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Research Article

Rhythmanalysis Theory as a Dialectical Method in Urban Geography

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Abstract: The primary aim of this paper is to thoroughly define the dialectical structure of the theory of rhythmanalysis, while at the same time providing a clear and detailed framework for the method it entails. To achieve this, the paper seeks to establish a useful link between Henri Lefebvre's theory of rhythmanalysis and its practical reflections in the context of urban studies, specifically under the umbrella of urban geography. The study then proceeds to classify selected works from the literature that can serve as guides within the framework of rhythmanalysis. A comprehensive analysis of the studies that use the rhythmanalysis approach as the basic research-analysis method has been conducted, systematically categorized under five critical concepts of urban geography: Location-Movement, Construction, Envisioning-Experience, Social-Political Organization, and Sites-Practices. Following theoretical and bibliographic analysis, this comprehensive approach highlights the scope, opportunities, and potential of rhythmanalysis while addressing its critiques, consolidating its conceptual foundations, and showcasing its relevance for urban studies. Through this detailed examination, the paper aims to make a significant contribution to the understanding and application of rhythmanalysis in the field of urban geography.

Keywords: rhythmanalysis; urban geography; dialectic method; Lefebvre; everyday life

Highlights:

- Lefebvre's approach to everyday life has formed the basis of the study.
- Rhythmanalysis is a unifying method for quantitative and qualitative geographic data.
- Dialectical methods are necessary for the multi-component structure of urban studies.

1. Introduction

Henri Lefebvre, renowned for his theories on the patterns of everyday life, has profoundly contributed to urban studies, particularly deepening our understanding of dialectical space. This contribution is evident in the human geography literature, such as Tim Edensor (2010), Mattias Kärrholm (2009), Benjamin Fraser (2008), and Dydia DeLyser & Daniel Sui (2013), who have further explored the debates surrounding dialectical space. Most critically for this paper, Lefebvre's work on rhythm and rhythmanalysis (1991b) provides a distinctive lens through which to comprehend and interpret these dynamics, offering critical insights into the temporal and spatial rhythms of urban environments. The rhythmanalysis project is an advanced version of his theoretical perspective on cities and is regarded as a method for reading complex cities (Lefebvre, 2004). This method offers an important opportunity to address the relationship between the time dimension with the societal-space dimensions. It does not accept the dimension of time as one kind. Relationships to other dimensions can be analyzed by assessing them both linearly and cyclically in this method.

As the dialectic approach to space is seen as one of the major shifts in the philosophy of space, Lefebvre (1991b) criticizes the reduced, distant, and constant structure of the modern Cartesian space approach, merging the dialectical space readings as "unity in opposition". Schmid (2008) defends this dialectical view that the city is not just a physical place but a site of constant social struggles and transformations. This dialectical structure of the concept of space-city, which emerges through social practices where opposites come together and create a constant change offers an opportunity to evaluate complex structures such as the modern cities.

Lefebvre's concept of rhythmanalysis is one of the foundational elements of his dialectical understanding of space, which perceives space as a dynamic and continuously produced entity. In other words, as opposed to a results-oriented perspective, a process-oriented approach focuses on understanding the evolving dynamics and interactions that give rise to spatial and temporal patterns, rather than merely analyzing static outcomes. Drawing upon the theoretical groundwork presented, the paper will investigate the potential of adopting Lefebvre's "Rhythmanalysis" perspective as a methodological or analytical framework. The discussion aims to uncover rhythmanalysis' promising implications for advancing urban studies, particularly in the realm of urban geography.

Lefebvre's concept of rhythmanalysis is closely related to Marxist dialectical materialism and evaluates social processes through the determining role of the economy. While social structures are shaped by production relations and economic processes, especially in Marxist theory,

Lefebvre places rhythms in the framework by emphasizing the temporal dimension of this process. He is able to include social practices in the equation within this framework. In this context, Lefebvre argues that the capitalist system commodifies human bodies and time, and therefore individuals have limited control over their own rhythms. This issue, which could only be addressed through social rhythms before modern society, has become valid for individual rhythms in modern society, and the processes that Lefebvre considers as hidden rhythms have also begun to become a topic of discussion in the daily life of the city.

The theoretical studies on rhythmanalysis in social sciences and urban studies (Fraser, 2008; DeLyser & Sui, 2013; Blue, 2017; Brighenti & Kärrholm, 2018; Lyon, 2021), along with case studies in this field (Kärrholm, 2009; Simpson, 2012; Sarmiento, 2017; Sletto & Palmer, 2016; Edensor & Holloway, 2008; Hetherington, 2013; Nash, 2018; Pardoel, 2020), significantly contribute to urban geography by focusing on topics such as urban mobility, everyday life in public spaces, the transformation of time and space, and the interactions of social structures. These contributions are crucial in terms of reflecting the impact of rhythmanalysis on the field of urban geography. However, while the topic of rhythmanalysis has been explored and discussed to some extent in urban geography (Reid-Musson & Barber, 2017; Brighenti & Kärrholm, 2018; Nash, 2021), it is evident that it has not been sufficiently addressed in the theoretical and empirical studies of disciplines focused on the organization of the built environment, such as urban and regional planning and urban design.

To expand the contributions of rhythmanalysis, particularly to the disciplines of the built environment and urban geography, this study is structured around the necessity of mapping extensive references and publications through methods such as bibliographic analysis, which are commonly used in applied disciplines, rather than focusing primarily on in-depth theoretical discussions. While bibliographic and bibliometric analyses on the meaning and structures of social sciences and urban space are present in academic publications (Lesné, 2022), they are more commonly employed as a literature mapping method in applied disciplines within the natural sciences and built environment (Pradana & Dimiyati, 2024). This paper uses a broad literature review to map the possibilities for applying Lefebvre's concept of rhythmanalysis in urban geography within the global academic publishing environment. These possibilities will contribute to the intersection of social sciences and the built environment—multidisciplinary fields that have not previously explored or even referenced this concept.

This paper employs a two-stage literature review to explore the intersection of rhythmanalysis and urban geography through an analytical process. In the first stage, key literature is screened to establish clear connections between the definitions and theoretical frameworks of rhythmanalysis and urban studies. It is essential to define the theoretical boundaries of rhythmanalysis while highlighting its advantages and limitations in the urban context. In the second stage, the focus shifts to studies that use rhythmanalysis as a primary research method. This allows the research to narrow its scope to works that apply rhythmanalysis directly in their analysis. To categorize these studies, the framework provided by Key Concepts in Urban Geography (Latham et al., 2009) is used, enabling the grouping of works based on their quantitative and qualitative data evaluations, research scales, subject matters, and dialectical stances. This extensive review examined a total of 305 social science studies, 165 of which focused specifically on urban geography. Among these, 54 studies were identified as utilizing rhythmanalysis as a primary research method. By concentrating on these studies, the paper was able to focus on research that applies rhythmanalysis in a meaningful and methodologically rigorous way. These selected studies were evaluated based on a variety of criteria, including their contributions to understanding urban spaces, the methodologies they employed, and their overall findings. The data for this review were sourced from several key academic databases, including Web of Science (WoS), Scopus, SAGE Journals, and the Institute of British Geographers. These databases provided a wide-ranging collection of studies, ensuring that the review captured a diverse set of perspectives and approaches in the field of rhythmanalysis as it relates to urban geography. The findings from these databases offered a comprehensive view of how rhythmanalysis is being applied in contemporary urban research, setting the stage for further exploration of its role in urban geography.

The concept frame begins by outlining the theoretical foundation of rhythmanalysis, focusing on its development through Henri Lefebvre's perspective, essential for understanding its broader significance. The first chapter examines how rhythmanalysis has been used to analyze social patterns and behaviors in urban settings, reviewing its strengths in capturing temporal rhythms and its limitations in urban studies. Next, the article then explores how rhythmanalysis has been applied in urban studies, particularly in understanding the spatial and temporal rhythms of cities. This includes a critical discussion on the theoretical boundaries and interdisciplinary critiques of rhythmanalysis, emphasizing its dual potential as a tool and a framework. In the final stage, the focus shifts to urban geography, detailing how rhythmanalysis helps analyze cities through a spatial-temporal lens. Key themes include the dialectical relationships between various urban elements. The results section summarizes these findings, concluding that rhythmanalysis has the potential to offer new perspectives in urban theory and analysis.

2. Rhythmanalysis and its Reflections in Social Sciences

The subject of rhythmanalysis began with the book *La Rythmanalyse* by Lúcio Alberto Pinheiro dos Santos in 1931, and it became a key method for analyzing the dialectical structure of urbanism with spatial and social dimensions after Henri Lefebvre developed the concept. His emphasis is to consider the measurable aspects of rhythm as well as the immeasurable, revealing hidden structures that shape society (Soja, 2011). As Elden (2004) explains, “the question of rhythm raises issues of change and repetition, identity and difference, contrast and continuity.” Thus, rhythmanalysis becomes a powerful tool for understanding systems, disruptions, and transformations in social order.

Lefebvre (2004, p. 18) argues that rhythm plays a crucial role—both hidden and overt—in various aspects of our lives. First, hidden rhythms are intricately linked to physiological and psychological processes. These rhythms operate beneath the surface, often unnoticed but profoundly influential. Secondly, public rhythms, which are social in nature, These rhythms are expressions of collective experience, revealing the virtuality and structure of social life. Third, fictional rhythms go beyond mere rhetoric and verbal patterns, incorporating elements like elegance, gestures, and learning processes. Lastly, dominant rhythms are those entirely constructed by human action and represent power dynamics within society. These rhythms, often imposed by social, political, or economic structures, shape the way individuals move through time and space, reflecting the inequalities of power that regulate everyday life.

To fully understand social rhythms, Lefebvre insists that one must consider multiple rhythms together. The harmony or disharmony between rhythms within society—whether in individual experience or larger social systems—can reveal much about the state of that society. Lefebvre categorizes these rhythms into three types: arrhythmia, polyrhythmia, and eurhythmia. Arrhythmia occurs when there is disorder or conflict in one or more rhythms, leading to social disharmony or dysfunction. Polyrhythmia refers to the coexistence of different rhythms that do not conflict, representing a state of coherence or balance. Eurhythmia, on the other hand, is the ideal state where multiple rhythms interact harmoniously and creatively, leading to innovation and societal well-being (Lefebvre, 2004, p.16). In this context, arrhythmic situations signify dysfunctions or crises within social systems, while eurhythmia represents a state of optimal social function.

Table 1. Basic classification of rhythms according to Lefebvre (2004, p.18).

Formations	sources-examples	features
secret rhythms:	physiological- psychological	recollection and memory, the said and the non-said
public (therefore social) rhythms:	calendars, fêtes, ceremonies and celebrations	one declares and one exhibit as virtuality, as an expression
fictional rhythms:	verbal rhythms, but also elegance, gestures and learning processes	short-, medium and long-term calculations and estimations
dominating–dominated rhythms:	every day or long-lasting, in music or in speech	completely made up

Lefebvre's rhythmanalysis method, with its focus on hidden and public rhythms, provides critical insight into how power operates through the regulation of time and space. It reveals the ways in which modern society imposes dominant rhythms on individuals, particularly through the lens of capitalism and consumption. These imposed rhythms create uniformity and limit diversity, contributing to the reproduction of social inequalities. Lefebvre's rhythmanalysis thus becomes a crucial tool for analyzing not only how societies function, but also how they change, and how individuals and communities resist, adapt to, or are shaped by these rhythms of power.

Rhythmanalysis places great importance on classifying rhythms based on their qualities. The dialectical duality of rhythms is particularly noteworthy in this regard. In a social context, the combined evaluation of these dualities can be used in structural analyses. The relationship between natural and artificial rhythms, which increases during the transition from traditional to modern cities, can be revealed through rhythmanalysis, especially the evolution of artificial rhythms in modern cities. The mechanical form of artificial rhythms can be compared to the organic structure of natural rhythms. Similarly, Lefebvre's critical perspective on different phenomena through rhythms allows us to look at phenomena from a different and broader perspective by examining the transformation of continuous and cyclical rhythms in the modern city into discontinuous and linear rhythms.

Lefebvre's rhythmanalysis shares significant connections with dialectical analysis, a method that seeks to uncover the underlying contradictions and conflicts within societal structures. While dialectical analysis focuses on the interplay of opposing forces, rhythmanalysis examines the temporal rhythms that shape these conflicts. By combining these two approaches, a deeper understanding can be gained of how societal change unfolds over time. Unlike classical reductive analysis, which isolates phenomena, rhythmanalysis looks at the interaction between multiple rhythms in their entirety. This holistic method is more advantageous in analyzing complex systems because it takes into account not only what happens but when and how it happens (DeLyser & Daniel Sui, 2013; Fraser, 2008).

Through this dialectical path, Lefebvre's critique of modern society extends beyond the surface-level observation of consumerism. He argues that consumption ideologies, often presented as means of improving quality of life, are actually shaping the very fabric of social existence. The pursuit of consumption, he suggests, is becoming the dominant organizing principle of social life, leading to a homogenization of rhythms and a suppression of diverse ways of being. Lefebvre (1971) further critiques modern society by noting that individuals are under the influence of consumption ideologies aimed at improving quality of life (Lampropoulos et al., 2020). He argues that as a result of this, future social life will be based on uniform consumption habits.

Rhythmanalysis can help analyze how communities are affected by this process of synchronization, which often leads to the suppression of diverse rhythms and ways of life. By examining the patterns of consumption, leisure, work, and other social activities, we can see how the dominant rhythms of modern society are shaping our lives. Moreover, rhythmanalysis can shed light on the potential consequences of a society centered on consumption. The homogenization of rhythms can lead to a loss of cultural diversity, social inequality, and environmental degradation. By understanding the underlying rhythms that shape our social world, we can work towards creating more equitable and sustainable alternatives.

In this sense, the key concepts that rhythmanalysis studies in social sciences focus on are diversifying and looking at the concepts of consumption and culture in today's modern era in a multifaceted way. While we can see studies focusing on concepts such as consumption, tourism, employment, big data, and neoliberalism, the phenomenon of culture is encountered in a way that focuses on the practices of everyday life, routines, and public space (Figure 1).

3. The Scope of Rhythmanalysis Theory in Urban Studies

Beyond defining rhythmanalysis theory, extensive critiques have been conducted regarding its boundaries within the discipline of urban studies. These critiques often focus on the theoretical limitations of rhythmanalysis, highlighting both its potential and its constraints, and providing valuable guidance for its application. While some studies regard rhythmanalysis as a tool for addressing the limitations of reductionist approaches, others emphasize its potential as an interdisciplinary methodology. A significant trend among studies that critique rhythmanalysis is the integration of quantitative and qualitative methods. Although not entirely reductionist, these works tend to prioritize qualitative approaches over quantitative ones in the application of rhythmanalysis. Fraser (2008) proposes rhythmanalysis as a methodological strategy to overcome the constraints of reductionism. Koch and Sand (2009) emphasize the inclusivity of their proposed approach, highlighting its adaptability and openness to experimentation. DeLyser and Sui (2013) further stress the unifying potential of rhythmanalysis by suggesting that it transcends the quantitative-qualitative divide. Their approach connects multiple scales, senses, and emotions in urban research, offering a more comprehensive and integrated understanding. Additionally, Lyon (2021) broadens the scope of rhythmanalysis as a comprehensive methodology applicable across disciplines, underlining its potential to address complex research challenges through its unifying nature.

Critiques also emphasize the instrumentalization of rhythmanalysis. Mendieta (2008) considers it a tool for understanding the relationship between the cyclical and linear aspects of social life. Beyes and Steyaert (2011) describe rhythmanalysis as a method of exploration, while Brighenti and Kärrholm (2018) view it as a means to deepen our understanding of user rhythms and their spatial regions. Procházková (2018) highlights the transformative potential of rhythmanalysis, suggesting it can turn sounds into objects of focused listening. Additionally, Farrington (2021) and Blue

Table 2. The Scope of Rhythmanalysis Theory Critiques

Aspect of Critique	Key Authors	Key Points	Critiques
Instrumentalization	Mendieta (2008); Beyes & Steyaert (2011); Procházková (2018)	Rhythmanalysis as a tool for exploring cyclical and linear aspects of social life, user rhythms, and spatial regions.	Lacks precision in operationalizing rhythms for consistent application across contexts.
Methodological Integration	Fraser (2008); Koch & Sand (2009); Lyon (2021)	Combines qualitative and quantitative methods; emphasizes inclusivity, adaptability, and methodological flexibility.	Over-reliance on qualitative approaches leads to descriptive results with limited generalizability.
Spatial and Temporal Dynamics	Farrington (2021); Blue (2017)	Highlights rhythmanalysis's value in understanding the transformation of space and time in everyday life.	Ambiguity in defining the boundaries of spatial and temporal rhythms limits its analytical clarity.
Dialectical Potential	Brighenti & Kärrholm (2018); DeLyser & Sui (2013)	Positions rhythmanalysis as a framework for examining contradictions and harmonies in urban systems.	The abstract nature of dialectical reasoning can make practical applications challenging for urban research.

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potential, ambiguity remains a key limitation of this method. Rhythmanalysis is often favored over quantitative methods, emphasizing qualitative approaches, which leads to descriptive results that focus more on the characteristics of rhythms than their measurement.

In conclusion, the scope of rhythmanalysis theory in urban studies highlights its versatile application in understanding the complexities of urban life. When considered alongside traditional analytical methods, its comprehensive, unifying, and transformative nature, particularly as a tool for analyzing individual and societal experiences, provides a more holistic understanding of urban structures. Rhythmanalysis offers valuable insights into the dynamic interplay between social rhythms, space, and time, facilitating a deeper exploration of the underlying processes shaping urban environments. Despite its limitations in operationalizing rhythms across contexts, its dialectical approach remains a critical tool in addressing the gaps left by reductionist methodologies, making it an essential framework for analyzing contemporary urban systems.

4. Urban Geography and Rhythmanalysis

In the 19th century, as issues of capital, labor, and economic organization began to reshape modern cities, the social representations of individuals and communities emerged as a central theme in urban contexts. Understanding and evaluating these complex social processes and economic life cycles posed significant challenges for traditional analytical methods. In this regard, rhythmanalysis provided a transformative framework, offering unique advantages for capturing the dynamic interplay of temporal and spatial dimensions within urban systems. At the same time, urban geography provides a complementary spatial framework for addressing the limitations of rhythmanalysis highlighted in the previous section, offering further depth and precision to its application. In conclusion, the relationship between urban geography and the concept of rhythmanalysis provides an opportunity to evaluate today's modern cities' backgrounds and futures together. This dialectical understanding means the embodiment of the understanding that Lefebvre is trying to create. Especially in the cause-effect relationship, the discussion of the commodification of the city and space can be created with this dual relationship. It also has the potential to reveal the changes in all dimensions of the cities, especially, changes caused by linear and cyclical processes of the daily life in urban space.

This chapter utilizes bibliographic analysis to map the use of urban geography and rhythmanalysis in the literature, traditionally examined within the social sciences. However, different research areas are seen in urban geography, such as economics, planning, etc., in addition to social sciences. 'The Key Concepts in Urban Geography' study by Latham et al. (2009) has classified the basic research topics of urban geography. This classification brought a different and new categorization to the discipline, and it gathered the study subjects under similar concepts from the perspective of urbanism. These concepts are "1. Location and Movement" studies, "2. Constructions" studies, "3. Envisioning and Experience" studies, "4. Social and Political Organization" studies, and "5. Sites and Practices" studies (Latham et al., 2009). These concepts consider the purpose, method, and scale in addition to the study subjects. Because it includes different components flexibly, Latham et al.'s (2009) study has provided many connections in the discipline. It has been a valuable tool, especially for research on the built environment and the senses (Williams, 2016) and on the place of physical space in everyday life (Sobrinho, 2014; Tozer, 2019).

After the translation of Lefebvre's *Rhythmanalysis* into English, the concept has been extensively applied in urban geography studies. The comprehensive literature review presented in this section focuses on various topics within urban geography. A total of 165 studies using the keywords "rhythmanalysis" and "urban geography" have concentrated on some common concepts (Figure 2). However, only 5 of these studies have employed rhythmanalysis as the primary analytical method. When these studies are further differentiated by scale and methodology, as shown in Figure 2, the classification by Latham et al. (2009) helps group these rhythmanalysis studies. This allows us to see how the comprehensive framework of rhythmanalysis has been utilized in urban geography research.

As seen in Figure 2, when rhythmanalysis studies are filtered through the lens of urban geography, certain research areas within the broader social sciences become narrower, and shifts occur in the relationships between the topics studied. Notably, research on migration, women, gender, and labor tends to shift its focus within urban geography towards time geography, migration, and mobility. Instead of studies centered on hidden rhythms related to the body, there is a stronger emphasis on the representation of social rhythms, as highlighted by Lefebvre. Additionally, it can be observed that while the focus on mobile data and big data studies has decreased within urban geography, research on public space and mobility—where spatial representations of social and public rhythms are analyzed—has intensified. These studies, in particular, focus heavily on movement-related activities, such as running and walking.

When the scale, methodology, and scope of these key concept networks within the relationship between urban geography and rhythmanalysis are considered, studies that specifically use rhythmanalysis as an analytical method allow for a more detailed examination through the categorization proposed by Latham et al. (2009).

4.1. Rhythmanalysis in Location and Movement Studies:

Location and movement studies examine global urbanism, urban central area formations, transportation geography, and user movements of the cities (Latham et al., 2009). Rhythmanalysis studies on location and movement analyze repetition and differences in the formation of rhythms (Marcu, 2017; Sun, 2022; Walker, 2021). It is seen that these transportation geography studies use the subject of rhythmanalysis as a tool. They consider being in flow/process as the physical flow/process of urban actors, as defined by Lefebvre (2004) (Edensor, 2010). Specifically, studies on the polyrhythmic and eurhythmic relationship between individual and group motions and flow-oriented techniques provide a chance to approach the process-oriented dialectical approach instead of the result-oriented Cartesian perspective.

Similarly, Walker's (2021) evaluation focuses on the polyrhythmia inherent in urban mobility, with a specific examination of public transport mobility. In particular, it has expanded the scope of polyrhythmic situations by addressing urban mobility through the concept of energy, which is at the center of the climate crisis. Similar to the concept of mobility in these studies, Sun (2022) contributes significantly by deepening the understanding of the temporal experiences of pedestrians and street vendors in Yuncheng, China, utilizing rhythmanalysis as a key approach. In another study focusing on pedestrian rhythms, Chan (2024) focuses on using pedestrian rhythms as an experimental tool in transportation system planning and thus tries to benefit from the experiences of pedestrian users in future transportation projects. The focus of the study is on the relationship between the mechanical rhythmic order of different transportation modes and the body. Waitt and Stanes (2022) try to understand the changing urban rhythms in post-pandemic processes by discussing the relationship between transportation modes and the body through cyclists. Another perspective on urban mobility emerges from studies that utilize data on mobility enabled by advancing technologies. Marada et al. (2023) study, on the other hand, enables the analysis of mass movements through mobile data and instrumentalizes big data through rhythmanalysis in terms

of mobility and spatiotemporal relations. Similarly, Earl (2023) can compare the local/global and past/present features of polyrhythmic rhythms by using mobile data as a tool in reading mobility.

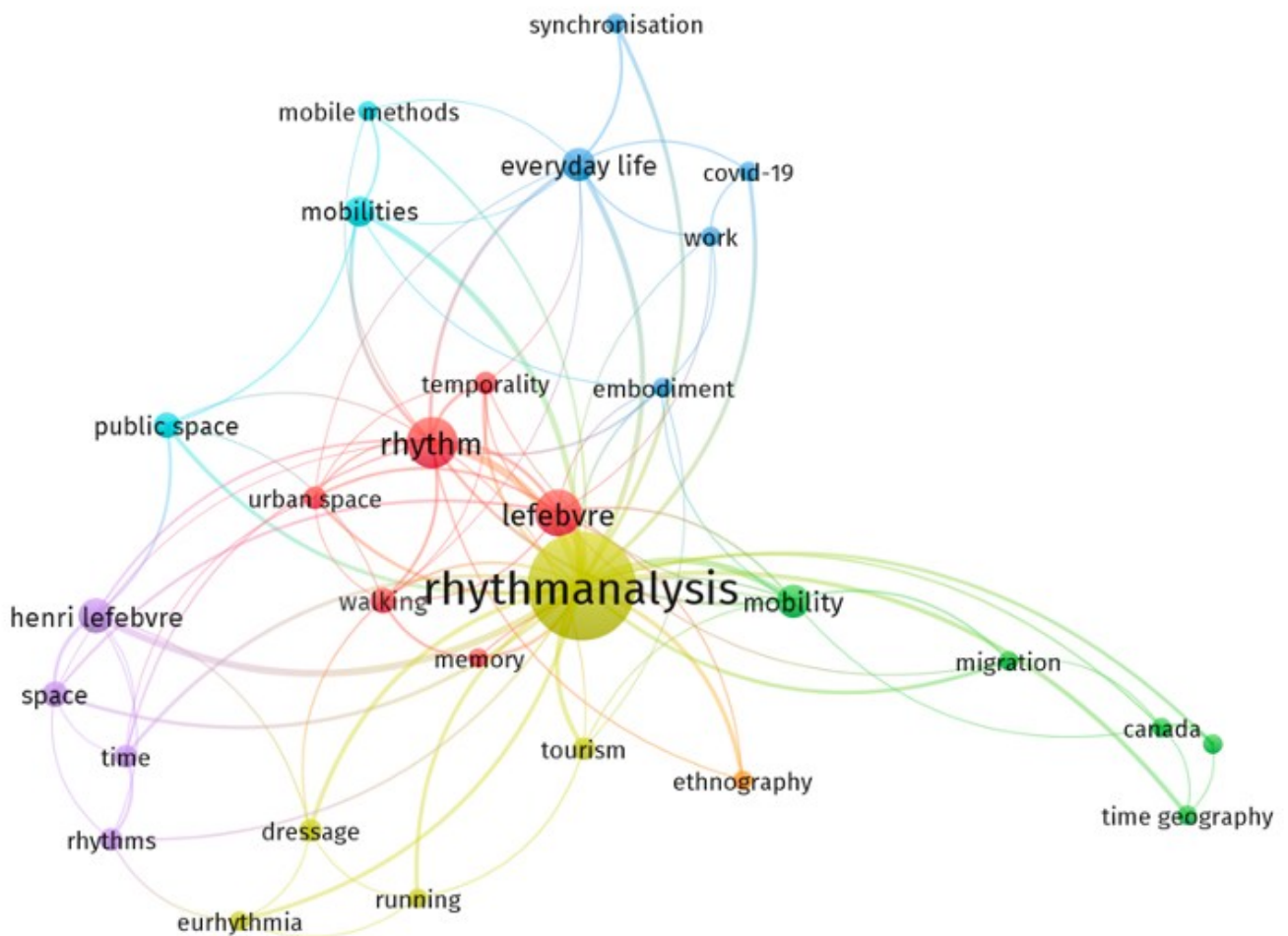


Figure 2. Distribution of key concepts in “Urban Geography”-social science studies in the “Rhythmanalysis” study spectrum. (165 studies from Web of Science (WoS), Scopus, SAGE Journals, and Institute of British Geographers databases.)

On the other hand, other studies under this title approach the concept of mobility 'socially' and assess the state of being mobile on a mass scale. For instance, Marcu (2017) shifts the perspective, placing emphasis on the rhythmic changes in the temporal mobility of Eastern Europeans in Spain, shedding light on arrhythmic mobility and its underlying causes. Reid-Musson and Barber's (2021) research delves into the analysis of employment-related spatial formations, investigating the intricate relationship between social groups and distinct patterns of "non-standard" job mobility. Also, Tartia (2018) builds upon this by constructing a conceptual framework that integrates elements of rhythmanalysis with Lynch's (1960) urban components. Specifically, this study focuses on the city center with the concept of the image of the city and evaluates the rhythms that create these areas.

These studies mostly evaluate the relationship between the spatial and social structures of pre- and post-movement mobility situations. It mostly takes place through quantitative data. These use time variation (Drevon et al., 2024), which can be considered an advantage of the concept of mobility, in evaluating varying rhythms. In particular, these studies can decipher the complex relationships within polyrhythmic structures while exploring the causes of conflicts between different urban systems that may lead to arrhythmia (Sun, 2022; Walker, 2021).

4.2. Rhythmanalysis in Constructions Studies

Construction studies examine the built environment and the urban spaces emerging from it. Studies on this topic mostly reveal the quantitative inventory of the built environment and discuss the meaning and importance of the natural environment (Latham et al., 2009). Construction studies often focus on the physical dimension of urban space. Therefore, among other study topics, it is the closest to Cartesian space approaches. On the other hand, rhythmanalysis studies that fall under this category have recently been frequently employed to analyze the impact of large-scale construction projects on the city's social and built environment. Specifically, they explore how these construction processes alter the existing social rhythms of the city. Although this approach appears to focus on qualitative data, the effects being examined are complex and can be both quantitative and qualitative in nature.

Unlike the previous heading, these studies tend to explain the social and physical changes through constant time sections. For this reason, rhythmanalysis studies in this heading mostly focus on the emergence of relations between physical space and human behaviors. For this, there are studies on the natural and ecological structure of cities. For example, Nash's (2018) study focuses on identifying how rhythms shape the urban landscape in London, England. It examines how natural and urban rhythms affect each other. Similarly, Flemsæter et al. (2018) examine spatial relationships through landscape design in Dovrefjell-Sunndalsfjella National Park, Norway in addition to these Pardoel's (2020) research is dedicated to understanding the nature of long-distance transhumance movements in rural Spain. Unlike others, Pardoel (2020) focuses on only rural rhythms as natural rhythms.

Another focus of this theme is studies focusing on the changing infrastructure of cities. Addie's (2022) work creates a new dimension by establishing an urban-physical time framework through the concept of 'infrastructure time', presenting an alternative perspective on temporal dimensions. Plyushteva and Schwanen's (2022) study explores continuous disruptive rhythms by considering flooding and the intricate social-technical-natural relationships within urban infrastructures. Schwarze and Jankowski (2024) examine how major infrastructural projects on Chicago's South Side alter the rhythms of urban spaces, including Jackson Park and the surrounding neighborhoods. In addition, Osman et al. (2022) investigate how different actors, including municipalities, NGOs, and private companies, influence the transformation process of an old textile factory in the Czech Republic. In particular, the changing pace of physical transformation today and its impact on other dynamics of the city are the focus of these studies. Especially, the commodification of space that arises from the analysis of infrastructure-reproduction processes and its effects on various urban structures can be interpreted through rhythms. This highlights the value of rhythmanalysis as a tool in understanding the relationship between change and reproduction processes in the built environment, as forecasted by Castells (1977).

In particular, the measurability of the physical structure is the main feature of the rhythms discussed in these studies. The comparability of both natural rhythms and structural rhythms provides an advantage in the analysis of inter-rhythmic situations. It is seen that the quantitative feature of Cartesian space is also reflected in rhythmanalysis studies. However, it is seen that the dialectical approach can be dominant when discussing the shifts in the capitalist relationship structures that this interaction shows.

4.3. Rhythmanalysis in Envisioning and Experience Studies:

Envisioning and experience studies are perceptual and sensorial research and emphasize the systematic examination of everyday life through methodologies such as observation, diagrams, and photography. Mostly they focus on the temporal and spatial dimensions of the human experience (Latham et al., 2009). Rhythmanalysis studies within the context of envisioning and experience primarily concentrate on elucidating the nuances of public spaces, including parks, squares, commercial areas, streets, and avenues, among others. These inquiries consistently demonstrate a discerning examination of the distinctive qualities of public spaces and the inherent rhythms of various user groups. For this reason, these studies generally appear as studies that require a relatively small sample of daily users in the field.

Simpson (2012) investigates the impact of a street magician on the daily life of the city of Bath, England, utilizing time-lapse photography. It investigates the effects of the individual on social rhythms through the relationship between the individual and the place. McEachern et al. (2012) capture the embodied daily experiences of individuals using urban parks. Similarly, Middelmann (2019) examines people's physical orientation in Johannesburg, South Africa, considering perceptions of fear, security, opportunity, and distress. Also, Flemsæter et al. (2020) explore polyrhythmic relationships between visitor experiences and the actions of host communities on the Telemark Channel in Norway.

Some studies analyze the effects of past heritage rhythms. For instance, Hetherington's research (2013) analyzes the relationship between the rhythms of past heritage and current rhythms in the public sphere, using sound elements and changing sound rhythms. Similarly, Przybylska and Flaga's research (2022) investigates past heritages-rhythms such as monuments, symbols, and rituals of roadside accidents in Poland. They diagram the rhythms of past cultures through space. Moreover, Drevon et al. (2020) delves into the examination of the two main rhythms of the Montreux Jazz Festival, connecting historical changes and revealing the festival's potential to create spaces on both an international and local scale. Edensor and Holloway's study (2008) explores the effects of itineraries, narratives, and commodified Irish discourses on the Ring of Kerry tour in western Ireland.

In addition to the differentiation of the subjects, some studies specialize in research methods. Stansfeld's research (2021) evaluates the privacy of multicultural streets in London through slow-motion videos. In this way, it can analyze polyrhythmic situations in a complex structure in detail. Similarly, Palipane's study (2019) seeks to understand the phenomenon of transformation in the Melbourne suburb of Australia through data collected in various modalities such as sense, sound, and image. They try to capture different rhythms with different data sets. Additionally, Schupp and Penz's work (2021) reveals how everyday lives differ between different cultures, seasons, building typologies, or times of the day. They try to capture different rhythms of urban systems with different data sets. Kismet Bell's work (2023) analyzes the spatial distributions of short literary writings expressed in Istanbul's public spaces. In a different perspective, Nash's study (2021) analyzes gender-based meeting spaces in daily life in London with photographs and interviews. These studies, which specifically investigate the types of use of public space, attempt to understand the impact and power of Lefebvre's Marxist-oriented approach to the production of space through 'use value'. These differ from classical readings of everyday life, particularly because they use public and qualitative rhythms.

4.4. Rhythmanalysis in Social and Political Organization Studies:

Social and Political Organization studies try to understand the nature of the social structure that creates the city. They focus on the changes, diversity, segregation, and similarity of society. Subjects of these studies are generally social sustainability, ethnic-spatial segregation, cultural/age differentials, and neighborhood studies (Latham et al., 2009). The orientation of rhythmanalysis towards social structure focuses on Henri Lefebvre's examination of the internal composition of modern society, one of the central themes in his critique of everyday life (1991b). This approach provides a valuable tool for concepts that are often evaluated through qualitative representations in urban geography. Through rhythmanalysis, the internal evaluation of multiple social structures, their interrelations, and their connections with different concepts can be clarified more effectively. Urban geographers have long studied how neighborhoods function and how particular social groups are distributed in urban settings (Layton and Latham, 2022). Rhythmanalysis studies under this heading generally focus on the conflicts of different ethnic and religious origins of different social groups. In particular, they investigate the encounters between the rhythms of these groups and the impact of these

encounters on urban space and daily life. For instance, Reid-Musson's (2017) study analyzes racial, gender, and social class boundaries of immigrants in Ontario, Canada. This study contributes to understanding the complexity of immigrant experiences and their intersections with ethnicity, gender, and class in urban contexts. Similarly, O'Connor's (2017) study focuses on understanding the relationship between ethnicity and enduring social patterns in Hong Kong, China. This research focuses on the complex interplay between ethnic identity and social dynamics in urban environments. Unlike the conflict of groups with different rhythms, King and Puppa's (2020) analysis examines increasing multistage migration among Bangladeshi immigrant men in north-eastern Italy and London. This research reveals the migration patterns and socio-economic dynamics of Bangladeshi communities in transnational contexts. With these studies, the differing rhythms of ethnic origins and the effects of their coexistence in the city can be revealed. Soaita (2023) investigates the interaction between migration and social structure through an in-depth analysis of the temporal cycles of migration. In this context, the power of rhythm analysis in examining cyclical time emerges as a significant analytical tool. The study explores the diverse and transformative rhythms generated by migrants and their impact on local dynamics such as education, employment, housing, and family.

Unlike ethnicity, studies based on age and gender rhythms mostly try to understand the pace of daily life behind the varying rhythms. In their study, Lashua and Kelly (2008) investigate how young people produce and represent their urban spaces in Edmonton, Alberta, Canada. This research offers insights into the ways young individuals interact with and shape the urban environment and offers valuable perspectives on urban youth culture and spatial practices. Similarly, Lager et al.'s (2016) analysis explores the 'othering' effect of rhythms associated with young and old populations in Groningen, the Netherlands. This research reveals intergenerational dynamics and perceptions through rhythms.

In addition to the arrhythmic situations created by gender- and age-based disadvantaged groups in the city or the rhythmic disruptions they are exposed to in daily life, Walker et al.'s (2022) study analyzes the concept of social inequality through air pollution elements in Paris city center. This research aims to understand the effects of environmental factors on social structure and how ecological crises affect social disadvantages from the resulting arrhythmic situations. Reinekoski et al.'s (2023) study evaluates the organizational practices of Finnish local governments based on interviews with climate experts. This research seeks alternatives to reduce the arrhythmic urban politics patterns faced by groups with social disadvantages.

There are also studies aimed at understanding the place of similar rhythms in the formation of neighborhood relations. For instance, Bennett's (2015) study considers how neighborhood relations in Wigan, England illustrate the process of creating spatial belonging. This research seeks to understand how neighborhood relationships shape different rhythms and create community identity.

Gibert-Flutre's (2021) study analyzes actors and power relations by revealing the temporal variability of activities in Ho Chi Minh City, Vietnam. This research focuses on understanding how power dynamics are shaped by rhythms in urban space. Grazioli's (2023) study analyzes the spatial transformations of slum areas in Rome, Italy, and the forms of social production and social organization through changing rhythms.

Many rhythm analysis studies addressing the impact of the Covid-19 pandemic on social organization and rhythmic disruptions are also evaluated in this context. In this context, Zasina and Nowakowska's (2022) study tries to detect the rhythms of student activities before and during the COVID-19 pandemic in Loatz, Germany. This research aims to understand the effects of the pandemic on student life and examine the change in social rhythms. Rhythmic changes in daily life are used as the basic tool in this study. Thorpe et al.'s (2022) study analyzes the rhythm abnormality that occurs in the daily lives of women during the COVID-19 pandemic in Aotearoa, New Zealand. This research focuses on women's life experiences to understand the effects of the pandemic on social and spatial arrangements.

The basic method of social and political organization is the determination of groups based on their characteristics and investigating the spatial coexistence of them (Bennett, 2015; Thorpe et al., 2022). In summary, qualitative distinctions of social and political organizations can be made according to age, ethnicity, and social class. Because of that, it is seen that arrhythmias are discussed instead of polyrhythmias. Arrhythmias, especially emerged by the "others", are studied in this heading (Grazioli, 2023; King & Puppa, 2020; O'Connor, 2017; Reid-Musson, 2017; Wee et al, 2020;). In addition to these, political organization studies focus on power relations in the city (Gibert-Flutre, 2021; Jenns, 2021; Reinekoski et al., 2023). Studies by Lashua and Kelly (2008), Lager, et al. (2016), and Walker et al. (2022), try to reveal the changing relationships of two different social groups in the city. It is seen that rhythms are used as common variables in addressing urban and social structures that are not based on quantitative data. This situation increases the importance of rhythm analysis in comparing qualitative data and information.

4.5. Sites And Practice Studies:

Sites and practice studies focus on historical events, rituals, and routine habits that cause the emergence of the public space. At the same time, there are studies on social media and consumption habits that are of great importance in shaping public space (Latham et al., 2009). Public spaces can be described as places where individual rhythms transform into social rhythms. Rhythm analysis studies on public spaces generally try to understand the rhythms that form public identity. In recent studies, big data and geographical information systems have been used to reveal this identity. Studies on this subject generally obtain observable data. This provides a great advantage in obtaining the rituals and spatial reflections of the consumer society. Studies in this context generally address the rhythms that form the foundations of public life. For this reason, studies investigate and compare different rhythms in various ways depending on the character of the areas.

For instance, In Kärholm's (2009) exploration, the focus is on unraveling the intricate urban synchronizations enforced by commercial enterprises within public life and spaces in Malmö, Sweden. This focus delves into the multifaceted interactions between commercial activities and the broader urban fabric, shedding light on how businesses shape and influence the dynamics of urban environments. Similarly, Sarmiento's (2017) research examines pedestrian movement patterns among tourists, with a particular emphasis on understanding changing patterns in the center region of Tunisia. Using a combination of observation and quantitative analysis, Sarmiento aims to reveal the complexity of tourist behavior and its effects on urban areas. Cihanger Ribeiro's (2018) work underlines the important role of user participation in the production of urban space, focusing specifically on the main pedestrian street in the center of Ankara, Turkey. Through participatory research methods and ethnographic observation, she highlights how users actively shape and transform the built environment through their daily practices and interactions. These three studies, which take place in the urban centers of big cities, use rhythm analysis to explain the production of public life that emerges with the polyrhythmic structures.

Other studies under this heading help define the mediating role of rhythms in public space research. For example, the work of Lehtovuori and Koskela (2013) offers a new perspective on the analysis of public space, especially in the context of Lisbon, Portugal. The research demonstrates the importance of understanding the eurhythmic and polyrhythmic states of rhythms in providing new insights into the complexity of urban environments. Similarly, Sgibnev's (2015) study explores the complex dynamics underlying the conflict between public and private spheres in the

Republic of Tajikistan. Through analysis and theoretical research, Sgibnev uses rhythms as a theoretical tool to reveal various dimensions of the public sphere.

The last working group under this heading uses various analysis techniques as a means of converting rhythmic observations in the city into quantitative data. Sletto and Palmer's (2016) research aim to reveal spatial patterns and movement dynamics of various mobility characteristics of African cities through empirical methods such as Geographic Information Systems (GIS) and Space Syntax analysis. By providing insights into the complexities of urban mobility through data collection and spatial modeling, Sletto and Palmer provide an understanding of the factors shaping movement and accessibility in African cities. Similarly, Halás and Klapka (2023) conduct rhythm analysis using big data derived from mobile location data collected via cell phones. By analyzing changes in mobile data density, they seek to understand both experiences and consumption patterns. This approach enables the real-time evaluation of anomalies through instantaneous data.

5. Results

According to DeLyser et al. (2013), rhythm analysis transcends the quantitative-qualitative distinction in understanding the concept of the city, providing a nuanced grasp of the complex urban systems shaped by multiple scales, senses, and emotions. As Lefebvre particularly emphasized, rhythm analysis offers a valuable framework for evaluating urban phenomena within the dialectical materialism of Marxism. However, some quantitative rhythm analysis studies have not been able to reveal the depth of the time-space-society relationship. Because of their perspective, they have used rhythms as a tool of the cartesian space approach (Addie, 2022; Sletto & Palmer, 2016). On the other hand, some qualitative rhythm analysis studies have focused mainly on the process and relations of description (Edensor and Holloway, 2008; O'Connor, 2017; Reinekoski et al., 2023; Rose-Redwood et al., 2019). As suggested by Lefebvre (2004), the comprehensive perspective of rhythm analysis has been evaluated from many research perspectives. The use of rhythms, especially in evaluating quantitative and qualitative data together, has enabled the explanation of many urban dynamics (Marcu, 2017; Przybylska and Flaga, 2022; Reid-Musson and Barber, 2021; Schupp and Penz, 2021; Stansfeld, 2021). These studies used quantitative data to understand rhythms and qualitative data to evaluate the relationship between these rhythms.

Urban geography could concretize the spatial context of rhythm analysis studies. In this way, rhythm analysis as a method offers important opportunities for many topics of urban studies. For instance, the use of rhythm analysis in transportation studies has achieved successful results in reading the polyrhythmic movement of users of the city. Edensor (2016) expressed it as a shift in relationships of temporality-spatiality. Moreover, comprehensive results have been obtained by reading the formation-change-development rhythms of the city centers from past to present in analyzing public space. Edensor and Holloway (2008) and Hetherington (2013) carried the traces of the past to the present and evaluated the rituals of the past through their effects on today's public space.

Evaluating the effects arising from the interconnection of different rhythms in the context of urban geography reveals different contextual findings. For instance, the rhythms of nature in urban space are related to both natural and human structures, and they have unique qualities in the natural-built environment relationship. This situation can create arrhythmia in urban space (Plyusheva & Schwanen, 2022), as well as provide an opportunity to create eurythmia with the right choice of natural spaces (Flemsæter et al., 2018). Similarly, Mendieta (2008) uses rhythm analysis to detect arrhythmias within polyrhythmia in ethnic and cultural studies. In particular, rhythms are considered in the analysis of the problems between different communities and social groups. This characterization is of great importance in understanding today's societies over the struggles between disharmony and coherence. It also reveals the effect of processes (digitalization, COVID-19 pan-demic, international migration, etc.) that can change the characteristics of social structures. Particularly, these changes could be read in public spaces where individual rhythms turn into social rhythms (McEachern et al., 2012; Middelman, 2019; Simpson, 2012; Walker et al., 2022). In this context, relations of space-user patterns develop the socio-spatial context of public space discussions.

6. Conclusions

This article, along with theoretical studies examining rhythm analysis in social sciences and urban studies, and case studies in the field, presents findings to explore whether the concept of rhythm analysis has methodological and analytical implications in urban geography. Transforming Lefebvre's rhythm analysis theory into a methodological and analytical framework presents significant opportunities to better understand the complexities of urban daily life. By categorizing the literature under Latham et al.'s (2009) five critical themes—Location and Movement, Construction, Visualization and Experience, Social and Political Organization, and Places and Practices—this study reveals rhythm analysis's capacity to uncover the intricate interplay between urban rhythms and socio-spatial contexts.

Rhythm analysis not only addresses the gaps in traditional urban geography methodologies but also redefines how spatial and temporal dimensions are integrated within urban studies. This integration provides a holistic lens to examine the evolving dynamics of urban environments, offering new insights into how contemporary cities function and adapt to changing socio-economic and ecological conditions. Through its dialectical approach, rhythm analysis uncovers both the harmonies and disruptions (eurhythmias and arrhythmias) within multi-structured urban systems, highlighting the interplay of various polyrhythms.

Methodologically, rhythm analysis's ability to integrate qualitative and quantitative data strengthens its applicability across interdisciplinary research domains. Moreover, its process-oriented approach enables the re-evaluation of cyclical processes, which are often deemed 'static' in classical methods, by examining the interactions between short-term cycles, such as technological and economic developments, and long-term cycles, including ecological and social processes. This methodological flexibility positions rhythm analysis as a critical tool for addressing contemporary urban challenges such as global migration, climate change, and social inequality.

By transcending the limitations of traditional urban geography methods, rhythm analysis emerges as an essential framework for exploring the dialectics of urban space. The two-stage literature review based on (comprehensive) bibliographic analysis, presented in this study provides urban geographers and sociologists with a strong analytical tool for rethinking urban dynamics. In particular, this article maps (frames) the possibilities of applying Lefebvre's concept of rhythm analysis in urban geography through the extensive literature review conducted. It aims to contribute to the introduction of this concept, which has not previously been examined or even referenced by multidisciplinary fields, particularly those at the intersection of social sciences and the built environment. Additionally, it offers practical components for fieldwork, paving the way for future research aimed at addressing the complexities of urban systems. While using conventional concepts and attitudes from widely applied disciplines of urban studies, it is anticipated that Lefebvre's important but rarely used as a reference concept in this field, such as rhythm analysis, can be introduced. In future studies, instead of addressing rhythm analysis in its broad dimensions, there is a need to discuss in depth its relationship with

other specific concepts and dimensions and to establish its intellectual expansions. As such, rhythmanalysis holds broad potential for advancing urban geography and contributing to the envisioning of more equitable, sustainable, and resilient urban futures.

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