

MAPPING OF THE SOCIO-SEMANTIC NETWORK OF THE *ARHITEKTURA* MAGAZINE (1931-1934)

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DOI: 10.7906/indecs.22.2.2
Regular article

Received: 12 May 2023.
Accepted: 12 March 2024.

ABSTRACT

Networks serve as a metaphor for understanding various phenomena in humanities, encompassing the circulation of ideas, people, and artifacts. This research employs network analysis, drawing from H. C. White's concept of *netdom*, to capture social and language patterns within Ljubljana's *Arhitektura* magazine from 1931 to 1934. Its objective was to map the socio-semantic network of the magazine, assisting in discerning relationship and expression patterns within Yugoslavian architecture discourse of the 1930s, aligned with the principles of "new architecture". Methodologically, the research has entailed text analysis using natural language processing techniques and quantitative network analysis, revealing three types of networks: a bimodal network of authors and issues, individual semantic networks of authors, and a socio-semantic network. This has resulted in 18 networks. Despite a simplified text processing model and trivial architectural concepts, common language among contributors is detected, pointing to mutual connections in architectural expressions and actors' social ties. *Arhitektura* was not the sole platform for discourse creation; however, the conducted network analysis has confirmed that the nature of the magazine embodies the concept of *netdom* switching, where identities are formed and altered through transitions between *netdoms*, shaping and changing those identities over time. Furthermore, this research illustrates how network analysis can offer actionable insight into historical phenomena, as well as its applicability in understanding social and cultural dynamics.

KEY WORDS

digital humanities, history of modern architecture, natural language processing, network analysis, socio-semantic network analysis

CLASSIFICATION

ACM: I.2.7, J.5

APA: 2900, 2930

JEL: O18

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INTRODUCTION

During the 20th century, architectural magazines played a crucial role in representing actual architectural discourse, shaping, and reflecting architectural and planning production, and promoting professional and technical knowledge. Through collaboration, they constructed a distinct language of architecture, referring not to design but rather to architectural language in the linguistic context. This language served as a forum for architects, artists, sociologists, politicians, and other theorists, embodying a network of underlying ideas conveyed through architectural texts [1]. From a wider sociological perspective, magazines represent a network in which intricate personal, social and cultural connections are intertwined. As a newer paradigm [2], the network approach is a set of procedures that enable the visualization of relationships between entities that are shaped as nodes connected by edges. This network serves both as a metaphor and as a tool for conceptualizing phenomena, particularly when viewed through the framework of Harrison C. White's theory of *netdom* [3].

Arhitektura–Mesečna revija za stavbno, likovno in uporabno umetnost, stood as the cornerstone among the architectural magazines of the Kingdom of Yugoslavia during the 1930s. Its publication in Ljubljana from 1931 to 1934 marked a pivotal moment in the standardization and elevation of discourse surrounding architecture and urbanism [4]. Prior to its emergence, discussions about architecture within the Yugoslavian context primarily unfolded in professional journals like *Viesti Kluba inženirah i arhitektah* (1880-1913) and *Tehnički list: organ Udruženja Jugoslavenskih inženjera i arhitekta* (1919-1939), where architectural topics shared space with news and issues from other engineering fields. Influence also extended from other European journals through architects who were educated and worked in European offices. *Arhitektura* faced competition from publications like *Građevinski vjesnik* (1932-1940), a magazine centred on architectural and technical structures published in Zagreb under the editorship of engineer Branko Širola. In contrast to *Arhitektura*, *Građevinski vjesnik* was characterized as “narrower in content and highly technically oriented” [5]. This distinction positioned *Arhitektura* as a specialized platform dedicated to the promotion of architecture, and architectural thought within the cultural landscape of the Kingdom of Yugoslavia. In 1928, within *Tehnički list*, Pavao Jušić articulated the principles of “new architecture” – rational, solid, hygienic, and cost-effective style of construction aimed at addressing acute social problems [6]. In this study, the lexical items (words, phrases which we call concepts) used to articulate these principles are termed as “new architecture.” “New architecture”, synonymous with the term “new building” [7], embodies the culmination of modernist architectural principles and underwent an extensive process of validation. While the expression “new building” was introduced through German professional publications, it is common to use the term “modern architecture”. The groundwork for the language of “new architecture” in Yugoslavia had been laid in *Tehnički list*, however, its acceptance was not immediate. Architects invested many years into competitions, public engagements, project realizations, and contributions to professional publications before “new architecture” gained recognition [7]. The emergence of *Arhitektura* magazine further fuelled both positive reception and controversy surrounding “new architecture”.

This research aims to map the socio-semantic network of *Arhitektura* magazine, seeking to reveal patterns of relationships and linguistic expressions within the discourse of “new architecture”. The boundaries of the explored network are delineated by selected opinion pieces within the magazine's publication period and the capabilities of open-source tools. The proposed methodology is grounded in the concept of *netdom*, which involves mapping networks that encompass both social and cultural constructs.

The article follows this outline. It begins with an introduction, followed by a review of related research. Next, there is a brief overview of the *Arhitektura* magazine and the theoretical

framework. The methodology, including research limitations, is outlined in the fifth part. The sixth part presents the results, followed by a discussion and conclusion.

RELATED RESEARCH

In the realm of related research, investigations into the networking of cultural magazines have followed various trajectories. Traditionally, studies have adopted conventional art historical methodologies [8]. However, there is a discernible shift towards the incorporation of digital humanities methodologies, particularly network analysis [9-14]. Some studies focus specifically on applying text analytics to explore architectural magazines [15], while others contribute to the discourse on digital architectural and urban history [16]. These approaches yield valuable statistical insights, particularly when augmented by network analysis techniques.

Research on the discourse of *Arhitektura* magazine has been explored within various academic contexts. Historically, it has predominantly served as a primary source for historiographical research on architecture and urbanism during the interwar period. However, only a handful of authors have delved into specific topics and contributors within *Arhitektura* as a part of broader surveys of architectural magazines in former Yugoslavia [4, 17, 18]. *Arhitektura* formed a part of a doctoral thesis [19], with more detailed discussions emerging at a conference in Belgrade focusing on architecture and visual arts within the Yugoslav context [4, 5]. However, no one has truly explored a socio-semantic approach. Emil Špirić, in his doctoral thesis, explored the semantic aspects of architecture, primarily focusing on concepts of “architecture” and “architectural form” [20]. While his emphasis on the dual nature of architectural form complements the socio-semantic analysis, his work revolves mostly around architectural form and not so much around social and linguistic dimensions analyzed here.

Socio-semantic network analysis represents a burgeoning interdisciplinary field that has gained momentum over the past decade [21-24]. A comprehensive overview of research in socio-semantic network analysis, exploring its origins and the duality it encompasses, was presented in a special issue of the journal *Poetics* titled “Discourse, Meaning, and Networks: Advances in Socio-Semantic Analysis” [25]. Although the field itself remains somewhat uneven, its roots can be traced back to the seminal works of Di Maggio [26], White [27], and Kirschner and Mohr [28]. Two scholars have been instrumental in the evolution of socio-semantic network analysis. Kathleen Carley revolutionized the treatment of culture within social network analysis by integrating semantic network analysis, thereby structurally analyzing both social and cultural orders [29]. Building on the concept of dual relations between networks and culture, Camille Roth [30] proposed a comprehensive socio-semantic analysis of networks, combining social relations among individuals with semantic relations among the concepts they engage with. Presently, two main research trajectories are evident: one explores the convergence of culture and network analysis, while the other leverages social media platforms for reconstructing social and semantic networks [25]. This diverse range of topics and methodologies applied across various disciplines lays a solid foundation for future research in the discipline of architecture.

ARHITEKTURA MAGAZINE (1931-1934)

The *Arhitektura* magazine was founded with the vision of uniting architects across the Kingdom of Yugoslavia and fostering collaboration with craftsmen and building material manufacturers [31]. Spearheaded by Slovenian architect Dragotin Fatur, the magazine was published by a private consortium comprising *Arhitektura* and *Technical Library*. This autonomy allowed the editorial team to shape content independently, aiming to promote new architectural trends amidst domestic criticism during the 1920s.

Initially led by ethnologist and archaeologist Rajko Ložar, editorial leadership was later passed to architect Jože Mesar. Mesar, alongside the editorial teams in Belgrade, Zagreb, and Ljubljana, facilitated a diverse range of contributors and thematic sections [5]. The Belgrade team, including members of the *Grupa arhitekata modernog pravca* (GAMP), comprised modern-oriented architects like Jan Dubovy, Milan Zloković, Branko Maksimović, and Branislav Kojić. Similarly, the Zagreb team consisted of architects Marko Vidaković, Ivan Zemljak, and Josip Pičman, while the Ljubljana team saw frequent changes in membership, with notable architects like Rado Kregar, Ivo Spinčič, Janko Omahen, and Jože Žigon serving at different times, with Žigon assuming the role of editor-in-chief from 1932 onwards.

The magazine's early collaboration involved project presentations and opinion pieces on architecture and urbanism, evolving after 1932 to focus on thematic sections overseen by specialists in various fields. Architect Marko Vidaković led the architecture and urban planning section, Dragotin Fatur oversaw applied arts, engineer Ciril Jeglič managed landscape architecture, and academic painter Miha Maleš curated visual arts. Thematic sections covered topics such as interior furnishing, hotels, the ideology of modern architecture, urbanism, Adolf Loos, and the planning of modern school facilities. Noteworthy essays and opinion pieces by prominent architects aimed to elucidate the principles of "new architecture", addressing its relevance and challenges, thus shaping architectural discourse during that period [5].

Despite editorial changes, the magazine maintained a consistent structure, featuring project descriptions, tenders, letters, book and magazine reviews, foreign architectural achievements, and, notably for this research, opinion pieces on architecture and urbanism. Illustrated advertisements from various manufacturers and architecture offices were a prominent feature, aligning with the magazine's goal of facilitating knowledge exchange on new technical materials, constructions, and products.

THEORETICAL FRAMEWORK

Many studies conceptualize culture as a composite of constructs encompassing shared ideas, concepts, and meanings among individuals [23, 32-35]. According to numerous scholars engaged in cultural network analysis, the convergence of culture and networks reveals that culture is intricately intertwined with social relations [35, 36]. Culture is both reproduced through interpersonal interactions and shapes the structure of social connections. In essence, culture and social networks mutually constitute each other, forming a dual relationship [14, 25, 36, 37].

This research on mapping the socio-semantic network of *Arhitektura* is grounded in this duality, drawing upon the concept of *netdom* introduced by Harrison C. White in his book "Identity and Control: How Social Formations Emerge". *Netdoms* are conceptualized as social domains organized around shared concepts and ideas, known for their capacity to generate and disseminate new ideas and influence the beliefs and behaviors of individuals within them. They manifest at various societal levels, from small groups to global networks. As White posits, "*Netdoms* make up the fabric of socio-cultural life, where domains – through stories – provide interpretation, while networks – through relationships – provide social texture". *Netdoms*, akin to identities, exhibit variability in scale and scope [38]. White's theory suggests that social structures emerge from patterns of relationships bound by narratives. In this study, we scrutinize the *Arhitektura* magazine as a *netdom*, or perhaps several *netdoms*, with authors and editorial policies shaping the architectural discourse of the Kingdom of Yugoslavia.

METHODOLOGY

The corpus analysed in this study includes 23 issues of *Arhitektura* that were digitised by the Digital Library of Slovenia using Optical Character Recognition technology. It has been

weighted according to the type of text being analysed. Consequently, it has been narrowed down to include solely opinion pieces and essays, excluding technical descriptions, news, notices, project presentations, images, and advertisements from the analysis. This has yielded a corpus of 117 opinion pieces, distributed as follows: 8 in 1931, 40 in 1932, 52 in 1933, and 17 in 1934. Each piece has been associated with its corresponding author and issue for analysis. In cases where authors have not been specified, the pieces have been labeled as “Anonymous”. Given the magazine’s multilingual contributions, all texts have been translated into Croatian to maintain analytical consistency.

Due to the lack of a free and open-source tool for textual network analysis in the Croatian language, we have created a simplified text processing model. The texts have been processed using the Python programming language and spaCy software library. The pipelines [39] used for listing and creating a data set¹ of concepts have involved: 1.) reading the corpus and removing stop words, 2.) loading the *hr_core_news_lg* training model [40, 41] from spaCy and running a morphological text analysis (tokenization, POS tagging, and lemmatization), 3.) identifying most frequent concepts in the text, computing all possible pairs of concepts, computing connections (edges) in the network, i.e. counting pairs. Connections between terms have been drawn from co-occurrences, with two terms being connected if they have appeared next to each other in the same sentence [42].

Based on the corpus of the *Arhitektura* magazine transformed into data sets and using a simplified text processing model, three types of networks have been mapped.

The first mapped network is a bimodal network of authors and issues. This network has dealt with entities author-issue, and their relationships. Authors are connected if they wrote opinion pieces in the same issue, providing insight into the magazine’s structure and social connections within.

The second network is an individual semantic network of authors, centering on concept-concept entities and their interconnections within sentences. This network has elucidated the cultural structure [43] of the author’s language, offering insight into the linguistic landscape of the magazine.

The third mapped network has been a socio-semantic network, focusing on author-concept entities. It has uncovered connections between authors and specific concepts, illuminating the cultural constructs they share among themselves.

Besides Python and Spacy, which have been used for the text processing model, we used the open-source software Gephi. Gephi has enabled us to generate and visualize networks and to observe four centrality measures: degree centrality, betweenness centrality, eigenvector centrality, and closeness centrality [44, 45].

The linguistic diversity of the *Arhitektura* magazine has presented a challenge for this research, as it was published in Croatian, Slovenian, and Serbian. Current research on the Croatian language corpora has faced limitations due to the lack of open-source tools for NLP. Although there have been several free digital tools for exploring corpora and creating semantic networks, such as Automap, neTxt, Cowo, Wordij, and VosViewer, none of them currently support Croatian NLP. To overcome this obstacle, we had planned to conduct the semantic analysis using NooJ, a software environment for linguistic development. However, we quickly realized that creating a new vocabulary specific to architectural discourse would be time-consuming. Consequently, a model based on the Croatian language has been developed specifically for this research. As a result, we have focused on a relatively small number of concepts to improve result control and simplify pair computation. Due to the ongoing development of the text processing model, no concept weighting has been applied, and a few crucial n-grams have been computed manually.

RESULTS

To uncover patterns of social connections, cultural structures, and their interrelations within the magazine, three network types have been mapped: author-issue, concept-concept, and author-concept. That has resulted in 18 networks.

NETWORK OF AUTHORS AND ISSUES

The initial network, a bimodal network of authors and issues, has comprised 75 nodes and 291 edges. It has encompassed 52 authors who contributed opinion pieces and 23 issues in which these pieces have been published, Figure 1. Node size correlates with degree centrality, indicating the number of direct connections each author has possessed within the network. The authors who have contributed at least with two opinion pieces and have had a degree centrality greater than 5 have been listed in Table 1, along with other centrality measures. Notably, those with the highest representation have often held dual roles within the magazine as both authors and editors. Among the 16 selected authors, three have stood out for their significant centrality

Table 1. Centrality measures of 16 authors in the network of authors and issues.

	Author	Author (A) or Author/Editor(A/E)	Town	Degree centrality	Betweenness centrality	Eigenvector centrality	Closeness centrality
1.	Dragotin Fatur	A/E	Ljubljana	53	1330	1	0,770
2.	Marko Vidaković	A/E	Zagreb	36	663	0,743	0,649
3.	Rado Kregar	A/E	Ljubljana	23	418	0,439	0,573
4.	Ivan Zemljak	A/E	Zagreb	17	82	0,459	0,513
5.	Ante Gaber	A	Ljubljana	17	52	0,369	0,513
6.	Ciril Jeglič	A/E	Ljubljana	16	79	0,382	0,544
7.	Branislav Kojić	A/E	Belgrade	15	27	0,467	0,506
8.	Niko Armanda	A	Split	15	30	0,473	0,532
9.	Anonymous	NA	NA	14	117	0,342	0,540
10.	Hugo Ehrlich	A	Zagreb	12	17	0,325	0,471
11.	Drago Mattanovich	A	Ljubljana	11	22	0,328	0,517
12.	Zdenko Strižić	A	Zagreb	11	38	0,324	0,517
13.	Adolf Loos	A	Vienna	10	1,871	0,323	0,435
14.	Bogdan Rajakovac	A	Ruma	9	13,81	0,253	0,486
15.	Rihard Jakopič	A	Ljubljana	7	6,8	0,182	0,474
16.	Branko Maksimović	A/E	Belgrade	7	1,91	0,171	0,453

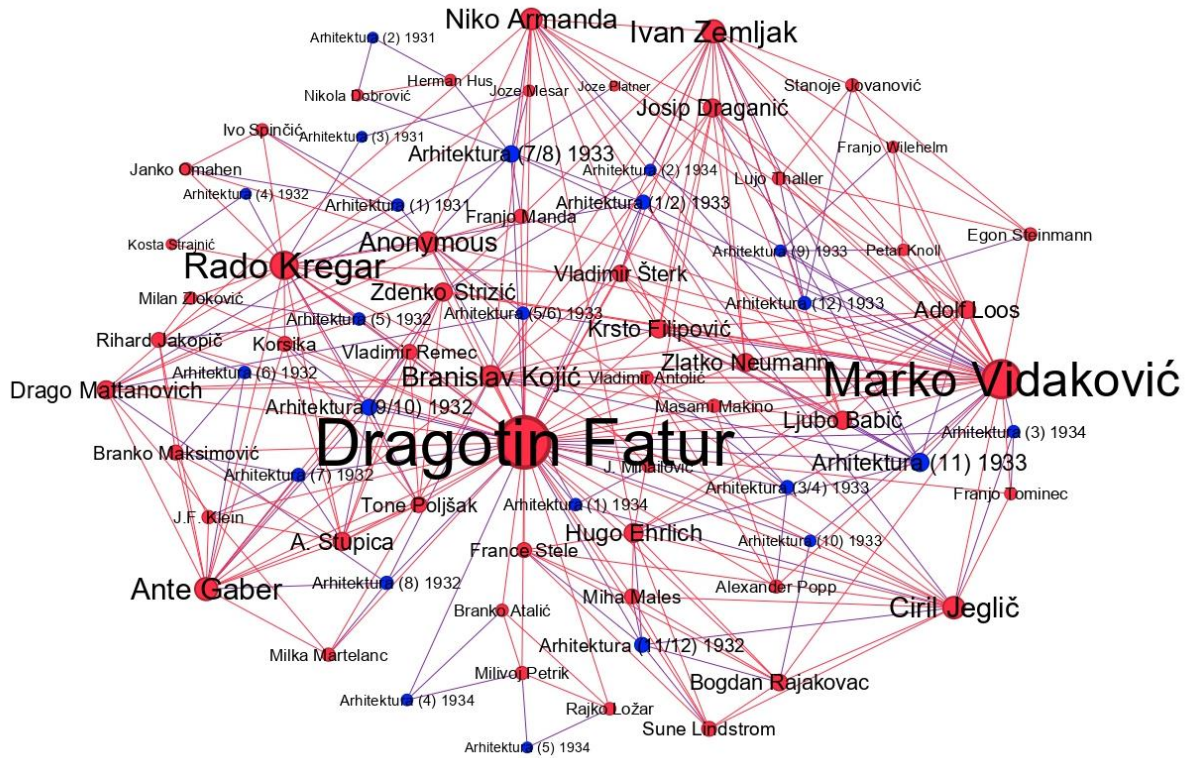


Figure 1. Bimodal network of 52 authors (red nodes) and 23 issues (blue nodes) of the *Arhitektura* magazine. Node size according to degree centrality.

and editorial responsibilities: Dragotin Fatur, serving as editor-in-chief, Marko Vidaković, the Zagreb editor, and Rado Kregar, the Ljubljana editor. The degree centrality values for these three author-editors have ranged from 23 to 53, indicating their substantial presence and connections within the network [44, 45]. Additionally, they have exhibited high values across other centrality measures: betweenness centrality has ranged from 418 to 1330, eigenvector centrality from 0.439 to 1, and closeness centrality from 0.579 to 0.770. Betweenness centrality measures the extent to which an actor serves as a mediator between other actors in the network. Eigenvector centrality quantifies an actor's connections to the most influential actors in the network. Closeness centrality identifies actors who have had the shortest paths to reach others in the network, allowing them to access a wide range of actors without intermediaries [44, 45].

It is significant that Adolf Loos, a pioneer of “modern architecture”, has been among the authors. He has become a key figure of the magazine when the editors decided to dedicate issue 11 from 1933 to the then-deceased Loos. However, the inclusion of individuals such as Ante Gaber and Drago Mattanovich, who were neither architects nor editors, is surprising. Similarly, while Kosta Strajnić and Petar Knoll have held significance as architectural critics, they have had minimal connections and have been less prominent in the network. Editors like Jan Dubovy and Milan Zloković from Belgrade and Josip Pičman from Zagreb, although they did present their projects in the magazine, do not appear in the network as they have not contributed with opinion pieces. Notably, there is a lack of female representation among the central actors, despite their presence in the network. Most authors (6 out of 16) have been from Slovenia, where the magazine originated, and 4 out of 16 have been from Zagreb. Additionally, thanks to Adolf Loos, contributors went beyond the borders of the Kingdom of Yugoslavia.

INDIVIDUAL SEMANTIC NETWORKS

Individual semantic networks (Figure 2) have been created using the opinion pieces of the 16 authors listed in Table 1. Each network has been generated based on the 10 most frequently

used concepts by each author. Limiting the number of concepts to 10 has ensured better control of the results and has accounted for tool imperfections. Node size has been determined by degree centrality. Relationships between concepts have been undirected and based on the co-occurrence technique, considering pairs within the same sentence. Their weight has been determined by binary counting, which considered two terms as significant if they appeared together in one text unit.

In our investigation of the discourse surrounding “new architecture,” we have initially examined the usage of this concept. Among the 16 networks, the concept of “new architecture” was utilized by Marko Vidaković and Bogdan Rajakovac. Additionally, as mentioned in the introduction, the term “modern architecture” was employed. This concept was used by Anonymous, Branko Maksimović, and Branislav Kojić. Interestingly, the synonym “new building” was utilized by Maksimović within the concepts of “new” and “building”. However, 8 out of the 16 authors used the term “new,” and 5 out of those 8 authors incorporated the term “architecture.” This suggests that they may have been discussing new architecture, although the co-occurrence technique may not have captured this specific n-gram.

Concepts used by Ante Gaber and Rihard Jakopič could not have been related to architecture in any way. However, Engineer Drago Mattanovich has been connected to architecture through the concept of “indirect light” and its various associations. Ciril Jeglič’s network featured entirely different concepts compared to those of all architect-editors. Zdenko Strižić’s network encompassed urban-related themes like “centre”, “settlement”, “street”, and “square”, which align with Kojić’s focus on the concept of “social development.” Meanwhile, networks associated with Bogdan Rajakovac, Hugo Ehrlich, and Niko Armanda featured concepts such as “Le Corbusier”, “Loos”, “Kovačić”, and “Vidaković”, highlighting the significance of these figures within the discourse of modern architecture.

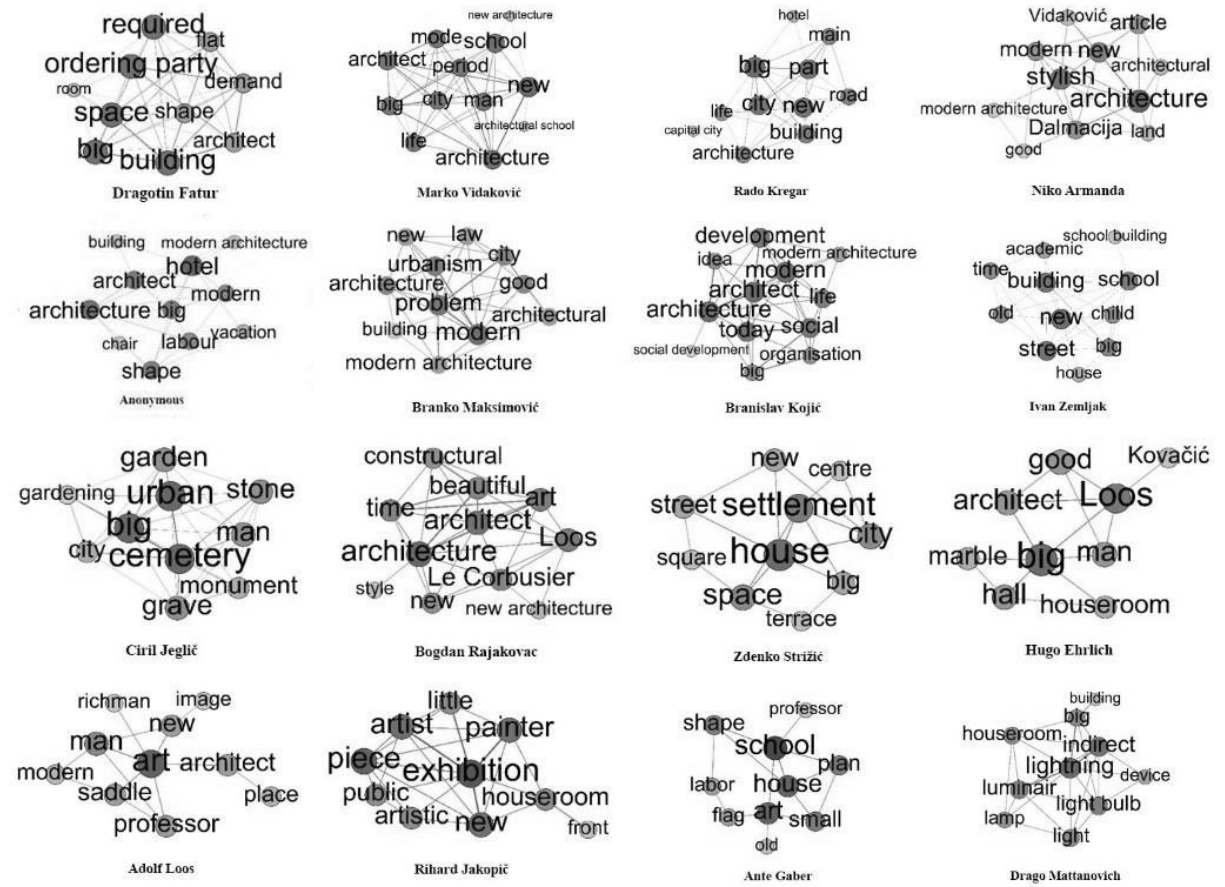


Figure 2. Individual semantic networks of 16 authors. Node size according to degree centrality.

If we compare the networks of the Belgrade editors, their concepts are identical in terms such as “modern” or “architecture,” and similar in concepts related to urbanism, such as “problem” and “development.” The networks of the Zagreb editors also share identical concepts like “school,” as well as concepts closely related to urbanism such as “city” and “street.” In contrast, the networks of the Ljubljana editors have common concepts such as “building,” but due to the diverse professions of the contributors, they shared fewer concepts overall. Some concepts, like “modern architecture” and “modern,” are consistent across the networks of Kojić, Maksimović, and Armanda, as well as in the Anonymous network. The concept of “hotel” appeared in both the Anonymous network and Rade Kregar’s network. Similarly, the concept of “school” appeared in the networks of Gaber and Vidaković, which may seem initially unrelated. Additionally, two translated texts by Adolf Loos have formed a semantic network that has revealed his metaphorical narrative on “rich man”, and the “saddle”.

SOCIO-SEMANTIC NETWORK

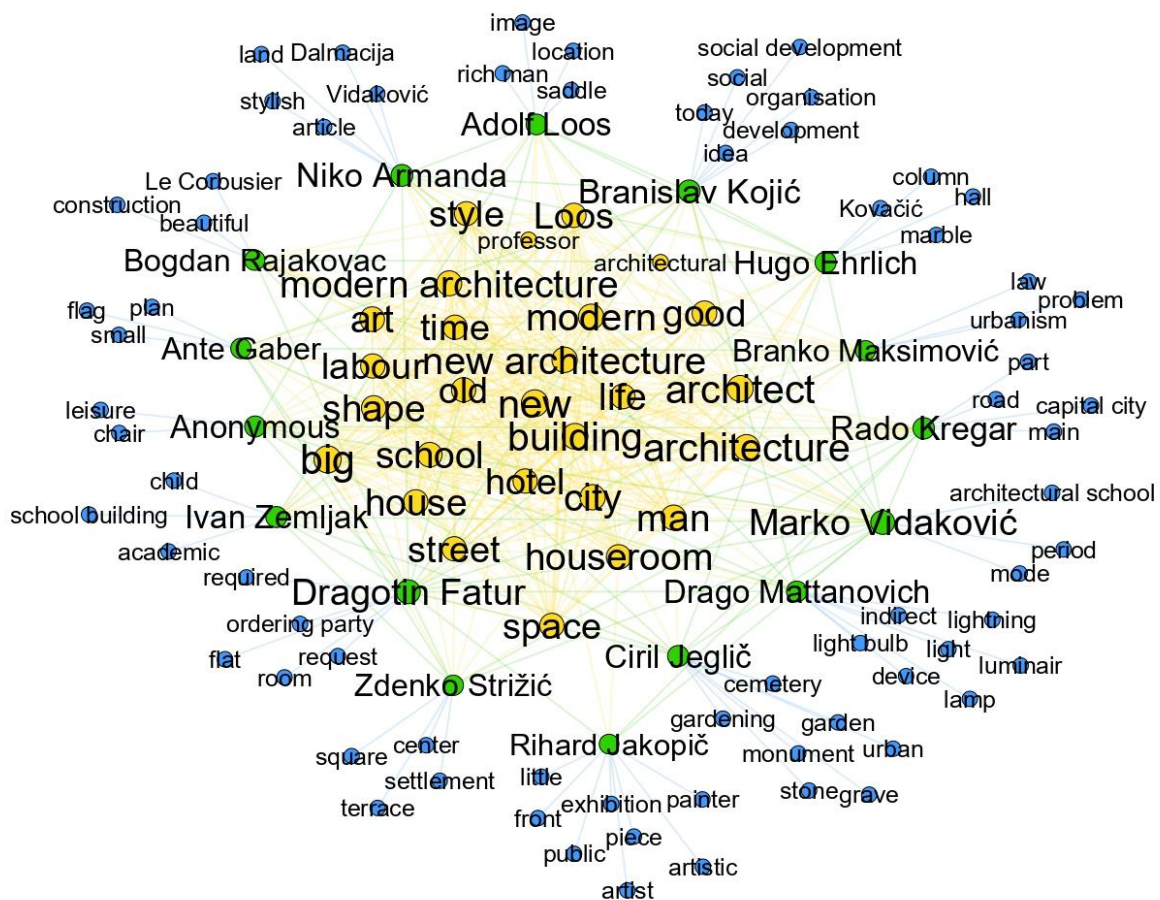


Figure 3. Socio-semantic network. Node size according to degree centrality.

The last mapped network, featuring author-concept entities (Figure 3), represents the socio-semantic network. It has comprised a bimodal network of authors and concepts, featuring 16 authors (represented by green nodes), 98 concepts (represented by yellow and blue nodes), and 526 edges. Among these, 71 were individual concepts (blue nodes) and 27 have been shared concepts (yellow nodes), both extracted from the individual semantic networks of authors. Common concepts are shared by at least two authors. This analysis has considered the binary usage of concepts in the network, without accounting for frequency of word usage. The most shared concepts in the network were “big”, “new” and “architecture”, whereas the least

shared concepts included “Loos”, “professor”, “labour”, “time”, “old”, “hotel”, “street” and “space.” This segment of the network can function as the collective semantic network of the magazine. Since the node size in the network has been determined by degree centrality, which indicates a concept’s popularity, it’s natural for shared concepts to carry more significance than those used by only one author. This observation has underscored the diversity of the network, which includes 98 concepts contributed by 16 authors. Anonymous and Marko Vidaković have the highest number of shared concepts (9). Among editors, the Zagreb team exhibits the highest use of shared concepts. Dragotin Fatur and section editor Ciril Jeglič have the fewest shared concepts. Among non-editors, Ante Gaber has the most shared concepts (8), while Rihard Jakopič shares only one concept with others.

Regarding the concepts “new architecture” and “modern architecture,” some authors used both terms interchangeably. The presence of both terms among the shared concepts indicates a lack of standardized usage. The degree centrality of shared concepts ranges from 2 to 9, while betweenness centrality ranges from 3 to 240. Notably, the concept “new” has a significantly higher betweenness centrality (240) compared to “modern” (26), suggesting its greater importance in connecting other concepts. The most popular concepts in terms of degree centrality are “new” (9) and “architecture” (7), reinforcing the focus on the language of new architecture. These findings shall be further discussed in the following section.

DISCUSSION AND CONCLUSION

The article aims to map the socio-semantic network of the *Arhitektura* magazine in order to unveil patterns of relationships and linguistic expressions within Yugoslavian architectural discourse of the 1930s, as supported by the White’s theory of *netdom*. According to White, the social world emerges from patterns of relationships that are composed of “stories that link identities” [3]. To visualize the “world” and “stories”, three types of networks have been generated.

The most important contribution of the article may be summarised as follows: First of all, quantitative network analysis has identified the key actors and concepts of the magazine, highlighting the role of the concept “new architecture” as a mediator between other concepts. Frequent appearance of the concept “new” confirms that discussions within the magazine’s discourse revolved around “new” ideas and concepts. Secondly, the analysis has recognized linguistic diversity and regional differences among authors and editorial teams, emphasizing the importance of contextual specificity. Thirdly, the usage of concepts like “new architecture” and “modern architecture” underscore the absence of standardized discourse terminology. Fourth, assessing the significance of individual actors and concepts, such as “Loos” and “new architecture”, has revealed important areas for further research and interpretation. The most noteworthy result of the analysis is the pattern of shared concepts within the socio-semantic network and the nature of the magazine as a dynamic and permeable entity, or a set of identities shaped through *netdom* switching. The term “switching”, refers to changes or transitions between different *netdoms* or domains of expectations and meanings within the social network [38].

Previous research has examined various aspects of the magazine, including its content, actors, architectural theory, and the design language of “new architecture” [4, 5, 7, 17, 19]. This study highlights the influence of editors such as Fatur, Vidaković, and Kregar, and sheds light on lesser-known actors within the network. For example, less prominent figures like Mattanovich gained visibility due to the inclusion of other disciplines essential for architecture, such as technology. However, one area that has been overlooked is its linguistic expressions. This research addresses this gap by analysing networks to identify key authors, concepts, and their relationships within the magazine’s linguistic discourse, thereby highlighting the editorial role in shaping discourse. Identified prominent figures include Adolf Loos, along with key concepts

like “new architecture” and “modernism” within the magazine’s discourse, pointing out the non-standardized terminology of “new architecture.”

The architectural language initially developed in the professional journal *Tehnički list* transitioned to *Arhitektura* in order to both promote and provoke discussions surrounding “new architecture.” In 1928, within *Tehnički list*, Jušić articulated the principles of “new architecture” as rational, robust, hygienic, and cost-effective construction style [6]. However, the analysis of 16 individual semantic networks of authors has revealed high-centrality concepts with somewhat trivial architectural meanings that cannot be directly related to the design principles of “new architecture”. This is not surprising as in semantic networks, words with trivial meanings often have the highest degree centrality [25, 29]. However, the results still indicate few noteworthy features. Firstly, the key concepts of Anonymous’ semantic network can play a crucial role in attributing anonymous texts. Secondly, the semantic network analysis serves to elucidate the terminology prevalent in 1930s architecture, while also providing insights into the ideas and influences of the authors involved. Lastly, a notable connection to the language of “new architecture” is identified in Loos’s metaphor of the “saddle” [46]. In this metaphor, the “saddle” symbolizes a house, or architecture, that must cater to everyone, in contrast to art, which does not need to please anyone. This suggests architecture’s responsiveness to user input during design, catering to the inhabitants’ need. Semantic analysis reveals diverse topics, interests, and regional differences among authors and editorial teams, highlighting the discourse’s breadth and depth. Additionally, variable terminology usage within the magazine underscores a lack of standardization in terms such as “new architecture” and “modernism,” prompting further research and discourse analysis method development.

The most notable outcome of the socio-semantic network is the pattern of shared concepts, particularly evident in the higher usage demonstrated by the editorial team from Zagreb compared to other editorial teams. This segment of the socio-semantic network not only indicates a framework for fostering collaborations but also highlights the importance of shared language among stakeholders in working towards common goals and a shared vision [47]. Despite the initial appearance of triviality, these shared concepts play a crucial role as they represent “stories that link identities” [3]. Each of the 16 authors contributed with their own narrative, yet the patterns of shared language among them collectively narrate the story of the magazine or the “new architecture” it seeks to promote. According to Godart and White, such narratives interweave meanings within a relational structure, creating a horizon of possibilities [33]. Consequently, this socio-semantic network can be interpreted as comprising multiple *netdoms*, whereby each author shares common concepts with every other actor indirectly included in this network, thus forming new *netdoms*. White suggests that narratives within *netdoms* have enduring impacts, generating, and disseminating new ideas that influence the attitudes and actions of individuals within them. In the domain of architecture, where the interplay between social networks, cultural constructs, and design practices is notably intricate, the emergence of new *netdoms* is particularly significant. *Arhitektura* was not the sole platform for discourse creation; however, the conducted network analysis has confirmed that the nature of the magazine embodies the concept of *netdom* switching, where identities are formed and altered through transitions between *netdoms*, shaping and changing those identities over time. This underscores how architectural discourse within *Arhitektura* remains fluid and adaptable. As long as there are readers or contributors utilizing the same concepts, it ensures the endurance and ongoing impact of these ideas on architectural discourse.

Finally, this research offers a deeper understanding of modern architectural discourse through author and concept network analysis, revealing their interactions and impact, while identifying differences in language among professions and the absence of standardized terminology, thus

laying the groundwork for further discourse analysis methodologies. Such findings offer a basis for further discourse analysis methodologies, particularly evident in the usage of concepts like “new architecture” and “modern architecture”. From this perspective, quantitative network analysis could benefit architecture theorists in understanding the dynamics and interactions within architectural discourse, potentially stimulating research on the evolution of architectural ideas over time. Additionally, the resulting corpus serves as a valuable foundation for developing a simplified NLP tool tailored for the Croatian language, specifically designed for architectural discourse analysis. Furthermore, White argues that stories created through *netdoms* endure, emphasizing the importance of conducting text analysis in the original language to preserve the richness of meaning and maintain the vitality of *netdoms*.

The research encountered linguistic hurdles due to the magazine’s multilingual content and the absence of open-source NLP tools for Croatian, leading to the creation of a Croatian-based model. Consequently, the study focused on a restricted set of concepts to enhance result control and facilitate pair computation, while the method of analysing the most frequent words proved inadequate for capturing the distinctive concepts of architectural discourse. Therefore, future research should focus on expanding semantic networks of authors, utilizing concordances, improving methodology through concept annotation, and exploring ego-networks of authors. This should uncover the dynamics and knowledge transfer between other *netdoms*, especially the transfer from other European architectural journals, together with their mutual interactions, journals both predating *Arhitektura* and following it.

REMARK

¹Jaklenec, T.: *Data and codes for magazine Arhitektura (1931-1934)*. Data set, 2023, <https://github.com/tajanaj/Magazine-Arhitektura-1931-1934->.

ACKNOWLEDGMENTS

We would like to extend our gratitude to Prof. Darko Fischer, Ph.D. for valuable advice and the final pipeline, Jurica Kostanjevac for initial pipelines, and Tea Raše, Ph.D. for proofreading and language advice. This article is a result of the doctoral research on Croatian architectural magazines at the University of Zadar, Interdisciplinary Humanistic Studies and research project *Protection and restoration of 20th century architecture: operational principles and contemporary practice* (IP2022-20) at the Faculty of Architecture, University of Zagreb.

This article represents an expanded iteration of research firstly presented at the conference “Digital Art History – Methods, Practices, Epistemologies IV”. We would like to thank our colleagues who have contributed to the improved quality of this work through their suggestions.

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