacted a low-income housing policy –inclusionary zoning (IZ), which is a local ordinance that requires or encourages housing developers to make a certain portion of new construction affordable to low-income households. Madison, Wisconsin, after a progressive mayor, former environmental organization leader, was elected, enacted and implemented inclusionary zoning ordinance for 5 years from 2004 to 2009. It expired in January 2009. The policy gave rise to intensive controversies and conflicts among community leaders and members from the policy debate period before it was enacted.

It was strongly opposed by several business groups such as developers' association and realtors' association. Particularly, an association of local apartment owners challenged and partially struck down the ordinance through a lawsuit. Local developers were blamed to try to avoid constructing inclusionary zoning units. The ordinance did not contribute to creating so many inclusionary zoning units as anticipated. While there were many reasons for the failure, it turns out to be obvious that the anti-IZ community leaders' politics was stronger than the pro-IZ leaders' politics. The anti-IZ coalition politics between local politicians and developers have induced many developers' noncooperation to produce IZ-units although many developers supported the policy.

Since Madison's IZ has undergone three idiosyncratic periods of local politics, the historical timeline of the issue was qualitatively identified as follows: 1) prior discussion on enactment of a mandatory IZ ordinance before Mayoral election; 2) controversies over mandatory IZ after new mayor election but before mayor's IZ effective; and 3) after IZ enactment and the legal challenge to the IZ ordinance. Therefore, media framing was analyzed by the phases across the newspapers. Therefore, this study addresses how the three local newspapers framed the IZ issue among the actors, their standpoints toward the issue, and the frames over time. In order to assess connections among actors, frames, and standpoints, this research employs actor-by-frame-by-standpoint, tripartite network analyses of the newspapers' coverage of the policy issue. The analyses will show how each newspaper portrays the IZ issue by selecting the linkages between the local issues and key actors/stakeholders' reactions to the issues.

## 3.2. *Data Collection*

For the framing analyses, this study has chosen three main local newspapers –*The Capital Times*, *The Wisconsin State Journal*, and *The Isthmus* and collected a total of 300 newspaper articles and 94 editorials on the inclusionary zoning issue from the three newspapers from 2002 through 2007. It is a total population from the three newspapers, not a sampling.

*The Capital Times* (*CT*) and *The Wisconsin State Journal* (*WSJ*) had been two rival daily newspapers until *CT* stopped printing daily in late April 2008. *CT*'s founder worked as a former managing editor and business manager of *WSJ*. However, he left *WSJ* and established *CT* because *WSJ* had opposed the progressive politician Robert La Follette over his opposition to World War I. *CT*'s motto was to continue to be Wisconsin's Progressive newspaper. *CT* maintains a left-liberal editorial policy.

On the other hand, *WSJ* has a conservative editorial policy. *WSJ* had supported Robert La Follette until he publicly opposed World War I. There was an intense competition between *CT* and *WSJ* until the late 1940s. After years of competition for reportage, advertising, and circulation, both newspapers began negotiation for consolidation in order to maintain both of them.

*The Isthmus* is Madison's weekly alternative newspaper, and it was established in 1976, and belongs to the National Association of Alternative Newsweeklies. While its mission –to inform, not persuade– implies that *The Isthmus* tries to include both conservative and liberal voices, it has tended to be skewed to the left. It has a reputation for authoritative coverage on news, arts, and features stories on trends and culture.

While *The Capital Times* has more frequently covered the IZ issue than other newspapers, *The Wisconsin State Journal* has covered the IZ issue through relatively more editorials (36%) than *The Capital Times* (17%).

**Table 1**: Numbers of Newspaper Articles and Editorials across Time Periods.

| Phase | 1st | | 2nd | | 3rd | | Subtotal | |
|---|---|---|---|---|---|---|---|---|
| Newspaper | Article | Editorial | Article | Editorial | Article | Editorial | Article | Editorial |
| *Capital Times* | 19 (73%) | 7 (27%) | 37 (84%) | 7 (16%) | 112 (84%) | 21 (16%) | 168 (83%) | 35 (17%) |
| *Wisconsin State Journal* | 11 (55%) | 9 (45%) | 23 (64%) | 13 (36%) | 73 (66%) | 37 (34%) | 107 (64%) | 59 (36%) |
| *Isthmus* | 2 | N/A | 11 | N/A | 12 | N/A | 25 | N/A |
| Subtotal | 32 | 16 | 71 | 20 | 234 | 94 | 300 | 94 |

Source: Shin, 2009, p. 146.

The historical timeline of the Madison IZ issue is composed of three distinctive phases: 1) prior discussion on enactment of a mandatory IZ ordinance before the mayoral election of 2003 (from June 2002 to April 2003); 2) controversies over mandatory IZ after Mayor Cieslewicz's election but before the mayor's IZ was enacted (from April 2003 to February 2004); and 3) after IZ enactment and legal challenge on IZ ordinance (from February 2004 to October 2007).

### 3.3. *Media Framing Analysis Framework*

Framing research has mostly been conducted in two ways: textual and cognitive framing analyses. Textual framing analysis focuses on assessing linguistic expressions in texts and the meanings in those while cognitive framing analysis deals with the cognitive, psychological schema that affect the audience's sense-making processes of texts (Johnston, 1995; Just, 2009). Cognitive frames are assessed when researchers purpose to examine the effects of textual or visual frames on the audience (Cappella & Jamieson, 1997; Engesser & Brüggemann, 2016; Powell, Boomgaarden, De Swert & de Vreese, 2015). On the other hand, textual analysis is aimed to identify patterns and themes in textual materials through a systematic rigorous analysis process (Lune & Berg, 2016; Matthes, 2009). This study aims to only analyze textual frames since it focuses on demonstrating how tripartite semantic network analysis can help us with media framing analysis.

Since frames can only be identified by analyzing an entire news story in macro-syntactic structure (Meyers & Abrams, 2010; Pan & Kosicki, 1993; Perkins, 2005), this research identifies and selects frames in a qualitative way. Qualitative content analysis identifies frames or themes in an inductive way that elicits frames or themes through open or conceptual coding by carefully reading the text, rather than employing major frames or themes that are deduced from theories (Altheide & Schneider, 2013; Strauss & Corbin, 1990). Since a qualitative way of identifying and selecting frames can help this research to collect more comprehensive and extensive frames regarding the case study, this study has identified frames by: 1) reading every news article and editorial that have covered inclusionary zoning and relevant issues; 2) extracting actors/stakeholders,' arguments and statements, which indicate and imply the stakeholders' standpoints toward the issue, in the news coverage; 3) selecting significantly distinctive meanings and ideas as frame components in the extracts; 4) enumerating all repeated meanings and ideas; 5) condensing the frame components into shared larger meanings and ideas that function as frames; and 6) deciding the final frames and creating a frame inventory, considering the entire relations among the frames. In order to finalize the frame inventory, the researcher was engaged in thorough discussion with other media researcher to articulate and verify each frame while reading all the articles and updating the frame inventory over time.

Frames identified from the three newspapers' coverage:

- Social remedy: IZ contributes to such social problems as the affordable housing crisis, rising housing price, and urban planning.
- Social burden: IZ causes unintended and undesired social burden such as tax increase and local school system's budget challenge.
- Social benefit: IZ contributes to children's education, community integration, and economic integration.
- Adverse effect: IZ results in negative effect such as housing cost increase and urban sprawl.
- Anti-free market: Developers should be forced to provide affordable housing.
- Pro-free market: Affordable housing should be dealt with by housing market.
- Social justice: IZ contributes to social justice and equality by providing affordable housing for lower-income households.

- Property right violation: IZ infringes on individuals' property right and prevents the advantage of home ownership.
- Progressive ideology: Mandatory IZ is developed based on progressive base.
- Conservative ideology: Mandatory IZ is too radical a policy.
- Legitimacy: Mandatory IZ enactment is legitimate in terms of timing, efficacy, and legality.
- Illegitimacy: Mandatory IZ is illegitimate due to the conflict with upper laws, inefficiency, and politics. Voluntary is alternative.
- Cooperation: Stakeholders are willing to cooperate for IZ enactment.
- Opposition: Stakeholders oppose IZ enactment.
- Consensus: All processes on IZ to be efforts to make consensus among stakeholders.
- Conflict: All processes on IZ are in conflict among stakeholders.
- Success: IZ ordinance is successful at achieving its goals.
- Failure: IZ ordinance fails to achieve its goals.

When it comes to identifying stakeholders' standpoints toward the issue, the researcher has thoroughly read all the articles and captured subtle differences in the standpoints although all the standpoints ultimately serve either to support or oppose the IZ policy during the three phases. In other words, as illustrated below, depending on the phase, the standpoints have been subtly differentiated. All identified standpoints are listed and explained below.
Eight Standpoints Toward the IZ:

- Standpoint M: "support mandatory IZ."
- Standpoint C: "change the mayor's IZ ordinance."
- Standpoint Z: "support the idea of IZ." (Z)
- Standpoint A: "support the mayor's IZ ordinance proposal." (A)
- Standpoint I: "support incentive or voluntary IZ." (I)
- Standpoint N: "do not support the idea of IZ." (N)
- Standpoint O: "oppose the mayor's IZ ordinance."
- Standpoint R: "repeal the mayor's IZ ordinance." (R)

### 3.4. *Galois Lattice*

As tripartite network analysis is based on Galois lattice and enabled by mathematically combining two bipartite networks, this study explains Galois Theory and then elaborate tripartite network analysis. Formal Concept Analysis follows the same mathematical principle as Galois Theory, an abstract algebra, with Galois lattice analysis. This section explains Galois lattice based on Mische and Pattison's work (2000) and Freeman and White's work (1993). Galois lattice analysis uses a two-mode binary matrix by entering a 1 into the matrix when a certain object and a certain attribute are associated. Then, the matrix is subjected to lattice analysis, including a lattice approximation procedure according to a two-mode Boolean clustering technique, which is known as hierarchical class analysis (HICLAS) (see van Mechelen, De Boeck & Rosenberg, 1995). The lattice approximation reduces complexity while maintaining the major organizing patterns in the social structure. As Mische and Pattison (2000) describe in detail, the basic lattice procedure applies two algebraic operations –intersection and inclusion– to a two-mode participation matrix (see Table 2).

At the beginning, every possible intersection between the rows of a two-mode matrix is calculated. The whole set is then added to complete the array of subsets, which are then arranged in what is known as a partial ordering, showing that subsets are included in larger subsets, and where particular groupings come together. This dual ordering of sets of actors and events constitutes the lattice, which can be graphically depicted in a line diagram in which

nodes representing subsets are linked to nodes representing the larger subsets in which they are contained.

In detail, the two-mode binary matrix is created through a triple $(A, E, I)$ set (Freeman & White, 1993). One mode is a set of $n$ number of actors $A = \{a_i, a_{ij}, \ldots, a_n\}$ and the other mode is a set that contains $m$ number of social events or organizations in which the actors are engaged, $E = \{e_j, \ldots, e_m\}$. These two sets are linked by an involvement or membership relation $I \subseteq A \times E$. When an actor $a_i$ engages as a participant in an event $e_j$, then the $<a_i, e_j> \in I$. A two-mode network is represented as an $n \times m$ binary matrix $P$ of participation, where $p_{ij} = 1$ if $<a_i, e_j> \in I$, and $p_{ij} = 0$ if $<a_i, e_j> \notin I$ (see Table 2). Therefore, a social event or organization may have more than two actors.

**Table 2**: Freeman and White's Hypothetical Two-Mode Data.

| Event / Actor | A | B | C | D |
|---|---|---|---|---|
| 1 | 1 | 0 | 1 | 1 |
| 2 | 1 | 0 | 0 | 1 |
| 3 | 1 | 0 | 0 | 0 |
| 4 | 0 | 1 | 1 | 1 |
| 5 | 0 | 1 | 0 | 0 |
| 6 | 0 | 1 | 0 | 1 |

Source: Freeman & White, 1993, p. 132.

Based on the hypothetical two-mode data, which is composed of 6 actors and 4 events, we consider $P(A) = \{A_1, A_2, \ldots\}$ is the collection of subsets of $A$, which is the power set $P(X)$ consisting of all the subsets $X_i$ of the set $X$. $P(X)$ includes $X$ itself and the null set $\emptyset$. The elements are $\{1, 2, 3, 4, 5, 6\}, \{1, 2, 3, 4, 5\}\ldots, \{2\}, \{3\}, \{4\}, \{5\}, \{6\}$, and $\{\emptyset\}$. The elements of this power set create a partial order, based on inclusion, where $(X_i) \leq (X_j) \Leftrightarrow (X_i \subseteq X_j)$. $P(E)$, the collection of subsets of $E$, follows the same procedure in order to make a dual ordering that is embodied by a Galois lattice.

Given $P(A)$ and $P(E)$, The $I$ relation can be used to define a mapping of subsets of $E$. The $I$ relation can be used to define a mapping $\uparrow: B \rightarrow B \downarrow$ from $P(A)$ to $P(E)$: $B \uparrow = \{e \in E | (a,e) \in I$ for all $a \in A\}$. In Table 3-3 above, we can find that the subset containing actor 1 is associated with the subset of events containing $A$, $C$, and $D$, and the actor subset containing 1 and 2 is linked with $A$ and $D$. Likewise, $I$ can be employed to define another mapping $\downarrow: F \rightarrow F \downarrow$ from $P(E)$ to $P(A)$: $F \downarrow = \{a \in A | (a,e) \in I$ for all $e \in E\}$. Hence, the subset including 1, and the event subset including B, C, and D, is associated with the actor subset including actor 4.

Then, we put $S(A) = \{A_1 \uparrow, A_2 \uparrow, \ldots\}$ as the collection of images of $\uparrow$, and $S(E) = \{E_1 \downarrow, E_2 \downarrow, \ldots\}$ as the collection of images of $\downarrow$. Because the two mappings of upward and downward are created from the same pairs in the relation $I$, they contain the same number of elements, and subscripts can be assigned in such a way that $A_i \uparrow = E_i$ for some $E_i \subseteq P(E)$ and $E_i \downarrow = A_i \subseteq P(A)$. In Table 3-3, the subset of actors containing actor 1 is mapped to that subset of events containing events A, C, and D, and the event subset containing events A, C, and D is mapped to the actor subset containing actor 1.

The subsets of $P(A)$ that are the elements of $S(E)$ create a lattice under inclusion, as do the subsets of $P(E)$ that are the elements of $S(A)$. These two lattices are dual inverse: $(E_i \downarrow \subseteq E_j \downarrow \Leftrightarrow A_i \uparrow \supseteq A_j \uparrow)$. Therefore, the order of the elements of $S(A)$ is the inverse of the order of the elements of $S(E)$: $(E_i \downarrow, A_i \uparrow) \leq (E_j \downarrow, A_j \uparrow) \Leftrightarrow E_i \downarrow \subseteq E_j \downarrow$ & $A_i \uparrow \supseteq A_j \uparrow$.

An element $(E_i\downarrow, A_i\uparrow)$ of this dual lattice is a lower bound of another $(E_j\downarrow, A_j\uparrow)$ when $E_i\downarrow$ is contained in $E_j\downarrow$, or equivalently, when $A_j\uparrow$ contains $A_i\uparrow$. In such a case, $(E_j\downarrow, A_j\uparrow)$ becomes an upper bound of $(E_i\downarrow, A_i\uparrow)$. The universal upper bound of the lattice contains all the elements in $E$. A dual lattice of this type, where each element is a pair, is called *Galois*. A Galois lattice can be graphically represented as a labeled line diagram with nodes and ascending and descending lines to show their partial orderings. Each node is assigned two labels. One indicates the subset of elements in $A$ that it represents; the other indicates the subset of elements in $E$ that it represents. Figure a is the diagram of the Galois lattice representing Freeman and White's hypothetical two-mode data above. Using *ConExp*, this diagram shows a reduced labeling.

**Figure 1**: Galois Lattice of Freeman and White's Hypothetical Two-Mode Data.
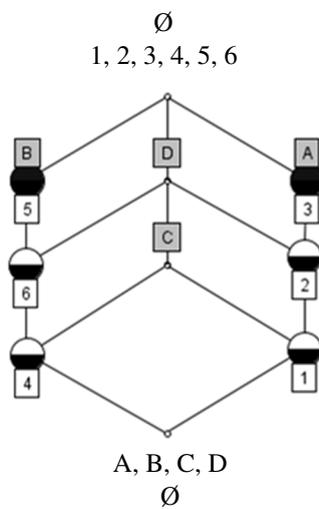


Source: Freeman & White, 1993, p. 134.

The null symbol Ø means that no actor is engaged in all four events at the bottom. On the other hand, the null symbol at the top indicates that there is no event in which all six actors are involved. Each node in the lattice is labeled with both an actor and/or an event since the labels are reduced to simply the graphic presentation. Any actor falling on a line descending from any events is engaged in that event; vice versa, any event falling on a line ascending from an actor contains that actor. In addition, the diagram shows the containment structures for both actors and events. For instance, event D contains event C. For this, any actor involving in event D is also engaged in event C. Hence, in this single diagram, we can identify all three patterns: 1) the actor–by–event relation; 2) the event–by–event relation; and 3) the actor–by–actor relation.

## 3.5. *Tripartite Semantic Network Analysis*

Originally, mathematical sociologists Thomas Fararo and Patrick Doreian developed tripartite network analysis to exhibit how bipartite diagram and matrix equations can be applied for a tripartite case among three or more sets of levels –for example, actors, groups, and events (1984). While some sociologists have employed the tripartite analysis for a case of civic participation over time (Mische & Pattison, 2000), the analysis, despite its practical benefits for communication research, has not attracted much attention from the field. Shin (2016) has demonstrated how to employ tripartite lattice analysis to analyze a policy debate in an urban politics case by solving the actors–by–frames matrix, actors–by–standpoints matrix, and frames–by–standpoints matrix.

**Table 3**: A Tripartite Network Matrix in a Context of Urban Politics.

| | | Stakeholders | | | | Frames | | | | Standpoints | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | S-a | S-b | S-c | S-d | F-1 | F-2 | F-3 | F-4 | P-A | P-B |
| Stakeholders | S-a | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 |
| | S-b | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 1 |
| | S-c | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 |
| | S-d | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 |
| Frames | F-1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| | F-2 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| | F-3 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 0 |
| | F-4 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 0 |
| Standpoints | P-A | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 0 |
| | P-B | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |

Note: 1 refers to the existence of a relation between a set of extent and intent. 0 means that there is no relation between them.

Source: Shin, 2016, p. 517.

As shown in Table 3, the arrangements of the three modes comprise a symmetrical matrix that indicates no within–set relationships by putting the zeros in the diagonal. Based on a two-mode Galois lattice process, or Formal Concept Analysis, which is a data analysis method that detects hierarchical conceptual arrangements among data sets on the basis of group theory in mathematics (Priss, 2006; Wolff, 1993), the tripartite lattice draws a diagram by connecting the actors, the frames, and the standpoints that indicate the relationships in the matrix. *ConExp* was used to perform the mathematical process and show the linkages centered on the node we want to focus on.

**Figure 2**: A Tripartite Line Diagram of Stakeholders by Frames by Position-Takings.
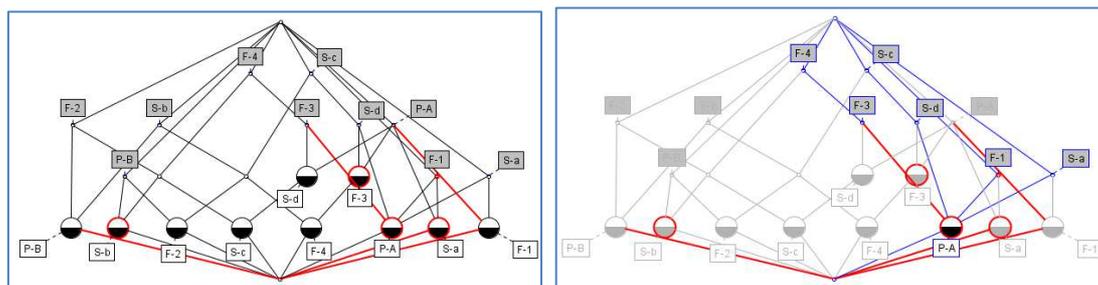


Source: Shin, 2016, p. 518.

The tripartite lattice diagram in Figure 2 denotes an exact mirror relationship of the top-down orderings and the bottom-up orderings. According to shin's explanation (2016), each element in a given set –in this case, stakeholders, frames, and standpoints– indicates the relationship with each other with a dual pair of nodes, one corresponding to the row label for the element in the original matrix and one corresponding to the column label. If we look upward from a certain stakeholder, we can find the frames and the standpoints connected with the stakeholder (Mische & Pattison, 2000). In this way, we can discover all stakeholders and frames connected with each standpoint. Also, we can detect the within–set orderings by

noticing that certain stakeholders and standpoints, which are connected with certain frames, are a subset of another frame. For instance, in Figure 2, on the left-hand diagram, we can find that frame 3 (F-3), which is linked with stakeholder d (S-d) and standpoint A (P-A), is a subset of frame 4 (F-4), which is tied with stakeholder b (S-b).

On the right-hand diagram, by focusing on standpoint P-A, we can recognize that the standpoint is connected with frames F-1, 3, and 4, and stakeholders S-a, c, and d. This selection function in the program improves the previous Formal Concept Analysis techniques by helping the user to find the linkages he/she focuses on in a complicated lattice diagram. As a result, we can choose our targeted research areas or aspects and assesses those in depth in addition to an overall comprehension of the research analysis. For instance, if we are interested in how a specific actor is connected with frames and standpoints, we can identify the linkages centered on the actor by using the selection function.

## 4. Results

### 4.1. *Descriptive Statistical Frame Analyses of News Articles and Editorials*

A comparison of frame frequencies in news articles shows the subtle differences in each newspaper's unconscious, routinized news production on the issue because newspapers in general intend to show balanced coverage of an issue through news articles. On the whole, *CT* has tended to cover more often the frames that supported IZ (59%) than the frames that opposed IZ (41%). On the contrary, *WSJ* has tended to cover more frequently the frames that opposed IZ (54%) than the frames that supported IZ (46%). *The Isthmus* has tended to cover almost equally the frames that supported or opposed IZ. Chronologically, *WSJ's* framing has drastically changed. While *WSJ* covered more often the frames that had supported IZ during Phase 1 (76%) and 2 (53%), it suddenly covered more frequently the frames that opposed IZ during Phase 3 (64%).

The difference in each newspaper's coverage through news articles has been consistent with editorials. *CT* has more often produced the frames that supported IZ (78%) than the frames that opposed IZ (22%). On the contrary, *WSJ* has more frequently produced the frames that opposed IZ (66%) than the frames that supported IZ (34%). Indeed, *WSJ* disagreed with the mayor's IZ ordinance and urged repeal of the law through its editorial pages on November 13, 2005, and May 22, 2006. On the other hand, *CT* has shown their support for IZ with a suggestion of revision through their editorial page on July 11, 2006.

In sum, the descriptive statistical analyses show the overall differences in framing across the newspapers and the changes in framings over time. As illustrated above, by and large, *CT* has tended to cover more voices that supported IZ. On the contrary, *WSJ* has tended to reflect more voices that opposed IZ. *The Isthmus* has tended to cover almost equally the voices that supported and opposed IZ. Nevertheless, all three newspapers have tended to reflect more voices from developers than any other group, which demonstrates that the newspapers were likely to consider the IZ issue primarily as a local housing development issue. However, interestingly, they have tended to pay more attention to the voices of politicians who supported IZ even though the local politicians were almost evenly split in the urban politics centered on the issue. Civic activists and experts who had supported IZ were also covered with the frames linked with IZ-supporting standpoints. In short, the differences in the media framing clearly show that the local mass media, as the main community cultural institutions, provide different ideas and themes about the community issues. This research attempts to address the reasons why the framings have varied across the newspapers in the research implication section below.

### 4.2. *Tripartite Semantic Network Analysis Outcomes*

The tripartite semantic network analyses offered detailed information about each newspaper's framing. For instance, an actor-by-frame-by-standpoint, tripartite network

analysis of all actors/stakeholders, all frames, and all standpoints that were covered by CT during Phase 1 generates such a very complicated graphic diagram that it is very difficult to articulate the complicated networks at a glance. However, the exhaustive analyses by using the selection function in the software program provided detailed information about the framing. This research is also aimed at analyzing the tripartite network analyses by the unit of each stakeholder group –politicians, interest groups, and civic activists– since the three groups in different social sectors were inductively identified through the content analysis.

In a nutshell, in *CT*'s coverage during Phase 1, 6 developers out of 8 totals were associated with adverse effect, property right, social burden, illegitimacy, and opposition frames. This means that *CT* covered more developers who had held negative notions about IZ during phase 1. However, at the same time, *CT* reflected relatively more voices from the politicians –8 out of 12– who had supported the mandatory form of IZ with social remedy, social benefit and social justice frames. Also, civic activists, who all had supported the IZ idea and the mandatory form of IZ, were linked with social remedy, social benefit, and anti-free market frames. *CT* also covered more experts' voices that had supported IZ with social remedy, legitimacy, social benefit, and cooperation frames. This overall pattern of framing has been maintained through all the phases. However, during Phase 2, *CT* covered more developers, 13 out of a total of 17, who had opposed IZ with conflict, illegitimacy, adverse effect, and property right frames. During the final phase, *CT* covered more developers –19 out of 31– who had supported IZ with social benefit, success, cooperation, consensus, and social remedy frames.

On the other hand, *WSJ* covered more developers who had opposed the IZ proposal but supported a voluntary form of IZ with social burden, adverse effect, pro-free market, property right, conservative base, illegitimacy, opposition, conflict, and failure frames throughout the whole timeline. This is a significant difference in framing because, unlike *CT, WSJ* has heavily covered the developers' ideas and opinions about the issue. Many of those ideas and opinions were against the IZ. However, many politicians, civic activists, and even experts who had supported IZ, were covered with social benefit, social remedy, and social justice frames throughout the whole timeline.

*The Isthmus* covered more developers who had opposed IZ with adverse effect, illegitimacy, property right, opposition, and social burden frames during the three phases. Politicians were evenly covered for supporting or opposing IZ with conflicting frames. *The Isthmus* covered more civic activists who had supported IZ with legitimacy, cooperation, social remedy, social benefit, progressive base, and social justice, and it also reflected more voices from experts who had supported IZ with social remedy, social benefit, legitimacy, and anti-free market frames throughout the whole timeline.

Furthermore, when we used the selection function in the software program to uncover how a specific actor, for instance, a key IZ-maker politician, the tripartite semantic network analysis shows what frames *CT* and *WSJ* used to cover the politician. For instance, as shown in Figure 3, the tripartite network analysis indicates how the politician was connected with frames and standpoints during Phase 1 covered by *CT*. Based on the outcome, we can see that the politician was linked with pro-IZ and pro-mandatory IZ standpoints through social remedy, anti-free market, legitimacy, cooperation and social justice frames. She was also linked with other three politicians in the local politicians' group by sharing frames and themes.

**Figure 3**: Tripartite Network Analysis, Centered on Konkel, Covered by *CT* during Phase 1.
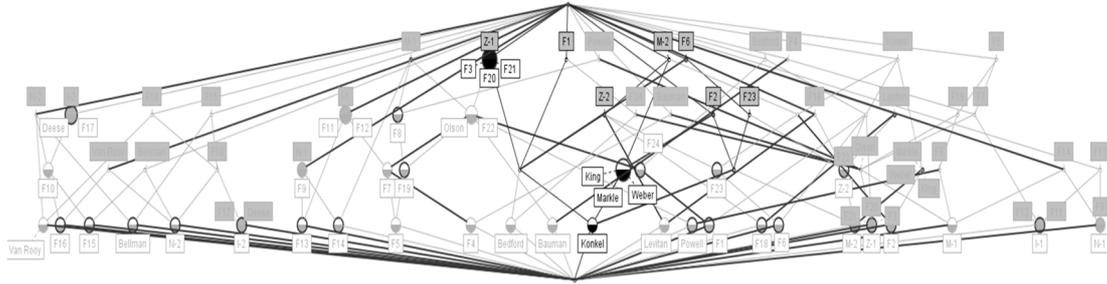


Note: Alphabets-numbers like Z-1, Z-2, and M-2 refer to themes that indicate standpoints. F and numbers like F1, 2, 3, 6, 21, and 23 represent frame components, which are listed by numbers.

Source: Shin, 2009, p. 244.

On the other hand, another analysis has found that the politician was linked with pro–IZ and pro–mandatory IZ standpoints through social remedy, social benefit, legitimacy, and social justice frames during Phase 1 covered by *WSJ*. She was connected with a different politician.

Through these analyses, we can see how the two newspapers linked the same politician with different frames. Therefore, the tripartite semantic network analyses help us to observe delicate and significant differences and changes in framing, which is hard to be captured in quantitative framing analysis. Interestingly, the complete analyses outcomes have shown that some developers' standpoints and frames have been depicted to be inconsistent and sway between conflicting themes and frames over time in the three newspapers' coverage while overall politicians' and civic activists' standpoints and frames have been portrayed to be consistent over time in the all three newspapers.

## 5. Conclusion and Discussion

This study has addressed the need to tackle the dynamical relationships among actors, frames, and the actors' standpoints in framing research, and demonstrated the usefulness of tripartite semantic network analysis for framing research through a case study of a local politics around a controversial local public policy. Although the tripartite framing analyses produced a great deal of detailed information on the local newspapers' framing, it has tried to provide the most significant outcomes that demonstrate the benefits of the tripartite semantic network analysis, including the ability to capture subtle but meaningful differences and changes in frames and their actors over time, which are often undetectable in quantitative framing research.

This study, as addressed in Entman's cascading activation model (Entman, 2003; Entman & Usher, 2018), is expected to amplify the need to investigate the complicated and dynamical relationships among multiple elements beyond the conventional quantitative frame analysis for frequency and salience of frames. In many cases, mass media frame social issues by selecting certain stakeholders and their reactions to the issues, including opinions about and standpoints toward the issues in their news coverage. The proposed tripartite framing analysis is expected to complement conventional quantitative and also emerging semantic network framing analyses by uncovering the detailed connections among stakeholders, their standpoints and frames, and therefore presenting the dynamical changes in the network connections as our social issues unfold and evolve over time.

Practically, identifying the linkages among stakeholders, their standpoints, and frames in the news coverage can provide substantive information and implications for relevant stakeholders and strategic communication practitioners to design counter–frames. In other words, we can strategize public communication by not only creating sophisticated counter–

frames but also connecting those with credible information sources/stakeholders. Particularly, given the changing media environment where social leaders and the public can actively utilize social media to voice their opinions, which often creates dynamical processes of frame formation, it become more important to uncover the dynamical frame formation processes between media and stakeholders.

Nevertheless, numerous media researchers have tended to overlook identifying the sources of information by focusing merely on the content and its effects. Indeed, in the age of informational politics or war, it becomes more crucial to investigate the linkages between news content and the sources, for we have witnessed a plethora of news and information, including fake news, and frames on the web. Under this circumstance, such multi-mode framing analyses as tripartite semantic network analysis seem more desired to uncover the relationships between the unknown sources of the information and the circulating frames on the web and provide the outcomes and the implications for our society. It might also be valuable for not only research but also more effective engagement in public discourses.

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