



Research Article

Prevalence of Articulation Errors among Jordanian Gifted Students with Dyslexia

Samer Mahmoud AL-ZOUBI¹ & Suhail Mahmoud AL-ZOUBI²

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Abstract

This research aimed at investigating the prevalence of articulation errors among Jordanian gifted students with dyslexia at Al-Khourah Directorate of Education. The sample consisted of 33 gifted students with dyslexia aged 6–12 years. The resource room teachers applied the articulation errors checklist to the participants to detect the prevalence of these errors according to gender, type of articulation errors, and the position of the error in the word. The results indicated that the prevalence of articulation errors among Jordanian gifted students with dyslexia was 36.36%; 75% of the articulation errors appeared among male students; the most prevalent type of articulation errors was substitution 66.67%, and 75% of the articulation errors in the word position appeared at the beginning of the word.

Keywords:

articulation errors, gifted with dyslexic, giftedness, prevalence

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¹ Department of English Language & Literature, Ajloun National University, Ajloun 26810, Jordan. E-mail: dr.samer_alzobi@anu.edu.jo ORCID No: 0000-0003-1113-8497

² Department of Psychology, Sultan Qaboos University, Alkhoud 123, Oman. E-mail: smalzoubi@squ.edu.om ORCID No: 0000-0002-6648-4680

Introduction

The term learning disabilities (LD) includes a disorder in one or more of the basic psychological processes related to attention, perception, memory, thinking, and oral language which are the prerequisite for students' learning process. Basically, any disorder in these psychological processes can be related to the developmental LD that may appear in children before they enroll in school education. The development of LD may lead to the academic LD that appears in students when they enroll in school education (Raymond, 2012). The academic LD comprises of dyslexia, dysgraphia and dyscalculia (Bani Abdel Rahman & Al-Zoubi, 2017). However, these types of LD refer to specific learning challenges associated with reading, writing, and mathematics (Kohli, Sharma & Padhy, 2018).

The heterogeneous of the basic psychological disorders appears as difficulties in the abilities of listening, speaking, understanding or using spoken or written language. The verbal language is classified into five components related to the phonology, pragmatics, syntax, morphology, and semantics (Moats, 2010). The listening and speaking skills are the most specific components of the oral language. These components are essential for learning and human communication that leads to investigate the linguistics basis of dyslexia (Kamhi & Catts, 2012).

Students with LD may encounter problems in receptive language related to listening and reading skills. They have problems in understanding what others say and distinguishing tones and sounds. This case is called receptive aphasia, which reflects negatively on reading skills, specifically in distinguishing between parts of a word and understanding the sentences that contain these words (Nakai et al., 2017). Moreover, students with LD may have problems in expressive language related to speaking and writing skills (Alzig & Alsewairy, 2010). They have problems with the phonology system that is used to communicating with others. This condition is called expressive aphasia/ Broca's aphasia, which students avoid in participating in verbal activities and may have a negative impact on writing skill (Amayreh & Natour, 2014).

The reading disability is the most academic problem facing students with LD (Adubasim & Nganji, 2017). Reading is a visual-auditory process that involves obtaining the meaning from written letters and words. The success of the reading process depends on phonological awareness, decoding, reading fluency, and reading comprehension skills (Trezek & Mayer, 2019). Students without LD develop their ability to word recognition or decoding skills automatically and facilitate their reading comprehension easily. On other hand, students with LD face problems with these skills, which are the most common in their reading problems. They have problems in converting written symbols into understandable language, and this can cause problems in the production of speech sounds and articulation disorders which are reflected negatively in word recognition.

Therefore, articulation disorders (also called phonetic disorders) are a specific problem in production of the speech sounds (Zrekat, 2014) which is negatively reflected in incorrect articulation of the speech sounds and the way sounds are formed and strung together. Articulation disorders have a great impact on children at preschool (Todorova, 2019) and school age (Azmat et al., 2014). In other words, articulation disorders affect academic achievement and social interactions of students with LD.

In order to understand the articulation disorders, it is essential to be familiar with the speech process. Speech is the language container through which voice messages are transmitted to the listener. Speech production and sound output are a complex process that require coordination between a list of processes that include breathing, phonation, resonance and articulation (Puyvelde et al., 2018), as well as the nervous system activities that control all of these processes (Amayreh & Natour, 2014).

In spite of the significance of these processes which end with the sound path in the oral cavity or nasal cavity, these processes alone are not sufficient to produce different speech sounds. In order to complete the process of producing sounds, speech organs that responsible of articulation must perform their functions. In other words, the articulatory parts include lips, tongue, teeth, and palate (Chaturvedi et al., 2015). These parts are known as speech articulators which can be classified into passive articulators (immobile articulators) like, upper lip, teeth, hard palate, soft palate, uvula etc, and active articulators (mobile articulators) like, lower lip, tongue etc (Shariq, 2015). Consequently, the process of producing speech sounds requires a list of processes and integrity of the parts responsible for speech. However, speech disorders are a difficulty in making the necessary sounds to speak in a proper manner. Because of the mismatch between sounds and letters, the International Phonetics Alphabet (IPA) was developed. The IPA is an alphabetic system of phonetic notation based on standardized representation of the sounds of oral language (Yurtbaşı, 2016). Thus, this IPA has one symbol for each sound and the symbols represent the sounds used in all languages of the world. The linguists categorized speech sounds into consonants and vowels (Brumberg et al., 2011).

The phonological system of Arabic language is made up of 28 consonants and 6 pure vowels, and fifteen of the consonants are very like English sounds (Rafik, 2012). The Arabic vowels are much less than the English ones, this normally results in difficulties of vowel realization, distinction and perception by the Arab learner of English (Kalalkeh, 2016). These differences in the consonants and vowels may cause speech errors among learners (Purnama et al., 2019).

Articulation errors categorized into four patterns related to the omission, addition, substitution and distortion (Preston et al., 2013). In omission, the child

deletes a sound in a word, such as saying (خال) /*xa:l*/ instead of saying (خالد) /*xa:lid* /; an example of addition, the child adds a sound that is not in the word, such as saying (مدارس) /*mada:ris*/ instead of saying (مدرسة) /*madrasa* /; in substitution, the child replaces a sound with another sound, such as saying (تلب) /*talb*/ instead of saying (كلب) /*kalb*/; an example of distortion would be, the child pronounces sound in an unfamiliar way, such as saying (زابط) /*za:biT* /instead of saying (ضابط) /*Da:biT*/. The distortion often appears in some letters of the language such as (س - ش) / *s - ſ* /.

The twice-exceptional or gifted students with disabilities have high achievements or creative potentials in the science or humanities science but at the same time they have one or more disabilities (Kurup & Dixit, 2016). These disabilities could be visual and hearing impairments (Al-Hroub, 2010a), attention deficit hyperactivity disorders (Al-Hroub & Krayem, 2018), physical and health disabilities, autism spectrum disorder, behavioural and emotional disorders, communication disorders, and LD (Reis, Baum & Burke, 2014).

The gifted students with LD are classified as twice-exceptional. Combining giftedness with learning disabilities can make misunderstanding among people and motivate them to seek logical explanations for this combining (Al-Hroub, 2012). The gifted students with LD have giftedness and academic talents, but at the same time they have a deficit in some learning aspects (Beckmann & Minnaert, 2018). The gifted students with LD are the largest group of gifted students with disabilities (twice-exceptional) and their giftedness is not a bulwark against their inability in their academic skills and oral language. Gifted students with LD are anonymous category in schools because LD may limit the emergence of their giftedness and abilities. Therefore, gifted students with LD exhibit bewildering behaviors, high intellectual abilities, an exceptional understanding of abstract ideas, but at the same time they have difficulties in reading, writing, and phonological awareness (Buică-Belciu & Popovici, 2014). This discrepancy contributed to difficulties in identifying them.

With reference to international context, the social, emotional and intellectual needs of gifted students with LD are ignored by teachers (Sansom, 2015). While, in the Arab context, gifted students with LD are the most disadvantaged of special education categories to receive appropriate educational services. This category is still suffers from ignorance, lack of identification methods, and their education programs. Thus, gifted students with LD need educational programs that are different from the programs of students without LD or students in other special education categories (Al-Hroub, 2007; Al-Hroub, 2010a). In the Hashemite Kingdom of Jordan, the ambiguity is still surrounds of gifted students with LD which is due to the lack of agreement between experts on the term and the

characteristics of this category (Al-Hroub, 2014). In order to remove this ambiguity, Al-Hroub (2010b) proposed a multi-dimensional approach to identify gifted students with LD and determine their eligibility to receive special education services. This approach including criteria for their diagnosis, especially Discrepancy Criterion by intelligence scales and formal achievement tests.

The ignorance of this category requires those who are in responsibility of LD programs in the Jordanian Ministry of Education to reconsider of LD resource room philosophy to comprise gifted students with LD in this program. The future of education for gifted students with LD at resource room program or general education classes in Jordan is based on the theory of multiple intelligences. This theory will improve broad perspectives to curricula and the individualized education program and contributes to stimulating the minds of students with LD (Al-Zoubi & Al-Adawi, 2019) and gifted students with LD. Brody and Mills (as cited in Beckmann & Minnaert, 2018) categorized gifted students with LD into three subgroups. The first group includes students identified as LD, but their disability hides their high abilities and giftedness. A second group comprises students who are identified as being gifted, but their disabilities are unnoticed because their high intelligence hides their LD. A third group includes students whose giftedness and learning disabilities hide each other; these children are unqualified for services provided to gifted or LD students.

The comorbidity of giftedness and disability among twice-exceptional students, Nielsen (as cited in Chamberlin et al, 2007) estimated that 2% to 5% of population of students with disabilities may be intellectually gifted. While, Baum (as cited in Agarwal & Singh, 2011) indicated that 33% of students identified with LD have high intellectual abilities. In contrast, the international prevalence of LD is estimated at 5.36% (Lerner & Johns, 2012), and 13% in the Arab World (Nada, 2009).

The gifted students with dyslexia may exhibit problems in phonics, word spellings, letter or word reversals, and written expression (Gilman et al., 2013). This research aims to provide a Jordanian indicator for the prevalence of articulation errors, diagnosis types of articulation errors, and positions in words (beginning, middle or end) among gifted students with dyslexia.

Method

Research Design

A Survey Research was used. The survey research is one of the Descriptive Research Designs that aim to collect data on a phenomenon through the use of a questionnaire, interview documentation review (Denscombe, 2017), test and observation. The school survey, social survey, and public opinion research are models of survey research. In the present research, the school survey model was

used to identify the articulation errors among Jordanian gifted students with dyslexia. This model was used articulation errors checklist which based on observation method.

Participants

Research Population

Total 386 students with LD between ages 6-12 years were included in this research. These students enrolled in 24 resource room program (RRP) in the academic year 2019/2020. The RRP are distributed in 24 girls and boys at elementary general education schools in Al-Kourah Directorate of Education, Jordan. The students have academic LD based on a list of informal assessment tools and formal diagnosis scales adopted by the Jordanian Ministry of Education. Table 1 shows the distribution of research population by gender.

Table 1.

Distribution of Research Population

Gender	Frequency	Percentage (%)
Male	261	67.61
Female	125	32.39
Total	386	100

Research Sample

The research participants consisted of 33 gifted students with dyslexia chosen from the research population. The researchers used purposive sample method because it may be the only appropriate method available since there are only limited number of participants (33 participants) who contributed to the study. As well as, it is one of the most cost-effective and time-effective sampling methods available. After the researchers applied a set of procedures that will be discussed later. The distribution of the participants according to gender was presented in Table 2.

Table 2.

Distribution of Research Sample

Gender	Frequency	Percentage (%)
Male	24	72.73
Female	9	27.27
Total	33	100

Instruments

This research used three instruments for collecting quantitative data: Group Inventory for Finding Talent (GIFT), Scale for Identifying Gifted Students (SIGS), and Articulation Error Checklist (AEC).

Group Inventory for Finding Talent (GIFT)

The GIFT was developed by Rimm (1984) to identify gifted students which include three levels for primary (K-2), elementary (3-4), and upper elementary (5-6) grades. GIFT consisted of 32, 33, and 35 items respectively for each level. GIFT

items permit students to answer “yes” or “no”. The GIFT was translated into Arabic by Al-Rousan et al (1998) to develop a modified Jordanian version (MJV). The MJV of GIFT included students from the first grade to the sixth grade whose age was from 6 to 12 years old. The final MJV consisted of 42 items classified into two levels: The first level applied to students in the fourth, fifth and sixth basic grades, while the second level applied to students in the first, second and third basic grades. The high validity and reliability coefficients confirmed the effectiveness of the MJV to identify Jordanian gifted students in the basic stage. The MJV of GIFT items permitted students to answer “yes” or “no” questions.

Scale for Identifying Gifted Students (SIGS)

The aim of SIGS was to identify gifted students with LD as perceived by Jordanian teachers of RRP. The SIGS was developed after reviewed intelligence theories, giftedness scales, and behavioural characteristics of gifted and talented students. To check validity coefficients, the first version of the SIGS was modified by seven faculty members who are teaching at Ajloun National University and Sultan Qaboos University. The final version consisted of 20 items with 3-point Likert scale (never = 0, sometimes = 1, always = 2). However, Cronbach’s alpha formula was used to test the reliability coefficient of the SIGS. The coefficient of internal consistency was 0.77.

Articulation Error Checklist (AEC)

To develop the AEC, the theoretical literature and previous research were reviewed. The AEC consisted of 84 words in Arabic. It is worthwhile to mention that the Arabic language has twenty-eight letters arranged alphabetically from the letter (أ) /ʔ/ to the (ي) /j/. For each letter, the researchers developed a checklist that included three Arabic words where the letter appeared either at the beginning, middle or at the end in order to identify the position of the articulation errors whether it is a deletion, addition, substitution or distortion. To judge the validity of AEC, the AEC was reviewed by seven faculty members who are teaching at Ajloun National University and Sultan Qaboos University. The agreement rate between reviewers reached 85%. To check the reliability of the AEC, a Test-Retest method was used. The AEC was conducted a pilot study consisted of 22 students with LD. The AEC reliability coefficient was 0.83 by using the Pearson Correlation Coefficient.

The teacher of RRP displays the AEC to gifted student with dyslexia and asks him/her to read each of the words in the AEC. The teacher evaluates the student's reading by marking (✓ or ×). The teacher gives one score for the correct answer and zero score for the wrong answer. The following criterion was adopted to judge the prevalence level of articulation errors: low (33% or less), average (34 to 66%), and high (67% to 100%).

Procedures

- Obtain the approvals letter from Ajloun University and Al-Kourah Directorate of Education to conduct this research.
- Get the data related to the RRP schools from the Planning Department at Al-Kourah Directorate of Education, Jordan.
- Meet with teachers of RRP to clarify the research objectives and gave an explanation on how to apply the research instruments.
- The RRP teachers distributed GIFT to students with LD enrolled in the RRP. The teachers read the GIFT instructions and assisted LD students while answering the items that required to put \surd under (yes) or (no).
- The RRP teachers were asked to assess the behavioral characteristics of LD students enrolled in the RRP through the application of the SIGS.
- After collecting and analyzing the statistical data resulting from the application of GIFT and SIGS, it was found that there were 38 students nominated to be gifted students with LD.
- The researchers asked the teachers of RRP to provide him with academic records to ensure that 38 of the students are gifted with dyslexia. After checking the academic records of those students, it was revealed that there were 5 students out of 38 students who had dyscalculia so they were excluded from the research sample. However, the final number of participants became 33 gifted students with dyslexia enrolled in 11 resource rooms in basic education schools at Al-Kourah Directorate of Education.
- The first researcher presented a training workshop for the RRP teachers on the procedures of applying the AEC standard to 33 gifted students with dyslexia.
- The teachers of RRP applied AEC individually to gifted students with dyslexia.
- After Three weeks the application of the AEC, the data was collected from the teachers of RRP.

Results

Results related to the first research question: What is the prevalence of articulation errors among gifted students with dyslexia? To answer this question, descriptive statistics were used. The percentage and frequency were shown in Table 3.

Table 3.

Descriptive Analysis of Articulation Errors

Articulation Errors	Frequency	Percentage %
Yes	12	36.36
No	21	63.64
Total	33	100

Table 3 showed the prevalence of articulation errors was 36.36% among gifted students with dyslexia. While, 63.64% did not have any articulation errors.

Results related to the second research question: Does the prevalence of articulation errors differ according to gender? To answer this question, descriptive statistics were used. The percentage and frequency were shown in Table 4.

Table 4.

Descriptive Analysis of Articulation Errors according to Gender

Gender	Frequency	Percentage %
Male	9	75
Female	3	25
Total	12	100

Table 4 presented that 75% of articulation errors were prevalent among male students whereas 25% of articulation errors were prevalent among female students.

Results related to the third research question: What is the prevalence of articulation errors types among gifted students with dyslexia?. To answer this question, descriptive statistics were used to identify. The percentage and frequency were shown in Table 5.

Table 5.

Descriptive Analysis of Types of Articulation Errors

Types of Articulation Errors	Frequency	Percentage %
Substitution	8	66.67
Omission	2	16.67
Addition	1	8.33
Distortion	1	8.33
Total	12	100

Table 5 showed the most prevalence types of articulation errors were substitution 66.67% among gifted students with dyslexia.

Results related to the fourth research question: Does the prevalence of articulation errors differ according to positions (beginning, middle or end) of the word?. To answer this question, descriptive statistics were used. The percentage and frequency were shown in Table 6.

Table 6.

Articulation Errors according to Positions in Word

Positions in Word	Frequency	Percentage %
Beginning	9	75
Middle	2	16.67
End	1	8.33
Total	12	100

Table 6 showed the most prevalence articulation errors in word positions dyslexia was at the beginning of the word 75%.

Discussion

The main aim of this research was to investigate the prevalence of articulation errors among gifted students with dyslexia. It provided statistical data on the prevalence of articulation errors among gifted students with dyslexia enrolled in the RRP at Al-Kourah Directorate of Education. The research also reached a set of results that confirmed the prevalence of articulation errors among gifted students with dyslexia according to the type of articulation errors, position in the word in addition to the gender variable.

Concerning the percentage of the prevalence of articulation errors among gifted students with dyslexia, the results showed that the prevalence percentage was 36.36%, which was an average prevalence rate. This result can be explained by the fact that communication disorders considered the second most common disability after LD. Ehren and Nelson (as cited in Hallahan, Kauffman & Pullen, 2012) indicated that the prevalence of communication disorders among Preschool children is between 8-9%, 5% in the elementary stage and 2-3% in the secondary stage. Therefore, students with various disabilities may show communication disorders that negatively affect cognitive development, academic achievement, and social behavior. However, communication disorders may decrease with age, perhaps due to the treatment programs provided by the speech therapist or due to maturity factors. Heward (2003) pointed out that articulation errors are the most common communication disorders, which constitute 80% of the total communication disorders. While Gibbs and Cooper (1989) indicated that the prevalence of communication disorders among students with LD is 96.2%, and the prevalence of articulation errors is estimated at 23.4% among these students. The current research indicated that the participants in this research were from the gifted category but at the same time, they suffered from dyslexia that was negatively reflected on their reading and contribute to the presence of articulation errors. The Diagnostic and Statistical Manual of Mental Disorders, (DSM-5) classified communication disorders among the neurodevelopment disorders as they characterized by the presence of disorders in the functions of the brain as a result of the presence of problems in the growth of the brain or the central nervous system, which were reflected negatively on the learning, memory and communication skills among children (Harris, 2014). Ates and Afat, (2018) stressed that more support should be provided to students with special needs in speaking skills, as the phonological processes play a role on reading skills acquisition and correct spelling.

The results showed that the prevalence of articulation errors among male students was a higher than female students. These results agreed with McKinnon et al. (2007) that presented the prevalence of stuttering, voice disorders, and speech-sound disorders was a higher prevalence in males as compared to females.

On the other hand, Shakhs (as cited in Salem, 2015) indicated that the prevalence of articulation errors in males is more than females in the Kingdom Saudi Arabia.

Moreover, the results presented that the position of the articulation errors appeared at the beginning of the word. The results were consistent with O'laimat and Al-Rousan (2016) that showed that articulation errors usually appeared at the beginning.

The results also demonstrated that the substitution pattern is the most prevalent types of articulation errors among gifted students with dyslexia. The results agreed with some previous research (Azmat et al., 2014; Salem, 2015; Al-Ajrami & Baides, 2015; O'laimat & Al-Rousan, 2016). This research showed the substitution pattern is one of the most common types of articulation errors among school students. Shakhs (as cited in Salem, 2015), emphasized that the substitution pattern was the most prevalent pattern among school students in Saudi Arabia. In the Jordanian context, Al-Okai (2008) pointed out that the substitution pattern is the most common type of speech disorder among students with LD. Substitution may occur intentionally to attract the attention of others or to generate sympathy and in many cases, the child changes more than one letter in his/ her speech and this may be due to the change of teeth or the lack of regularity or congruence, and the exchange may occur because of severe fear or emotional states or due to the imitation factor of others.

The substitution occurs when a child replacing a sound with another sound, for example, a child replaces the sound / r / with a sound/ l /, then he /she says/ ladʒel/ instead of saying / radʒl/. The substitution occurs with other sounds such as replacing /dʒ/ with a voice / d /, such as / daml/ instead of saying / dʒaml / . Another example of substitution would be replacing the sound / k / with the sound / t / saying /titab/ instead of saying / Kitab /.

The most prominent cases of substitution are called sigmatism (Defective pronunciation of sibilant sounds) in which the child replaces the sound of /s/ with other sounds like:

- Replacing the sound of /S/ with the sound of / θ /, which is what is known as Interdentals, Sigmatism. This state is due to the emergence of the tip of the tongue between the teeth (interdental sounds).
- Replacing the sound of /s/ with the sound of / ʃ /, which is known as Lateral Sigmatism and it is due to the spread of airflow on both sides of the mouth due to the child's inability to control the movements of his /her tongue or because of the formation of this organ.
- Replacing the sound of /s/ with the sound of /t/ or /d/, which is called dental Sigmatism, is caused by the height of the tongue to the top of the upper folds in a region higher than the one where the sound of (S) is pronounced.

- Pronouncing the /s/ sound like a nasal sound, which is called nasal Sigmatism. It occurs as a result of the air coming out from the nose instead of coming out from the mouth. This occurs as a result of a crack in the roof of the mouth (the palate).

Conclusion

To sum up, the results showed that articulation errors were common among gifted students with dyslexia. The students had many types of articulation errors, the most common was substitution errors, and the position of articulation errors was most apparent at the beginning of the word furthermore, their prevalence is more prevalent in males than females. Therefore, it is necessary to stress the importance of early intervention programs and the role of a speech therapist in limiting the spread of articulation errors among gifted students with dyslexia. Because of the small size of this research participant, the results of this research were not generalized to the Jordanian governorates.

The researchers faced some difficulties during applying this study such as administrative and bureaucratic obstacles in schools in addition to the distance between schools that had a RRP, besides the difficulty of obtaining some statistical data for preparing students with LD at Al-Khourah Directorate of Education, which required researchers to obtain this data from the teachers of RRP Learning. The researchers recommended conducting research on other Jordanian governorates dealing with the prevalence of articulation errors among gifted students with dyslexia and conducting national longitudinal research to follow the regional growth of gifted students with dyslexia compared to the development of their temporal age.

Disclosure and Conflicts of Interest

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article. This research is original work and does not contain any libelous or unlawful statements or infringe on the rights or privacy of others or contain material or instructions that might cause harm or injury.

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Biodata of the Authors



Samer Mahmoud Al-Zoubi is an assistant professor at Ajloun National University, Jordan. He holds a PhD in Applied Linguistics from the Red Sea University, Sudan. His main research interests include phonetics, phonology, syntax, semantics, applied linguistics and TEFL. **Affiliation:** Department of English Language & Literature, Ajloun National University, Ajloun, Jordan. **E-mail:** dr.samer_alzobi@anu.edu.jo. **Phone** +962779513113

ORCID: 0000-0003-1113-8497 **SCOPUS ID:** - **WoS ID:**



Suhail Mahmoud Al-Zoubi is an associate professor of special education at Sultan Qaboos University, Oman. He holds a PhD in special education from the University of Science Malaysia. His research focuses on learning disabilities, ADHD, giftedness, and Academic accreditation of special education programs. **Affiliation:** Department of Psychology, Sultan Qaboos University, Sultanate of Oman. **E-mail:** smalzoubi@squ.edu.om. **Phone:** +96871552143

ORCID: 0000-0002-6648-4680 **SCOPUS ID:** 35101436500 **WoS ID:**

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