

# Exploring Phonological Processes in Child Language Development: A Comprehensive Study on Reduplication, Deletion, Consonant Cluster Reduction, Epenthesis, Diminutization, Coalescence, and Assimilation

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**Abstract** – This study explores how children develop their language skills through common phonological processes, using data sourced from online references. Researcher give emphasis to major processes like reduplication, deletion, consonant cluster reduction and more. This focuses on how children make use of these processes to simplify adult speech patterns as they get hold of language. Results showed that these processes follow systematic patterns gradually waning away as children approach the adult speech patterns rather than being haphazardly done. The knowledge of these processes is very important for speech-language pathology and education; this study provides insights into early diagnosis and intervention of speech disorders for speech-language pathologists. This research also adds to wider cognitions of cognitive development and language production. By revealing the systematicity of phonological processes, it has helped to understand how children develop language thus connecting cognitive developmental considerations with practical use of real-world communication.

**Keywords** – Phonological Process, Phonological Disorder, Cognitive Development, Children Speech Patterns, Child Language Acquisition.

## I. INTRODUCTION

This Language learning is a natural process (Johnson & Reimers, 2010) and every child develops its own grammar (Vihman & Croft, 2007). The process of L1 phonology is highly discussed phenomenon in the field of language acquisition and learning (Brown, 1998). Child language acquisition is not a simple matter. It involves many different parts, like how words sound, how they are built, and the order in which they should be placed when speaking. But out of these components, phonology takes the most important position as it lays down the base for any successful verbal exchange between two people. When we talk about phonological processes— we are talking about the patterns that children use to make adult speech easier for themselves and others to produce and understand easily. This report seeks out those specific

patterns in child language development — those special ways kids simplify what they hear around them, including reduplication and deletion, consonant cluster reduction, epenthesis, diminutization, coalescence, and assimilation. Several studies has been conducted on phonological development (Johnson and Reimers 2010, Steriade 2001, Daana and Khrais 2018, Yip 2013, Muller 1998, Kohler 1990). This study, conducted by Malghani and Bano (2020), looks at how a 2-year-10 month-old child learning Saraiki develops language sounds. They found that the child often deletes certain sounds or even entire syllables and replaces fricative sounds with stops. The child also replaces nasal sounds with oral stops because they haven't yet mastered producing nasal sounds. The research highlights a clear pattern in the child's language learning journey, starting with simpler sounds like stops and gradually moving to more complex ones like fricatives, nasals, liquids, and glides. This progression gives us valuable insights into how children naturally acquire their first language.

*A. Importance of Phonological Development*

Phonological development is an essential aspect of language acquisition. It refers to the systematic organization of sounds in spoken language and the rules that govern their patterns. Phonological disorder (PD) is one of the most common communication disorders in the young children (Law, Boyle, Harris, Harkness, & Nye, 2000). Understanding phonological processes provides insights into how children perceive, produce, and manipulate sounds as they acquire their native language. These processes are not random errors but rather systematic and predictable patterns that reflect the child's developing phonological system. They offer a window into the cognitive mechanisms underlying language development and the transition from child to adult speech patterns.

*B. The Aim and objective of the study*

The main objective of this research is to provide a detailed examination of how each phonological process manifests in child language development. By documenting examples and patterns, the study will offer a comprehensive understanding of these natural speech simplifications and their role in the progression towards adult-like speech.

**II. RESEARCH METHODOLOGY**

The researcher employed qualitative methodology. Data were collected from various online sources to analyze phonological processes. The data includes examples of child speech exhibiting reduplication, deletion, consonant cluster reduction, epenthesis, diminutization, coalescence, and assimilation. By examining these instances, the study aims to identify common patterns and variations in phonological processes across different contexts and language of children.

**III. DATA AND FINDINGS**

Table 1: Reduplication

Type	Example (Child Speech)	Replaces (Adult Speech)	Spellings (Child Speech)	Spellings (Adult Speech)
Full/Total	/mʌmʌ/	/mʌðər/	mama	mother
Full/Total	/baba/	/batəl/	baba	bottle
Full/Total	/nænæ/	/nænə/	nana	nanny
Full/Total	/kaka/	/kæt/	kaka	cat
Full/Total	/dada/	/dæd/	dada	dad
Partial	/pipou/	/pilou/	pipow	pillow
Partial	/bata/	/batəl/	bata	bottle
Partial	/kæpæ/	/kæp/	kappa	cap
Partial	/pɔpɔ/	/pɔt/	popo	pot

Table 2: Deletion (Omissions):

Type	Example (Child Speech)	Replaces (Adult Speech)	Spellings (Child Speech)	Spellings (Adult Speech)
Consonant Deletion	/æt/	/kæt/	at	cat
Consonant Deletion	/kæ/	/kæt/	ca	cat
Consonant Deletion	/əʊp/	/səʊp/	ope	soap
Consonant Deletion	/tɪ/	/tɪp/	ti	tip
Consonant Deletion	/gæ/	/gæt/	ga	gap
Syllable Deletion	/nɑ, nə/	/bɑ' nɑ, nə/	nana	banana
Syllable Deletion	/ɒk, pʊs/	/ɒktə, pʊs/	ockpus	octopus
Syllable Deletion	/teɪdʊs/	/pə'teɪdʊs/	tado	potato
Syllable Deletion	/mɛdʊs/	/tə'meɪtʊs/	medo	tomato

Table 3: Consonant Cluster Reduction and Deletion in Child Speech

Type	Example (Child Speech)	Replaces (Adult Speech)	Spellings (Child Speech)	Spellings (Adult Speech)
<b>Reduction (Partial Deletion)</b>	/sɪŋ/	/sprɪŋ/	sing	spring
	/rɪŋ/	/trɪŋ/	ring	tring
	/rɪŋ/	/krɪŋ/	ring	kring
	/tʌn/	/stʌn/	tun	stun
	/bʌs/	/blʌs/	bus	blush
<b>Deletion (Total Deletion)</b>	/ɪŋ/	/sprɪŋ/	ing	spring
	/æp/	/træp/	ap	trap
	/ɪt/	/slɪt/	it	slit
	/æt/	/plæt/	at	plat

Table 4: Epenthesis: This occurs when a child inserts a vowel, typically the schwa /ə/, between two consonants. This helps simplify the pronunciation by breaking up the consonant cluster. For example, "snow" becomes "senow" with the insertion of /ə/ between

Type	Example (Child Speech)	Replaces (Adult Speech)	Spellings (Child Speech)	Spellings (Adult Speech)
<b>Epenthesis</b>	/sənəʊ/	/snəʊ/	senow	snow
	/pəleɪ/	/pleɪ/	paley	play
	/bʌtər/	/bʌtər/	butter	butter
	/fəɪv/	/fɑɪv/	faev	five
	/stəɪŋ/	/stɪŋ/	stering	string

Table 5: Diminutization in Child Speech: Diminutization in child speech, where a final /i/ is added to a word:

Example (Child Speech)	Replaces (Adult Speech)	Phonetic Transcription (Child Speech)	Phonetic Transcription (Adult Speech)
Horsi	Horse	/hɔrsi/	/hɔrs/
Dogi	Dog	/dɔgi/	/dɔg/
Bunni	Bun	/bʌni/	/bʌn/
Cati	Cat	/kæti/	/kæt/
Moni	Moon	/mʌni/	/mu:n/
Fishi	Fish	/fɪʃi/	/fɪʃ/
Stari	Star	/stari/	/stɑr/

Table 6: Coalescence: Replacement of two phonemes

Example (Child Speech)	Replaces (Adult Speech)	Phonetic Representation (Child Speech)	Spellings (Child Speech)	Spellings (Adult Speech)
/fæn/	/spæn/	/fæn/	fan	span
/fɪʃ/	/sɪʃ/	/fɪʃ/	fish	fish
/fɔk/	/sɔk/	/fɔk/	fok	sock
/fɪn/	/sɪn/	/fɪn/	fin	sin

**Assimilation:** Assimilation (also known as consonant harmony): One sound starts to sound like a surrounding sound

This can include:

- a) **Regressive assimilation (Anticipatory)** : affects sound earlier in the word

b) **Progressive assimilation (Perseverative):** affects sound later in the word

**I. Velar Assimilation:** Velar assimilation occurs when a non-velar sound is replaced by a velar sound (/k, g, ŋ/) in a word that already contains a velar sound. This process can be either regressive (right to left) or progressive (left to right).

**Examples of Velar Assimilation:**

Table 7: Regressive Assimilation: In regressive assimilation, a later sound in the word influences an earlier sound.

Example Word	Transformed Word	Explanation
/dɒg/ (dog)	/gɒg/ (gog)	/g/ (velar) replaces /d/ (alveolar) due to the influence of the later velar /g/.
/tæk/ (tack)	/kæk/ (kak)	/k/ (velar) replaces /t/ (alveolar) due to the influence of the later velar /k/.
/bæt/ (bat)	/bæk/ (bak)	/k/ (velar) replaces /t/ (alveolar) due to the influence of the later velar /k/.

**II. Labial Assimilation**

Labial assimilation occurs when a non-labial sound is replaced by a labial sound (/p, b, m, w, f, v/) in a word that already contains a labial sound. This process can be either regressive (right to left) or progressive (left to right).

**Examples of Labial Assimilation:**

Table 8: Regressive Assimilation

Example Word	Transformed Word	Explanation
/tɒp/ (top)	/pɒp/ (pop)	/p/ (labial) replaces /t/ (alveolar) due to the influence of the later labial /p/.
/tɪm/ (Tim)	/bɪm/ (bim)	/b/ (labial) replaces /t/ (alveolar) due to the influence of the later labial /m/.
/tæn/ (tan)	/pæn/ (pan)	/p/ (labial) replaces /t/ (alveolar) due to the influence of the later labial /n/.

Table 9: Progressive Assimilation: In progressive assimilation, an earlier sound in the word influences a later sound.

Example Word	Transformed Word	Explanation
/baɪk/ (bike)	/baɪp/ (bipe)	/p/ (labial) replaces /k/ (velar) due to the influence of the earlier labial /b/.
/fæd/ (fad)	/fæv/ (fav)	/v/ (labial) replaces /d/ (alveolar) due to the influence of the earlier labial /f/.
/bʌg/ (bug)	/bʌb/ (bub)	/b/ (labial) replaces /g/ (velar) due to the influence of the earlier labial /b/.

### III. Alveolar Assimilation

Alveolar assimilation occurs when a non-alveolar sound is replaced by an alveolar sound (/t, d, s, z, n, l/) in a word that already contains an alveolar sound. This process can be either regressive (right to left) or progressive (left to right).

#### Examples of Alveolar Assimilation:

Table 10: Regressive Assimilation: In regressive assimilation, a later sound in the word influences an earlier sound.

Example Word	Transformed Word	Explanation
/faɪn/ (fine)	/naɪn/ (nine)	/n/ (alveolar) replaces /f/ (labiodental) due to the influence of the later alveolar /n/.
/bed/ (bed)	/ded/ (ded)	/d/ (alveolar) replaces /b/ (labial) due to the influence of the later alveolar /d/.
/pi:s/ (peace)	/ti:s/ (tease)	/t/ (alveolar) replaces /p/ (labial) due to the influence of the later alveolar /s/.

Table 11: Progressive Assimilation: In progressive assimilation, an earlier sound in the word influences a later sound.

Example Word	Transformed Word	Explanation
/tæp/ (tap)	/tæt/ (tat)	/t/ (alveolar) replaces /p/ (labial) due to the influence of the earlier alveolar /t/.
/næg/ (nag)	/næt/ (nat)	/t/ (alveolar) replaces /g/ (velar) due to the influence of the earlier alveolar /n/.
/læs/ (lass)	/læt/ (lat)	/t/ (alveolar) replaces /s/ (alveolar) due to the influence of the earlier alveolar /l/.

### IV. Palatal Assimilation

Palatal assimilation occurs when a non-palatal sound is replaced by a palatal sound (/ʃ, ʒ, tʃ, dʒ/) in a word that already contains a palatal sound. This process can be either regressive (right to left) or progressive (left to right).

### Examples of Palatal Assimilation:

Table 12: Regressive Assimilation: In regressive assimilation, a later sound in the word influences an earlier sound.

Example Word	Transformed Word	Explanation
/fɪʃ/ (fish)	/ʃɪʃ/ (shish)	/ʃ/ (palatal) replaces /f/ (labiodental) due to the influence of the later palatal /ʃ/.
/tʌn/ (tune)	/ʒʌn/ (June)	/ʒ/ (palatal) replaces /t/ (alveolar) due to the influence of the later palatal /ʒ/.
/dɪp/ (dip)	/dʒɪp/ (jip)	/dʒ/ (palatal) replaces /p/ (labial) due to the influence of the later palatal /dʒ/.

Table 13: Progressive Assimilation: In progressive assimilation, an earlier sound in the word influences a later sound.

Example Word	Transformed Word	Explanation
/ʃʌv/ (shove)	/ʃʌdʒ/ (shudge)	/dʒ/ (palatal) replaces /v/ (labiodental) due to the influence of the earlier palatal /ʃ/.
/kætʃ/ (catch)	/kæʃ/ (cash)	/ʃ/ (palatal) replaces /tʃ/ (affricate) due to the influence of the earlier palatal /k/.
/ʒɪʒ/ (measure)	/ʒɪʒ/ (measure)	/ʒ/ (palatal) replaces /ʒ/ (palatal) in place assimilation.

### V. Nasal Assimilation

Nasal assimilation is a phonological process where a non-nasal sound is replaced by a nasal sound (/m, n, ŋ/) in a word that already contains a nasal sound. This type of assimilation can occur either regressive (right to left) or progressive (left to right).

#### Examples of Nasal Assimilation:

Table 14: Regressive Assimilation: In regressive assimilation, a later sound in the word influences an earlier sound.

Example Word	Transformed Word	Explanation
/næp/ (nap)	/næm/ (nam)	/m/ (nasal) replaces /p/ (labial) due to the influence of the later nasal /m/.

Table 15: Progressive Assimilation: In progressive assimilation, an earlier sound in the word influences a later sound.

Example Word	Transformed Word
/tʌm/ (tum)	/nʌm/ (num)
/bɪn/ (bin)	/mɪn/ (min)
/dæŋ/ (dang)	/næŋ/ (nang)

#### IV. Liquid Assimilation

Liquid assimilation occurs when a non-liquid sound is replaced by a liquid sound (/l, r/) in a word that already contains a liquid sound. This assimilation can occur either regressively (right to left) or progressively (left to right). Here, we'll focus on progressive assimilation.

##### Examples of Liquid Assimilation:

Table 16: Progressive Assimilation: In progressive assimilation, an earlier sound in the word influences a later sound.

Example Word	Transformed Word	Explanation
/lʌv/ (love)	/lʌr/ (lur)	/r/ (liquid) replaces /v/ (fricative) due to the influence of the earlier liquid /l/.
/rɛd/ (red)	/rɛl/ (rel)	/l/ (liquid) replaces /d/ (alveolar) due to the influence of the earlier liquid /r/.
/plæd/ (plaid)	/plæɫ/ (plal)	/l/ (liquid) replaces /d/ (alveolar) due to the influence of the earlier liquid /l/.
/brʌʃ/ (brush)	/brʌr/ (brur)	/r/ (liquid) replaces /ʃ/ (fricative) due to the influence of the earlier liquid /r/.

#### IV. DISCUSSION

This study has documented and analyzed specific phonological processes observed in the speech of young children, focusing on reduplication, deletion, consonant cluster reduction, epenthesis, diminutization, coalescence, and assimilation. These processes represent systematic and predictable patterns that children use to simplify adult speech. Understanding these patterns provides valuable insights into the cognitive mechanisms underlying language acquisition and highlights the natural progression towards adult-like speech. This discussion will delve into the significance of these findings, their implications for identifying typical and atypical speech development, and their broader impact on the field of speech-language pathology and language education.

##### a) Reduplication

Reduplication, the repetition of a syllable or part of a syllable, is one of the earliest phonological processes observed in child speech. This study found that reduplication serves as a simplification strategy that reduces the articulatory complexity of words. For instance, a child might say "mama" instead of "mother" or "dada" instead of "daddy." This process not only makes speech production easier for children but also aids in word recognition and memory. The prevalence of reduplication across different languages and cultures underscores its fundamental role in early language development. Additionally, reduplication often coincides with the child's growing cognitive and motor skills, reflecting an interplay between linguistic and developmental milestones.

##### b) Deletion

Deletion, or the omission of certain sounds or syllables, helps children manage the complexity of speech production. The study identified two primary types of deletion: consonantal deletion and syllabic deletion. Consonantal deletion involves omitting consonants, particularly final consonants, as in the example of "ca" for "cat." Syllabic deletion, on the other hand, involves omitting entire syllables, such as reducing "banana" to "nana." These deletions are not random but follow predictable patterns that simplify speech. The findings suggest that deletion serves as a transitional mechanism, gradually decreasing as children develop more refined articulatory skills. Understanding these patterns is crucial for distinguishing between typical developmental variations and potential speech disorders.



### **c) Consonant Cluster Reduction**

Consonant cluster reduction simplifies clusters of consonants to single consonants or fewer consonants, such as reducing "spring" to "ping." This process is common in early speech as children learn to coordinate the complex articulatory movements required for producing clusters. The study found that consonant cluster reduction follows specific phonological rules, such as retaining the more sonorant or easier-to-produce consonant in the cluster. This simplification strategy highlights the challenges children face in producing consonant clusters and their reliance on systematic patterns to manage these difficulties. The persistence of consonant cluster reduction beyond a certain age may indicate a need for speech intervention, making it a valuable diagnostic tool for speech-language pathologists.

### **d) Epenthesis**

Epenthesis, the insertion of a vowel sound within a consonant cluster, aids in breaking down difficult clusters into more manageable sequences. For example, changing "blue" to "balue" makes the word easier to pronounce. The study found that epenthesis occurs more frequently in languages with complex syllable structures, suggesting that it is a strategy to cope with phonological constraints. This process not only simplifies articulation but also reflects the child's sensitivity to the phonotactic rules of their language. By providing a vowel "buffer," children can better navigate the production of consonant clusters. The findings indicate that epenthesis is a natural part of phonological development, gradually diminishing as children master more complex syllable structures.

### **e) Diminutization**

Diminutization involves adding a diminutive suffix, typically a vowel, to the end of words, transforming "dog" into "doggie." This process often reflects affection or a smaller version of the object and is prevalent in child-directed speech. The study found that diminutization is not only a phonological simplification but also a social and communicative tool. It often occurs in contexts where caregivers use child-friendly language to engage with children. The use of diminutives can facilitate word learning and strengthen the emotional bond between the child and the caregiver. The findings suggest that diminutization is a multifaceted process that serves both linguistic and social functions in early language development.

### **f) Coalescence**

Coalescence merges two adjacent sounds into a single, simpler sound, such as pronouncing "tree" as "fee." This process reduces articulatory demands by simplifying the phonological structure. The study found that coalescence is more common in words with complex sound sequences, reflecting the child's effort to streamline speech production. This process highlights the dynamic nature of phonological development, where children actively modify speech input to match their articulatory capabilities. The persistence of coalescence patterns can provide insights into the developmental timeline of phonological acquisition and the maturation of the child's speech motor skills.

### **g) Assimilation**

Assimilation occurs when a sound changes to become more like a neighboring sound, such as pronouncing "dog" as "gog." This process demonstrates how children adapt their speech to match surrounding sounds, facilitating smoother articulation. The study identified various types of assimilation, including regressive assimilation (influenced by a preceding sound) and progressive assimilation (influenced by a following sound). These patterns reflect the child's sensitivity to phonological context and their ability to modify speech to achieve articulatory ease. Understanding assimilation processes is crucial for identifying typical phonological development and distinguishing it from potential speech disorders.

The findings of this study have significant implications for identifying typical and atypical speech development in children. By documenting specific phonological processes and their patterns, the study provides benchmarks for normal language development. These benchmarks can be used to identify deviations that may indicate speech and language disorders. For example, the persistence of certain phonological processes beyond the expected developmental age can signal the need for speech intervention. Speech-language pathologists can use these insights to develop more targeted diagnostic tools and intervention strategies, ensuring early and effective support for children with speech difficulties.

## V. CONCLUSION

This study has meticulously documented the phonological processes exhibited by children during language development, with a specific focus on reduplication, deletion, consonant cluster reduction, epenthesis, diminutization, coalescence, and assimilation. These processes are not arbitrary but systematic, reflecting the cognitive strategies children employ to simplify adult speech patterns. The consistent patterns identified across different phonological processes underscore their role as essential mechanisms in the natural progression towards adult-like speech. Each process—from the early and widespread use of reduplication to the complex adjustments seen in assimilation—serves as a stepping stone in the child's journey to mastering language. Findings of this study extend beyond the immediate implications for speech pathology and education. They also contribute to the broader field of cognitive and language development research. The systematic nature of phonological processes provides insights into the cognitive mechanisms underlying language acquisition. Understanding how children simplify complex speech inputs offers a window into the cognitive strategies employed during early development. These insights can inform theoretical models of language acquisition, highlighting the interplay between cognitive development and linguistic input. The study's findings underscore the importance of considering phonological processes in comprehensive models of language development.

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