دراسة صوتية للتأتأة لمصابي التوحد في المجتمع الموصلي كحالة

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المستخلص:

تدرس هذه الدراسة الجوانب الصوتية للتأتأة لدى الافراد المصابين بالتوحد في المجتمع الموصلي بالعراق، لمعالجة فجوة بحثية خارج السياقات الغربية. باستخدام منهج دراسة الحالة النوعي، قرأ المشاركون كلمات عربية محددة (محضرة مسبقا عن طريق مدربهم) أثناء تسجيلهم بالفيديو. ركز التحليل على تحديد أنواع التأتأة (التكرار، الإطالة، الوقفات) والأصوات المرتبطة بها. تؤكد النتائج حدوث جميع أنواع عدم الطلاقة الثلاثة. بشكل ملحوظ، ارتبطت الأصوات العربية)ح(/ħ/،)أ(/æ/، و)و(/ʊ/ بقوة بالوقفات والإطالات ، مما يسلط الضوء على التحديات الخاصة باللهجة. يشير التباين إلى صعوبات كامنة في المعالجة الصوتية. تؤكد هذه النتائج على أهمية مراعاة التأثيرات اللهجية وتوجيه علاج النطق المستهدف للأفراد المصابين بالتوحد الناطقين بالعربية الذين يعانون من التأتأة.

لكلمات المفتاحية: التأتأة، التوحد، الأنواع، التباين، عدم الطلاقة.

A Phonological Study of Stuttering in Autistics: Mousli Society as a Case in Point

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Abstract:

This study investigates the phonological characteristics of stuttering among autistic individuals in Iraq's Mosuli society, addressing a research gap beyond Western contexts. Employing a qualitative case study approach, participants were asked to read a set of pre-prepared Arabic words while being video-recorded, allowing for detailed phonological analysis. The study aimed to identify types of stuttering—repetitions, prolongations, and blocks—and to determine which Arabic phonemes were most associated with these disfluencies. The results revealed the occurrence of all three stuttering types, with the phonemes /ħ/, /æ/, and /ʊ/ particularly linked to blocks and prolongations. This indicates that specific sounds in the Mosuli dialect may present unique articulatory challenges, reflecting underlying phonological processing difficulties among autistic speakers. The findings are significant in highlighting the influence of dialectal and linguistic factors on stuttering and underscore the need for speech therapy approaches that are culturally and linguistically adapted to Arabic-speaking autistic individuals.

Keywords: stuttering, Autistics, types, variability, disfluency

INTRODUCTION

Stuttering is a speech disorder characterized by involuntary repetitions, prolongations, and blocks in speech sounds, which is more common in individuals with Autism Spectrum Disorder (ASD) (Smith & Weber, 2017). Phonological aspects of stuttering, such as difficulties with sound production and speech rhythm, are well-documented (Guitar, 2019).

Stuttering in ASD has been widely researched, revealing a close relationship between phonological deficits and stuttering severity (Bloodstein & Ratner, 2008). Studies indicate that stuttering is influenced by both neurological and environmental factors (Yairi & Ambrose, 2013). However, research is predominantly conducted in Western contexts, which may not fully represent the experiences of individuals in different cultural settings.

Autistic children often face unique speech and communication challenges referred to as disfluencies such as pronunciation difficulties, phoneme pronologation patterns, repetition and blocks Wiklund, M., & Laakso, M. (2021: 2773). These issues can hinder their ability to express themselves and interact with others, leading to frustration or misunderstandings in social situations. The reasons behind these speech challenges are often linked to neurological and sensory differences associated with autism) Via the net,1). Some autistic children may struggle with coordinating muscles used for speaking, making it difficult to produce phonemes clearly. Others may process sensory information differently, affecting how they hear and reproduce speech sounds (Mody & Belliveau, 2013:157).

Disfluencies can arise from motor planning difficulties, difficulty organizing thoughts, or sensory processing differences (Mayers ,2020: 12). Some children may also experience disfluencies as a way to manage anxiety or excitement. Disfluencies can make communication more challenging but also provide valuable insights into the child's cognitive and sensory processing patterns (Chaturavitwong, 2023:69).

Understanding disfluencies is crucial for providing effective support. Speech-language pathologists, educators, and parents can work together to

identify the specific types of disfluencies a child exhibits and develop strategies to address them. Speech therapy techniques can improve fluency, while sensory-based interventions can address underlying sensory processing issues (Via the net ,2). By recognizing and addressing disfluencies, autistic children can communicate more effectively and confidently, enhancing their ability to express themselves, social interactions, and overall quality of life (Via net ,3) . With the right support, children experiencing disfluencies can develop stronger communication skills and feel more empowered in their daily lives (Thurm, etal., 2017).

Stuttering refers to disruptions in the flow of speech, typically characterized by repetitions (of phonemes, syllables, or words), prolongations (of phonemes), or blocks (interruptions in the flow of air or voice). (Cited in net 1)

According to Tetnowski and Donaher (2022: 117), stuttering is more common in individuals with autism compared to the general population, but it still varies significantly across cases. The intersection of stuttering and autism introduces some unique phonological and speech fluency patterns. The first is co-occurrence of Speech Motor Problems which means that both stuttering and autism may involve issues with motor planning and execution in speech. These difficulties can result from challenges in coordinating the physical movements needed for fluent speech, which is particularly true for children who have both conditions. The stuttering behaviors seen in autism may differ from those seen in other populations due to motor coordination difficulties, and this often leads to more inconsistent or atypical stuttering. The second is repetition which might be more frequent or take on different patterns from what is typically seen in people who stutter alone, as the repetitions could be intertwined with their sensory processing differences or social communication difficulties. The final pattern is the word and phonems avoidance where some individuals with autism who stutter may engage in avoidance behaviors, such as using fillers (e.g., "um" or "like"), changing words, or even avoiding speaking altogether in stressful situations. This may reflect a combination of phonological processing issues and a desire to avoid social interaction due to anxiety or difficulty with communication (Ibid,120).

Muacevic and Adler (2023:4) suggest several factors which contribute to the manifestation of stuttering in autistic individuals: Sensory Processing Differences: Many individuals with autism experience heightened or diminished sensory sensitivity. This can affect the clarity of speech, as the sensory input from speech sounds may overwhelm the individual, causing delays or disruptions in the articulation process. Social Communication Impairments: Difficulty with the social use of language (pragmatics) is common in autism. This may result in disfluency as the individual struggles to formulate appropriate responses or engage in back-and-forth conversation. This stress could contribute to increased stuttering behavior in some cases. Cognitive and Executive Functioning: The cognitive processing and executive functioning challenges that are often associated with autism may also affect the sequencing of speech sounds and words. Difficulty in maintaining attention and processing information in real-time may lead to disruptions in the fluency of speech. Motor Planning and Coordination: Both stuttering and autism can involve motor speech issues. While stuttering typically involves difficulties in the sequencing of speech sounds, autism-related speech production issues often overlap with motor difficulties. This could cause physical speech disruptions like hesitation or difficulty in articulating sounds clearly, exacerbating the stuttering.

Concerning the contextual factors affecting stuttering, the context in which the stutter occurs can significantly affect the words involved in stuttering). The following factors influence which words are stuttered or how the stutter manifests:

a) Stress and Anxiety: Words that the individual finds more difficult or that are emotionally charged may be more prone to stuttering. For instance, words that are important for social communication (e.g., "hello," "please," or "sorry") may be stuttered more frequently due to increased social pressure or anxiety (Hall et al., 1999: 1367).

b) Speech Rate: Rapid speech can worsen stuttering, especially for those who already have difficulties with motor planning and speech coordination. Autistic individuals may be particularly susceptible to speech disruptions when pressured to speak quickly. The speed of speech can lead

to more repetitions and prolongations, especially in complex or multisyllabic words (Yairi & Ambrose, 1995:1367)

c) Repetition of Specific Phonemes: Certain phoneme or phonemes combinations may be harder to produce, such as fricatives like /s/, /f/, /sh/, or plosives like /k/, /t/, or /d/. These phonemes can cause more disruptions in individuals with autism who have difficulty with phonological processing or motor coordination (Zackheim & Conture, 2003:112)

In conclusion, The research reveals distinctive patterns where specific Arabic phonemes trigger disfluencies . Stuttering in autistic individuals stems from complex interactions among a complex interplay of neurological, sensory, and linguistic factors, resulting in unique fluency patterns. Understanding these interwoven factors is essential to support effective diagnosis and personalized interventions that consider both speech and broader developmental challenges.

In individuals who stutter, words may be affected by three primary types of disruptions:

a) Repetitions: it is divided into three types: phonemes repetition, syllable repetition and word repetition. As for the first, it is the most common feature of stuttering. It involves the repetition of a single phonemes or syllable at the beginning of a word. For example: "ba-ba-baby" (Crowell,1989:26). While the second, i.e. syllable repetition, it means repeating whole syllables, such as: "ta-ta-table". The third type, word repetitions, it means repeating entire words, for instance: "I I I want to go."

Hence, repetitions in stuttering may also be influenced by phonological difficulties in individuals with autism. These might result in stuttering-like repetitions due to anxiety or an increased demand for speech production, especially in words or situations with complex phonological structures.

b) Prolongations: it can be either consonant or vowel prolongation. The earlier is achieved when a phoneme is stretched out, sometimes inappropriately, for example: "sssss-sun". This can be a common feature in stuttering, where the individual is attempting to produce the phoneme but encounters difficulty in releasing it smoothly (Crowell, 1989:26). The latter, vowel prolongations, it is the case when individuals prolong vowels in

words, such as: "aaaaapple". This may also be due to speech motor planning difficulties.

Prolongations might occur more frequently in ASD children who have difficulty with speech timing, as their phonological structure is disrupted by other underlying cognitive or motor issues.

c) Blocks: A block happens when the speaker is unable to initiate the phoneme or word at all, creating a noticeable silence or interruption in speech. For example, an individual might get stuck on a word like "school", with no audible sound coming out for a few seconds before finally speaking it. Blocks may be more intense in autism-related stuttering due to sensory processing difficulties, cognitive overload, or a lack of coordination between thought and speech execution (Crowell, 1989:26).

The study aims at identifying the types of stuttering and showing which one is the most used by the ASD children. The study hypothesizes the following:

1) Autistic individuals who stutter exhibit the three phonological types of disfluencies, namely, prolongation, repetition, and blocking.
2) ASD Children mostly stutter in consonant phonemes.

Depending on the above hypotheses, the study sets the following research questions:

1) What type of stuttering (prolongation, repetition, or block) is most frequent among autistic individuals in Mosuli society?
2) Which phonemes are most commonly associated with stuttering in autistic speakers?

The study focuses on the utterance of some words uttered by autistic children as far as stuttering is concerned. Supersegmental features are not studied. Moreover, age, gender and background as well as physical and behavioral deficits are all excluded. The study might be useful for speech therapist or teachers of autistic children in the sense that it specifies areas of difficulty in a (pre-prepared list by the trainer of words. So, they can overlap them through intensive teaching.

Methods

In this research, semi structured interview method as one of the qualitative research methods was used because the researcher wanted to receive rich and detailed information on their difficulties which the children face among speech. This study adopts a qualitative case study design to explore the phonological characteristics of stuttering among autistic individuals in Mosuli society. The qualitative nature of the research allows for an in-depth examination of individual cases, emphasizing how autistic speakers experience difficulties in pronouncing specific Arabic sounds. This design was selected to capture detailed, context-specific patterns of stuttering behavior that might be overlooked in larger quantitative studies.

The study sample comprised fourteen (14) autistic participants drawn from *Al-Toofola Saeeda Center* (Happy Childhood Center) in Mosul, Iraq. Participants ranged in age from seven (7) to eighteen (18) years, including nine (9) males and five (5) females. Although demographic variables such as age and gender were recorded for documentation purposes, they were not considered in the data analysis. All participants had prior reading experience and were able to recognize and pronounce basic Arabic words.

Two main instruments were employed in this study:

1. **A pre-prepared list of Arabic words**, consisting of eight (8) items selected by the participants' speech trainer. These words were designed to include phonemes that may present articulation challenges for autistic speakers.

2. **A video recording device**, used to capture the participants' oral performance during the reading task. The recordings provided accurate data for identifying stuttering types and related phonological features.

Each participant was recorded individually in a quiet setting to ensure clear audio-visual quality. Participants were instructed to read the list of eight words aloud while being video-recorded. Following the recording sessions, the collected data were examined and categorized into three types of

stuttering: **prolongations**, **repetitions**, and **blocks**. Each disfluency type was identified, counted, and converted into percentage values to determine frequency rates. The analysis focused on recognizing which Arabic phonemes were most associated with particular stuttering types, providing insights into the phonological patterns of disfluency among autistic speakers within Mosuli society.

Table 1. Age and gender of participants under study

Case No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Gender	F	M	M	F	F	M	M	M	F	M	M	M	M	F
Age	7	7	8	8	8	9	10	13	13	14	15	17	18	18

Data Analysis

The trainer chooses certain words (pre-prepared words, because these words are difficult to those cases) and ask to repeat the words to diagnose the phenomenon of stuttering for each case, the researcher recorded and discovered the following analysis:

No= means no response from the case

Not clear= means the case pronounce but un clear

The data set comprises phonetic articulation across (14) cases involving eight Arabic words: "حياة" (ħayāt), "حوت" (ħūt), "احمد" (Aħmad), "ثعلب" (thawr), "يحيى" (Yaħyā), "ثوم" (thūm), "ثياب" (thiyāb), and "ثور" (tha'lab). The focus is on identifying three key types: Pronologation (Prono.) after a specific sound (e.g., /ħ/, /ʊ/, /æ/), phonetic blocking (block) after a sound, and repetition after a sound.

The table (2) below reveals variability in phonetic realization across participants and target words, suggesting a phonological processing challenge or variance in phonemic awareness

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Case No.	حياة	حوت	احمد	ثور	يحيى	ثوم	ثياب	ثعلب
1	Not clear	Not clear	Not clear	Not clear	Not clear	Not clear	Not clear	Not clear
2	no	no	no	no	No	no	no	no
3	Not clear	Not clear	Not clear	Not clear	Not clear	Not clear	Not clear	Not clear
4	no	no	Block after /ħ/	no	No	no	no	no
5	Prono. after /ħ/	Prono. /ʊ/	Block after /æ/	no	Prono. after /ħ/	Prono. after /u/	No	Block after /æ/
6	Not clear	Prono. after /ʊ/	Prono after /æ/	no	Not clear	Not clear	Not clear	Prono after /æ/
7	no	no	Block after /ħ/	no	no	Not clear	Not clear	Not clear
8	no	no	no	Prono. after /ʊ/	Not clear	no	no	no

9	Prono after /ħ/	no	Prono. after /ħ/	Block after /ħ/	no	Prono. after /æ/	Not clear	no
10	Repetition after /ħ/	Prono. after /ħ/	no	Prono after /ʊ/	no	Prono. after /ʊ/	Block after /æ/	Not clear
11	Block after /ħ/	No	Block after /ħ/	Not clear	Block after /ħ/	Prono. after /ʊ/	no	no
12	no	no	no	Not clear	no	no	Not clear	no
13	Prono after /ħ/	Block after /ʊ/	Prono after /ħ/	Not clear	Prono after /ħ/	Block after /ʊ/	Prono. after /æ/	Prono. after /æ/
14	no	no	no	no	no	Not clear	Not clear	no

The articulation patterns suggest that specific Arabic consonants, especially pharyngeal /ħ/ and back vowels like /ʊ/ and /æ/, introduce articulation difficulty or induce specific phonological patterns such as blocking or mispronunciation. For instance: Words starting with or containing /ħ/ (as in "احمد", "حياة") show high frequencies of blocking or repetition. The vowel /æ/ seems to trigger blocking or mispronunciation, particularly in "احمد" and "ثعلب". There is an observable lack of clarity (marked "Not clear") in several instances, indicating either perceptual difficulty or inconsistent responses.

Such results may reflect either speech development issues, dialectal interference, or a phonological disorder.

Results

The data analysis shows that phoneme /ħ/ is frequently associated with blocking (Cases 4, 9, 10, 11, 13) and repetition (Case 10). Also, vowel /æ/ is associated with blocking (Cases 5, 9, 10) and mispronunciation (Cases 5, 13). In addition, words with the consonant cluster "ثـ" (as in " "ثياب", "ثوم", "ثعلب"") appear to be less problematic, with fewer instances of blocking or mispronunciation. However, several responses were marked as "Not clear", indicating ambiguity or lack of articulatory precision—potentially due to hearing, cognitive, or phonological processing issues.

These findings underscore the influence of pharyngeal and back vowels on speech production accuracy and the importance of focusing on these phonemes in language acquisition or speech therapy programs. Consider Table (4) below:

Table 3. Results of the Analysis

Phoneme Context	Frequent Issues Observed	Affected Words
/ħ/	Blocking, Repetition	حياة, احمد, يحيى
/æ/	Blocking, Pronunciation	احمد, ثعلب
/ʊ/	Pronunciation Issues	حوت, ثوم, ثعلب
Cluster "ثـ"	Relatively Clear	ثوم, ثياب, ثعلب

The document presents data on three phonetic articulation patterns — Pronologation (Prono.), Repetition (Rep.), and Blocking (Block) — observed across 14 participants or cases when producing specific Arabic phonemes or words.

- Pronunciation Accuracy:

Pronunciation difficulties were most common in Case 13 (62.5%), followed by Cases 5, 6, 9, and 10 (each with 37.5%). Several cases showed 0% correct pronunciation, indicating significant issues in articulation.

- Repetition:

Repetition occurred only once (12.5%) in Case 10, and was absent in all other cases.

- Blocking:

Blocking was most frequent in **Case 11** (37.5%), followed by Cases 5 and 13 (25% each). Several cases had isolated instances of blocking (12.5%).

Blocking was a more common issue than repetition, indicating a phonological or articulatory difficulty rather than hesitancy or disfluency. Certain phonemes or phonetic contexts (like /ħ/, /æ/, /ʊ/) appear to be particularly problematic for accurate articulation. The following table shows the frequencies and percentages:

Table 3. The frequencies and percentage for each type

Type	Pronologation	Repetition	Block
Freq	20	1	11
%	62.5%	3.1%	34.3%

Interpretation of the Results

The analysis revealed that the three main stuttering types—prolongation, repetition, and blocking—were all present among the autistic participants, though to varying degrees. Prolongation appeared most frequently, with Case 13 exhibiting the highest rate (62.5%), followed by Cases 5, 6, 9, and 10. Repetition was the least frequent, occurring only once (12.5%) in Case 10. Blocking was relatively more common, particularly in Cases 11, 5, and 13. These results suggest that stuttering among Mosuli autistic individuals is primarily characterized by difficulties in sustaining and initiating certain

phonemes rather than simple speech hesitancy. The frequent occurrence of prolongations and blocks indicates deeper phonological processing and articulatory coordination challenges rather than surface-level disfluency.

Comparison with Previous Research

The current findings align with Roach's (1983) observation that certain tones and phonetic features correspond to specific communicative attitudes and difficulties in articulation. Similarly, research by Bloodstein and Ratner (2008) indicates that stuttering often involves tension and interruption during phoneme production rather than repetitive behavior alone. However, unlike studies conducted in Western or English-speaking contexts, this study highlights the unique role of Arabic phonemes—specifically /ħ/, /æ/, and /ʊ/—in triggering disfluency, suggesting that phonological structure and dialectal sound systems play a crucial role in stuttering manifestation among Arabic speakers. This distinction emphasizes the need for localized analyses that consider linguistic and cultural variables.

Implications of the Findings

The findings have both theoretical and practical implications. Theoretically, they support the view that stuttering is not merely a motor-speech disorder but also a phonological processing issue influenced by language-specific features. Practically, the study highlights the need for speech therapy programs that focus on phoneme-specific training, especially for Arabic sounds that require complex articulatory movements. Teachers and speech therapists working with autistic children can use these insights to design targeted exercises that address the most problematic phonemes and improve speech fluency through focused phonological practice.

Limitations of the Study

Despite its valuable insights, this study is limited by its small sample size (14 participants) and its confinement to a single speech center in Mosul. Additionally, suprasegmental features such as intonation, stress, and rhythm were excluded, which may have provided a more comprehensive understanding of speech disfluency. The study also did not account for factors such as cognitive level, behavioral patterns, or language exposure, which could influence stuttering variability among participants.

Future Research Directions

Future research should expand the participant pool to include autistic individuals from different Arabic dialect regions to determine whether similar phoneme-based stuttering patterns occur. It would also be beneficial to incorporate suprasegmental features and compare them with segmental findings to develop a holistic understanding of speech disfluency. Moreover, longitudinal studies could explore how targeted phoneme-based therapy impacts fluency over time, contributing to more effective and culturally sensitive speech intervention strategies for Arabic-speaking autistic populations.

Conclusion

This study explored the phonological characteristics of stuttering among autistic individuals in Iraq's Mosuli society, filling a notable research gap beyond Western contexts. Using a qualitative case study approach with fourteen participants, the study identified three major types of speech disfluencies: repetitions, prolongations, and blocks. The analysis revealed that specific Arabic phonemes—particularly /ħ/, /æ/, and /ʊ/—were most strongly associated with prolongations and blocks, indicating that dialect-specific phonetic features contribute to articulation challenges. The results also demonstrated considerable variability in stuttering patterns across participants, suggesting the presence of underlying phonological processing difficulties unique to Arabic-speaking autistic individuals.

The findings carry significant theoretical and practical implications. Theoretically, they support the idea that stuttering should be viewed not only as a speech fluency disorder but also as a language-specific phonological issue. Practically, the study highlights the necessity for speech therapists and educators to design therapy programs that account for dialectal and linguistic variation among Arabic speakers. Such culturally tailored approaches can improve therapeutic effectiveness and foster greater communication confidence among autistic individuals who stutter. Despite its valuable contributions, the study has certain limitations. The sample size was

relatively small (14 participants) and confined to a single center in Mosul, which may limit the generalizability of the findings. Additionally, the study focused exclusively on segmental phonological features and did not examine suprasegmental aspects such as stress, intonation, or rhythm, which could also influence stuttering behaviors. Broader demographic and cognitive variables were similarly excluded from the analysis.

Future research should include a larger and more diverse sample drawn from various Arabic-speaking regions to better capture dialectal differences in stuttering. Incorporating suprasegmental features would provide a more comprehensive understanding of phonological influences on speech disfluency. Furthermore, longitudinal studies that assess the impact of phoneme-specific therapy over time would be valuable in developing more effective intervention strategies for autistic individuals.

In conclusion, this study provides important insights into how stuttering manifests among Arabic-speaking autistic individuals and how linguistic and dialectal factors shape speech disfluency. By identifying phonemes that present specific articulatory challenges, the research offers a foundation for culturally and linguistically responsive speech therapy practices. Ultimately, the study contributes to a more inclusive understanding of stuttering, emphasizing the importance of contextualized approaches in speech-language pathology.

Name of the Institution or Hospital or Research Centre

Complete Postal Address

Statement / Declaration by the Investigator

I am ....Rand Zuhair.... declare that:

I have provided the document having the information about the proposed research / study / clinical trial and have explained the same. I have encouraged the participant to ask questions and answered to all the queries of the participant patiently. After the discussion I am satisfied that the participant has adequately understood about the information provided. I have / have not used a translator in this process.

Print Name of Principal Investigator ___Rand Zuhair Younis___

Signature of Principal Investigator ___R.a___

Date __8__/__11__/__2024__ Day/month/year)

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Statement / Declaration by the translator

I.im ....Rand Zuhair.... declare that:

I am proficient in participant's native language and have agreed to be the translator. I have assisted the principal investigator in explaining the document having the information about the proposed research / study / clinical trial in participant's native language. The participant was encouraged to ask questions and answers to all the queries were addressed patiently. I have assisted in the factual translation of the information provided to me. After the discussion I am satisfied that the participant has adequately understood about the information provided.

Print Name of Translator ___Rand Zuhair Younis___

Signature of Translator ___R.a___

Date __11__/__7__/__2025__ Day/month/year)

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CREDIT AUTHOR STATEMENT

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DECLARATION OF COMPETING INTERESTS

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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