# THE INVESTIGATION OF FOREIGN WORD MEMORY USING NURSERY

# RHYMES

# THE INVESTIGATION OF FOREIGN WORD MEMORY USING NURSERY RHYMES

# BY FIZA AHMAD, B.A.

A Thesis Submitted to the School of Graduate Studies in Partial Fulfillment of the

Requirements for the Degree Master of Science

McMaster © Copyright by Fiza Ahmad, August 2024

McMaster University

# MASTER OF SCIENCE (2024)

Hamilton, Ontario (Department of Linguistics and Languages)

TITLE: The investigation of foreign word memory using nursery rhymes

AUTHOR: Fiza Ahmad, B.A. (McMaster University)

SUPERVISOR: Dr. Elisabet Service

NUMBER OF PAGES: x, 51

### Lay Abstract

In linguistics, prosody encompasses the rhythm, stress, and intonation of speech, which plays an important role in the language-learning process. When adults don't have the meaning of words to rely on, they often use these rhythmic cues to remember them better. This research involved three tasks: processing the beat of music, learning foreign words through nursery rhymes, and then recognizing those words from a list. The results showed that rhythmic and timing cues are helpful for remembering words. Also, individuals with better rhythmic skills may demonstrate better word memory. This study suggests that using nursery rhymes could be an effective tool for teaching adults new languages.

#### Abstract

In linguistics, prosody encompasses the rhythm, stress, and intonation of speech, and this plays an important role in the language-learning process. This study seeks to understand this phenomenon further, providing novel language learning data with nursery rhymes as a vehicle to teach adults foreign words. Building on models of Dynamic Attending Theory and Phonological Short-Term Memory, it was theorized that the accuracy of foreign word learning is predicted by the prosodic cues present in the word's learning context. This experiment included 3 tasks to explore this theory. Task 1 tested how accurately the participant processed the beat of a musical sequence. In Task 2, participants learned foreign words in a nursery rhyme context. Finally, in Task 3, participants were asked to identify which words they recognized from a large list of foreign words. Results showed a significant effect for prosodic cues' influence on word memory. Specifically, temporal and rhythmic cues hierarchically facilitate phonological short-term memory, as represented in this paper's proposed theoretical model. A potential link was also found between individual rhythmic ability and memory of foreign words. Overall, the present thesis offers a theoretical understanding of the use of nursery rhymes during adult foreign language learning.

#### Acknowledgments

I would like to express my sincere gratitude to Dr. Elisabet Service for her invaluable guidance as my thesis supervisor and for encouraging me to pursue this master's degree. Her mentorship has been truly inspiring. I am also deeply thankful to my committee members, Dr. Daniel Pape and Dr. Phoebe Gaston, for their insightful support in preparing this thesis. I would also like to call attention to members of the LMB lab for their continuous support, and to Madison Won and Somya Khurana, who assisted with running participants as volunteer research assistants. A heartfelt thank you must be extended to Dr. Maxime Degenais for ensuring that ARIEAL is a welcoming and comfortable environment for its trainees. Max has always ensured that we have everything we need and more. Lastly, I am profoundly grateful to my friends and family, especially my mom, mother-in-law, and husband, for their unwavering love and encouragement, which have been the foundation of my motivation throughout this journey.

# **Table of Contents**

Lay Abstract	iii
Abstract	iv
Acknowledgments	V
Table of Contents	vi
List of Tables	vii
List of Figures	viii
List of Abbreviations	ix
Declaration of Academic Achievement	X
1 Introduction	1
1.1 Dynamic Attending Theory	1
1.2 The Phonological Loop	3
1.3 Prosody and Speech	5
1.4 Nursery Rhymes as a Vehicle for Language Learning	7
1.5 The Current Study	9
2 Methods	10
2.1 Participants	10
2.2 Tasks and Procedure	11
2.2.1 Beat Alignment Task (BAT)	
2.2.2 Nursery Rhyme Task	13

2.2.3 Word Recognition Task	
2.2.4 Recording of Stimuli	16
3 Results	17
3.1 Beat Alignment Task	17
3.2 Nursery Rhyme Task	
3.3 Word Recognition Task	21
3.4 Correlations Between Tasks	
4 Discussion	
4.1 Interpretation of Results	24
4.2 Limitations	
5 Conclusion	
References	
APPENDIX A: Full list of nursery rhyme task stimuli	
APPENDIX B: Full list of word recognition task stimuli	44

# List of Tables

Table 1: Descriptive statistics for the BAT    17
Table 2: A comparison between the published d' norms for each BAT condition
Table 3: Linear mixed effects model for the Nursery Rhyme Task
Table 4: Post Hoc Comparison (rhyming conditions) from nursery rhyme task's linear mixed      effect model
Table 5: Linear mixed effects model for the Word Recognition Task
Table 6: Correlation matrix comparing all 3 tasks: Beat Alignment Test, Nursery Rhyme Task,Word Recognition Task

# **List of Figures**

Figure 1: Visual representation of the Dynamic Attending Theory entrainment model	2
Figure 2: Visual representation of the Phonological Loop Model	4
Figure 3: Visual representation of the proposed model linking phonological awareness and reading success.	8
Figure 4: Nursery rhyme task stimuli example	15
Figure 5: A density plot of the performance on the Full Beat Alignment Task	18
Figure 6: Nursery rhyme task, performance on the proportion of consonants correctly recalled.	19
Figure 7: Word Recognition Task, long-term memory performance on the proportions of correctly recognized foreign words.	22
Figure 8: A proposed model of the role of prosodic cues in pSTM	27

### List of Abbreviations

- BAASTA = Battery for the Assessment of Auditory Sensorimotor and Timing Abilities
- BAT = Beat Alignment Task
- DAT = Dynamic Attending Theory
- DLD = Developmental Language Disorder
- EFL = English as a Foreign Language
- IBIs = Inter-Beat Intervals
- MEG = Magnetoencephalography
- MREB = McMaster Research Ethics Board
- pSTM = Phonological Short-Term Memory
- WM = Working Memory

### **Declaration of Academic Achievement**

The conceptualization of this thesis was conducted by myself, in collaboration with Dr. Elisabet Service. The data was explored and analysed by myself under the guidance and supervision of Dr. Elisabet Service. The present thesis was written by myself and edited with comments and feedback from Dr. Elisabet Service, Dr. Daniel Pape, and Dr. Phoebe Gaston.

#### **1** Introduction

When children acquire language, adults use nursery rhymes and songs to engage with language development. However, when adults desire to learn a new language, the traditional teaching methods are usually focused on vocabulary and grammar rules. This paper seeks to explore nursery rhymes as a prosodic vehicle to teach foreign words to adults. Very little is understood about the mechanisms that could allow prosodic cues to facilitate memory for foreign word forms. Nursery rhymes are ideal experimental stimuli to test this gap in knowledge as one can manipulate both temporal and rhythmic cues in rhyme contexts. In doing so, this paper uses theories in cognitive science, such as Dynamic Attending Theory, Working Memory Theory, and the Phonological Loop Theory, as possible conceptual frameworks to understand the role of prosodic cues in language acquisition. Section 1 of this thesis provides key concepts and a comprehensive summary of current theories involving short-term memory and rhythm. Sections 2 and 3 describe and interpret the experimental work conducted for this thesis.

#### **1.1 Dynamic Attending Theory**

Acoustic rhythms tend to be associated with music, but they are also present in regular speech. Human speech naturally has a regular rhythmic structure that allows listeners to tune in to temporal patterns, which include timing information (Li et al., 2019). In the English language, rhythm regularity can be identified through the consistent variations between strong and weak syllable pronunciation. Dynamic attending theory (DAT), described by Mari Riess Jones (Jones, 2019), seeks to explain the interaction between the external rhythms present in the environment, and the internal rhythms present in our brain's cortical system. DAT relies on the synchrony

between these rhythms. Synchrony is achieved through a dynamic activity called attending, during which the attendee tunes into rhythmic cues in real time. In natural speech, these timing and rhythmic cues are present in the prosodic patterns of the speech stimuli. As the attendee is exposed to prosodic rhythms, the brain's cortical oscillations entrain to the timing cues, allowing for synchrony between the internal and external rhythms. Entraining to speech allows the attendee to create predictions about the time of arrival of incoming critical information (Hickok et al., 2015). Predictions are represented in the brain by attentional pulses, each of which demonstrates an expectancy profile about the occurrence of significant information (Jones et al., 2002; Jones, 2019). Figure 1 includes a visual representation of DAT's entrainment model.



Figure 1. A visual representation of the Entrainment Model, taken from Jones et al. (2002). Attentional pulses are modulated by a rhythmically regular stimulus with fixed interonset time intervals (IOI). The oscillator period (arrow) is the time interval between attentional pulses. The oscillator phase (dashed line) corresponds to the time difference between the peak of an attentional pulse and the onset of a stimulus tone. The insert illustrates a predicted expectancy profile for a single attentional pulse: accuracy is shown to be greatest when the peak of an attentional pulse aligns with the onset of a stimulus tone.

Empirical studies have explored the significance of these predictions in relation to

perception. One such study found that when tonal stimuli were presented at unexpected times,

they were less accurately evaluated than tones that occurred at predictable time intervals (Jones

et al., 2002). Another study by Kösem et al. (2018) used magnetoencephalography (MEG) to examine the processing of sentences that had a change in speech rate. They found that participants were entrained to the previous speech rate, even after the temporal change occurred. This resulted in a biased perception of ambiguous words affected by the entrained rate of speech. Such perception studies suggest that rhythmic regularity and the ability to entrain to stimuli impact the accuracy of perception in the auditory domain. In sum, DAT suggests that during perception, attention is dynamically modulated by rhythm. These modulations generate expectations about the time of arrival of critical information. Accurate predictions about the occurrence of an event optimize its processing (Morillon et al., 2015).

Some theories differ from DAT by stating that the attentional pulses released by the brain are not predictive, but reactive (Jones, 2019). Jones (2019) discusses that according to linguistic theory, rhythmic cues evoke reactive pulses due to the saliency of their features, such as the heightened loudness of stressed syllables, which stand out and cause an enhanced brain response. However, DAT makes a distinction between internally driven predictions (attending) and stimulus-driven reactions (rhythmic salience). This study seeks to explain a possible interaction between these two theories.

#### **1.2 The Phonological Loop**

Working memory (WM) is the temporary short-term memory store for small amounts of information. Long-term memory, on the other hand, holds the wide array of information stored over one's life (Cowan, 2014). The most widely accepted WM model was proposed by Baddeley & Hitch (1974), who believe WM is involved in the execution of cognitive tasks such as reading, problem-solving, and learning (Baddeley, 1983). This paper is concerned with the component of Baddeley & Hitch's WM model that deals with spoken and written language material: The

<sup>3</sup> 

Phonological Loop (Figure 2). The phonological loop consists of two parts: 1) Phonological short-term store; and 2) Articulatory rehearsal. In the phonological loop, the listener perceives auditory speech inputs, which are maintained in the phonological short-term memory store at a phonemic level. Linguistically, phonemes are the smallest meaningful units of sound within a word. However, these memory traces are subject to rapidly decay from the short-term memory store, unless they are actively refreshed using an articulatory rehearsal process. Articulatory rehearsal is a subvocal process which allows speech information to maintain its place in the memory store, causing a loop. The term "phonological short-term memory" (pSTM) refers to this process and the WM for speech stimuli.



Figure 2. A visual representation of Baddeley's (1986) proposed phonological loop model. Verbal information is maintained in the short-term memory store through articulatory rehearsal.

Though the phonological loop is a widely-accepted model, it has also been criticized (Caplan, 1992; Service, 1998). One main criticism lies with the effect of "word length". Baddeley et al. (1975) found that serial accuracy is better for temporally shorter words compared to longer words. This was based on experimental data that compared recall accuracy for word sets with different articulatory durations, but equal phonological complexity. According to the phonological loop, the effect of "word length" occurs because shorter words can be rehearsed more frequently, and therefore are less likely to decay from the memory store before recall (Mueller, 2003). However, researchers such as Caplan (1992) and Service (1998) argue that it is the phonological structure of a word that determines the word length effect, not the features of its articulation (Baddeley, 2007). In fact, Caplan (1992) found that in some cases, longer words were remembered better than shorter words. The exact word features that determine the rate of decay in pSTM is still a topic of debate. This study aims to help define the prosodic features that make words easier to retain in one's pSTM.

#### 1.3 Prosody and Speech

In linguistics, the temporal structure of a language can be categorized by its prosody, which includes the loudness, pitch, and duration of sound in units of speech. Together, these acoustic and prosodic cues make up the rhythm of a language. Rhythm is a salient feature of language that may impact the efficiency of pSTM, and language acquisition in general. Mehler et al. (1988) found that already newborn infants are able to distinguish between languages solely based on their prosodic patterns. This ability indicates that infants rely on rhythmic information as they acquire language because they cannot yet use semantic context (meaning associations) to learn words. Similarly, when adults learn new foreign languages, the lack of semantic context forces them to also rely on rhythm and temporal cues to successfully learn word forms (Langus et al., 2017). This is because before one can truly adopt a new word into one's lexicon (vocabulary), one must first process its physical and rhythmic properties to be able to create semantic associations with the word form.

A key step to infant language acquisition is the ability to segment words within a continuous speech stream. Prosody is extracted as a reliable cue for speech segmentation in infants (Saffran et al., 1996). Similarly, one study (Endress & Hauser, 2010) found that adults are able to extract prosodic cues from natural speech to segment words in foreign languages. The

authors found that adults demonstrate this ability even with languages that have critically different prosodic features from their native language.

Segmenting words from a continuous speech stream is also an important process for speech perception in general. Many existing studies have demonstrated that during language comprehension, rhythmic regularity realized by prosodic features such as loudness and duration can facilitate syntactic and semantic processing of known languages (Cason & Schön, 2012; Magne et al., 2007). This is because rhythmic regularity enhances the listener's ability to predict incoming stress locations in a sentence (Rothermich et al., 2012). Rhythmic regularity that is characterized by consistent alternations of stressed and unstressed syllables is called metric regularity. Stressed syllables are information-heavy, and predictions about their occurrence lessen the noise and ambiguity inherent to the speech stream, which facilitates the semantic integration of unexpected words (Rothermich et al., 2012; Altman & Carter 1989). Therefore, rhythmic regularity is assumed to enhance comprehension, and one may extend the effect of rhythmic regularity to pSTM and the efficiency of the phonological loop.

However, a large portion of memory literature indicates that, on the contrary, items occurring in regular auditory patterns are less salient to a listener, and therefore leave weaker traces in memory (Kimball et al., 2019). This is evidenced by studies that found that memory is enhanced for contextually novel items, regardless of the particular feature that makes the event in question novel (Hunt, 1995). These findings suggest that contextually irregular items divert one's attention, thus modulating the encoding of the event in memory (Ranganath & Rainer, 2003). Kimball et al. (2019) tested this effect by measuring memory for words against their rhythmical contexts. In rhythmically regular sentences, they embedded target words that either matched the rhythm of their context or did not, making them rhythmically irregular and novel to their context.

They found that words with contextually irregular patterns were remembered better than rhythmically regular words. Kimball et al. (2019) argue that listeners attune to metrical structure, and while rhythmic regularity leads to entrainment and better processing in the moment, salient rhythmically novel features play a beneficial role in language retention and memory. This disconnect between rhythmic regularity's effect on speech perception and speech memory is further investigated in the current study.

#### 1.4 Nursery Rhymes as a Vehicle for Language Learning

When an English adult hears the beginnings of Humpty Dumpty, they may be reminded of the songs and poems they learned in their childhood. In fact, the poems and songs from one's youth tend to stay fresh in the mind no matter how much time has passed (Shwetha & Phil, 2013). Nursery rhymes are short poems that invite children to the joint activity of sharing a story, teaching a lesson, or singing along to a melody. Nursery rhymes have a highly rhythmic nature and tend to include rhyming words within their prose (Temple, Martinez, & Yokota, 2011). Though English nursery rhymes are nowadays typically used while engaging with children, their origins date back to the 1600s and were derived from adult songs, vendor's cries, and religious traditions (Sayakhan & Bradley, 2019). Over time, nursery rhymes were adopted into children's lives by being recited at home, in school, and during child's play (Sayakhan & Bradley, 2019). The use of hyperbole and exaggeration along with rhyme, repetition, and humour work together to create attractive stories and characters for young children (Norton & Norton, 2011). Being such a fundamental aspect of many children's lives, nursery rhymes act as a natural vehicle for language learning.

An important aspect of language acquisition in children is the development of phonological awareness. Phonological awareness fosters a child's ability to segment sounds,

encode words, and spell phonetically (Harper, 2011). Vloedgraven & Verhoeven (2007) found that rhyming performance and the skills of phoneme identification are vital aspects of phonological awareness. Phonological awareness is also a beneficial precursor to children's literacy preparation. In fact, children entering kindergarten are expected to have an understanding of the sound-based system of their language, including rhyming skills, before they begin reading instruction (Lonigan, Burgess, & Anthony, 2000). Many studies have found a link between nursery rhyme knowledge in children and future success in reading, writing, and spelling (Bradley and Bryant 1983; 1985; MacLean et al., 1987; Harper, 2011). Bryant et al. (1990) proposed a theoretical model to describe the connection between nursery rhyme knowledge (phonological awareness) and reading success. Figure 3 includes a visual representation of their model. Bryant et al. (1990) proposed that sensitivity to rhyme eventually leads to phoneme awareness, and thus, plays a role in the child's literacy skills. This is because rhyming involves segmenting phonemes and syllables. In linguistics, syllables are broken down into their onset and rime. The onset includes all phonemes before the syllable's vocalic nucleus, and the rime is everything from the syllable core and onwards. Recognizing rhyming involves breaking down and identifying the syllable's rime segment (Maclean, Bryant, & Bradley, 1987). For example, to recognize that cat and hat rhyme, one must understand that they have the common ending sound "at" (Maclean, Bryant, & Bradley, 1987).



Figure 3. A visual representation of the theoretical model to describe the connection between nursery rhyme knowledge (phonological awareness) and reading success. Taken from Bryant et al. (1990).

The benefit of nursery rhymes has been recognized by language teachers, and their application has been explored in English as a Foreign Language (EFL) studies. Multiple EFL studies have tested the use of nursery rhymes on young learners of English in countries like Indonesia and Iran (Hery & Arshad, 2020; Khorasgani, 2016; Pourkalhor & Tavakoli, 2017). These studies found that English nursery rhyme and song exposure had a significantly positive effect on English vocabulary and listening comprehension for children learning English. However, no found studies have explored using English nursery rhymes to teach foreign languages to adults. This study seeks to explore whether nursery rhymes can be a vehicle for language learning with adults and the theoretical implications of their potential success.

#### 1.5 The Current Study

This study investigates the rhythmic features that facilitate foreign word memory. Task 1 investigates individual beat perception abilities, Task 2 explores immediate memory for foreign words inside nursery rhymes, and Task 3 tests long-term recognition memory for foreign words encountered inside nursery rhymes. This work also proposes a theoretical model for the interaction between internally-driven predictions and external rhythmic cues. It is proposed that these processes work together through prosodic cues to activate pSTM and learn novel word forms. Additionally, this experiment is the first, to our knowledge, to use English nursery rhyme stimuli to teach adults foreign language forms. The research questions of this thesis are: 1) How do prosodic cues facilitate memory for foreign words? 2) How may the findings bridge the gap between models of working memory and attending? 3) Does individual rhythmic ability impact the efficiency of phonological short-term memory? 4) Are nursery rhymes an effective language teaching tool for adults?

#### 2 Methods

#### 2.1 Participants

For this study, 42 participants were recruited (35 females, mean age = 19.1 years, SD = 1.5 years) (7 males, mean age = 19.4 years, SD = 1.7 years). Participants were recruited through McMaster University's research participation system (SONA) and were enrolled in the streams of Linguistics and Languages or Psychology, Neuroscience, and Behaviour. Participants were also recruited through physical flyers and social media posts distributed throughout the Hamilton community.

Participants were first screened to ensure their eligibility for the experiment. All participants were required to be self-declared Native English speakers. During recruitment, we selected participants who were categorically English-dominant speakers. English-dominant speakers are those who learned English before the age of 5. This criterion was motivated by behavioural evidence that suggests language competence in bilingual speakers is indistinguishable from that of monolingual native speakers when first bilingual exposure is experienced before the age of 5 (Kovelman et al., 2008). All participants also reported having normal hearing, no language impairments, and no prior knowledge of Urdu or any other Indo-Aryan languages<sup>1</sup>.

The data of 4 participants were partially discarded for some tasks due to failure to meet screening requirements or technical issues. Screening and demographic information were collected prior to the experiment online through Limesurvey software. Written consent was

<sup>&</sup>lt;sup>1</sup> This experiment required participants to learn foreign Urdu words. Indo-Aryan languages are used as a categorization for dialects that share many linguistic characteristics such as phonology, grammar, vocabulary, and writing systems (Jain & Cardona, 2004). Therefore, because Urdu is a member of this language family, knowledge of any Indo-Aryan dialect would severely impact the novelty of the foreign Urdu words.

obtained before proceeding with the experiments. After completing the experiment, participants were provided with a debriefing sheet and a course credit. Participants were also sent study results if requested in the Letter of Information and Consent Form. This study protocol was cleared by the McMaster Research Ethics Board (MREB) in Hamilton, Ontario, Canada.

#### 2.2 Tasks and Procedure

This experiment consisted of three tasks: Beat Alignment Task, Nursery Rhyme Task, and Word Recognition Task. All tasks were completed in-person and during one study session, which lasted around 1-hour. The experimenter remained present in the lab room throughout the study session and led the participant through each task with both verbal and written instructions. The experimenter also ensured accurate data collection and scoring for the tasks. Each task was preceded with practice trials to familiarize the participants with the task and ensure that they accurately understood the instructions. Participants were given the opportunity to take breaks between each task if they required any.

Responses for the nursery rhyme task were audio recorded in a sound-proof audio booth using the Audacity software (Version 3.4.1) and a lab microphone (AKG C1000S).

#### 2.2.1 Beat Alignment Task (BAT)

This task was adopted from Dalla Bella (2016), who developed the Battery for the Assessment of Auditory Sensorimotor and Timing Abilities (BAASTA). The BAASTA consists of a collection of time perception and production tasks that assess an individual's timing and rhythm abilities. From the BAASTA, we used only the BAT as it provides a well-rounded assessment of an individual's competence for beat and timing perception. The BAT was conducted on an android tablet, which stored the software for BAASTA. Due to the restrictions of the software developed by Dalla Bella (2016), headphones were not used during this task, and we relied on tablet speakers. To compensate for the unideal audio quality, participants conducted a volume check first to adjust the speakers to a level that was comfortable for them.

In the BAT, participants heard musical sequences that had an overlying metronome beat play over them. Participants were asked to discriminate whether the beat aligned with the music or not. Prior to the task, the experimenter provided a thorough explanation of what a beat is and how to identify it in the stimuli. After hearing the musical sequence, participants were prompted to provide their response on the tablet by tapping one of two buttons (i.e., ALIGNED; NOT ALIGNED). A NOT ALIGNED trial was characterized by the overlaying metronome beat preceding or following the real beat of the music by 33% of the inter-beat intervals (IBIs). The responses were scored based on the number of hits, and final scores were represented by individual DPrime (d') values. There were 3 speed conditions for the music in this task (i.e., fast, medium, and slow). The tempos for the speech conditions were characterized by IBIs of 450, 600, and 750 ms, respectively. Participants heard all 3 speed conditions during the 72 trials.

The BAT stimuli<sup>2</sup> consist of four computer-generated musical fragments. Two fragments were selected from Bach's "Badinerie", whilst the other two were from Rossini's "William Tell Overture". Each musical excerpt played for a length of 20 temporal beats. The overlaying beat, used to distinguish for alignment, was superimposed on each excerpt at the 7th temporal beat. 24 trials presented a beat that aligned with the music, while 48 trials presented the music with a non-aligning beat. Participants conducted 4 practice trials, followed by 72 total test trials for this task.

<sup>&</sup>lt;sup>2</sup> The following information for this particular task was retrieved from Dalla Bella et al. (2017), Battery for the Assessment of Auditory Sensorimotor and Timing Abilities, and is a summarized description of the stimuli used in the BAT. This publication can be accessed for a full account of the stimuli used in this task.

#### 2.2.2 Nursery Rhyme Task

This task was coded on PsychoPy (Version 2023.2.3) experiment-building software and run on an external link (Pavlovia) through the desktop iMac lab computer. Participants wore lab headphones (SONY) for the duration of the task. In the Nurserv Rhyme Task, participants listened to an English nursery rhyme with two Urdu foreign words embedded in rhythmically salient positions (i.e., a rhyming Urdu word at the place of the rhyme, an unrhyming Urdu word at the place of the rhyme, an Urdu word randomly placed within the couplet). After viewing a 3-second fixation cross, they heard the rhyme again, but one of the Urdu words was not heard. During this recall phase, the audio was paired with a visual prompt where the full rhyme was written out, but the recall word was replaced with a fill-in-the-blank space. At the end of the recall presentation, participants verbally recalled the target foreign word. If a participant was unable to recall a word, they were prompted to say blank. Participant responses were audio-recorded using Audacity (Version 3.4.1) software to ensure accurate scoring after the experiment. Scoring was conducted using three different scales at the phonemic level. One point was given for each correctly recalled consonant on the consonant level, one point for each syllable on the syllable level, and one point for each word on the word level. Due to the phonological differences between English and Urdu, foreign consonant production was marked leniently and was determined by phonemic distinction in Urdu, rather than precise phonetic pronunciation. The final scores were represented as proportions of consonants, syllables, and words correct.

The nursery rhymes for this task were adapted from The Big Book of Nursery Rhymes (Jerrold & Robinson, 1903). The stimuli consisted of 36 nursery rhymes in the test trials, along with 2 nursery rhymes for the practice trials. The nursery rhymes were 2 couplets each, with 2

foreign target words distributed in the couplets. Each nursery rhyme was further modified into 3 conditions (i.e., RHYMING, UNRHYMING, and RANDOM POSITIONS), resulting in a total of 108 nursery rhymes and 216 total foreign words. The Nursery Rhymes were chosen based on the probability of exposure to the verses, where traditional and extremely popular Nursery Rhymes were avoided to diminish familiarity confounds within the stimuli. The majority of the chosen Nursery Rhymes follow an "a a b b" rhyming structure, where in a 4-line poem, the last words of the first two lines rhyme, and the last words of the last two lines rhyme. See Figure 4 for an example of the nursery rhyme task stimuli, where the highlighted word (1-2 syllables long) indicates the foreign word target. The target word was either the first or second word presented. A mixed effects analysis was later run on the data to examine any effects deriving from word length or the presentation order of the target word. APPENDIX A includes a full list of all final nursery rhyme task stimuli.

The 3 conditions for each nursery rhyme were counterbalanced between participants, so one participant only heard one version of each nursery rhyme. The presentation order of the nursery rhymes was pseudorandomized and further counterbalanced between participants to account for order effects. The final version of the study included 6 different experiment versions (i.e., Version 1A, Version 1B, Version 2A, Version 2B, Version 3A, Version 3B).

<b>RHYMING CONDITION</b>	UNRHYMING	RANDOM POSITION
	CONDITION	CONDITION
Hickety, pickety, my black	Hickety, pickety, my black	Hickety, pickety, my black
cobra,	cobra,	cobra,
She lays eggs for a <mark>جبڑا</mark>	کھڑک <mark>ی</mark> She lays eggs for a	She داڑھی (daaRhi) for
<mark>(jabRaa)</mark> ;	<mark>(khiRki)</mark> ;	October;
Gentlemen come everyday,	Gentlemen come everyday,	Gentlemen come everyday,
To see what my black cobra	To see what my black cobra	(allag) what my black الگ
(kaaTey) کائے	(kursi) کرسی	cobra lay.

Figure 4. An example of the nursery rhyme task stimuli. The target word is highlighted and the foreign words are presented in Urdu script, and English script (in the parentheses).

### 2.2.3 Word Recognition Task

This task was coded on PsychoPy (Version 2023.2.3) software and run on an external link (Pavlovia) through the iMac desktop lab computer. Participants wore lab headphones (SONY) for the duration of the task. In this task, participants were instructed that they would be tested on their memory for the words just learned in the Nursery Rhyme Task. The participants heard audio recordings Urdu foreign words one-at-a-time and discriminated whether the word had been heard before or was new. If they had heard the word, they pressed the 'P' key on their keyboard, if the word was unfamiliar, they pressed the 'Q' key on their keyboard. Reaction times were recorded for this task and the final scores were represented by individual DPrime (d') values.

Participants heard a total of 144 words for this task. 72 tokens were words they had heard during the nursery rhyme task (tested on 36 words, not tested on 36 words), and the remaining 72 words were distractors that they did not hear during the Nursery Rhyme Task. The word order was completely randomized. APPENDIX B includes a full list of all Word Recognition Task stimuli.

#### 2.2.4 Recording of Stimuli

In this experiment, all stimuli were recorded by the author of this thesis: one female speaker who was native in both Urdu and English. All recordings were completed in one session. For the Nursery Rhyme Task, each rhyme was recorded in a single take where the speaker code-switched between English and Urdu at the place of the foreign words. During the recording session, a phonetician was also present to ensure good quality recordings and seamless transitions between the two languages. The phonetician also helped the speaker maintain a consistent rhythm across all stimuli recording, along with all other speech parameters, such as loudness and pitch differences. The Nursery Rhymes were pronounced in the natural meter of nursery rhymes, where stressed (S) and unstressed (x) syllables are realized rhythmically throughout each stanza (Jacqueline, 1973).

#### *For example:*

Hickety, pickety, my black cobra, She lays eggs for a jabRaa

S xx, S xx, S x S x, S x S S x S x

The Word Recognition Task stimuli were recorded separately from the Nursery Rhyme stimuli. Each word was recorded in the phrasal sequence "Say BLANK again".

All stimuli were recorded on the Audacity software and were further processed on the Praat software. Audio recordings were normalized to 70 dB loudness. For the stimuli heard during the immediate recall phase of the nursery rhyme task, the target words were spliced out of the recording on Praat. For the stimuli heard in the Word Recognition Task, using Praat, the phrasal structure was spliced out of each recording to isolate the foreign words.

#### **3 Results**

#### **3.1 Beat Alignment Task**

The data for 1 participant could not be analyzed in this task due to technical issues with the BAT equipment.

BAT data was processed by researchers on Dalla Bella's BAASTA team. The sensitivity index (DPrime: d') was calculated based on the proportions of Hits (correct identifications of misaligned beats) and False Alarms (incorrect identifications of misaligned beats) (Dalla Bella et al., 2024). The d' was also calculated separately for each speed condition. Descriptive statistics for the BAT are shown in Table 1.

	Full Test DPrime	Fast DPrime	Medium DPrime	Slow DPrime
N	40	40	40	40
Missing	2	2	2	2
Mean	3.54	2.89	3.04	3.11
Std. error mean	0.150	0.106	0.131	0.124
Median	3.59	2.79	3.54	3.54
Standard deviation	0.946	0.670	0.830	0.781
Shapiro-Wilk W	0.830	0.819	0.660	0.613
Shapiro-Wilk p	<.001	<.001	<.001	<.001

*Table 1. Descriptive statistics for the BAT. Columns represent the d' values for each speed condition of the BAT.* 

The density plot for the full BAT (Figure 5) demonstrates that the distribution of results was not normal but right-skewed. This indicates that the results may have been subject to ceiling effects. To understand this distribution, the BAT data must be analyzed against the norms that were published by (Dalla Bella et al., 2024) for this task. Compared to the published norms, participants in this study overperformed on the BAT (Table 2).



Figure 5. A density plot of the performance on the Full Beat Alignment Task.

	Full Test d'	Fast d'	Medium d'	Slow d'
Current Study Results	3.54	2.89	3.04	3.11
Published norms	3.02	2.46	2.61	2.83

*Table 2. A comparison between the published d' norms for each BAT condition (for participants aged 18-21 years old), against the d' results from this study.* 

#### 3.2 Nursery Rhyme Task

The data for 2 participants was not included in the analysis of this task due to their failure to meet the language screening requirements of no knowledge of Indo-Aryan languages.

The rhyming conditions led to a difference in recall accuracy for foreign words at the consonant level (Figure 6). In the final analysis, consonant-level scoring was used because it offers the most detailed measure of pSTM, providing finer accuracy compared to syllable or

word-level scoring. It should be noted, however, that all levels of scoring showed the same effects. On average, rhyming words presented in a rhyming context were remembered with the numerically best accuracy (Mean = 0.76; Median = 0.75; SD = 0.13). Next, unrhyming words presented in the rhyming context were remembered with the second-best accuracy (Mean = 0.69; Median = 0.71; SD = 0.13). Finally, words in the random position condition with no expectation of rhyming were remembered with the least accuracy (Mean = 0.63; Median = 0.65; SD = 0.16).



Figure 6. Nursery rhyme task, immediate recall performance on the proportion of consonants correctly recalled. Each dot on the plotted graph is an individual data point. The horizontal lines within the boxes represent the medians for each condition. The X within each box represents the mean for that condition. The vertical lines (whiskers) represent the lower and upper 25% of scores. Therefore, individual data points (dots) occurring outside of the whiskers are considered to be outliers.

A Repeated Measures ANOVA was conducted to compare the effect of the rhyming

conditions on immediate recall accuracy for the foreign words. Comparisons were made between

the rhyming condition, unrhyming condition, and random positions condition. The results

demonstrated a significant difference in recall among the 3 different conditions [F(2, 76) = 19.8];

p = < 0.001).

A linear mixed effects model (Table 3) was run on the Urdu word recall data to allow words as well as participants as random effects, and to control possibly confounding factors. The fixed effects were 1) Rhyming Condition; 2) Relative Recency to examine if there was an effect of the target word having been presented first or second in the nursery rhyme; 3) Syllable Count to examine an effect of the target word being 1 or 2 syllables long; 4) Rhyming Condition \* Relative Recency to examine an effect of the interaction between the rhyming condition and presentation order of the target word (whether the recency of the target word had different effects in the different rhyming conditions). Random intercepts were also included in the model. Individual WORDS and PARTICIPANTS were both added as intercepts. Only the Rhyming Condition showed to be a significant fixed effect on recall accuracy.

Fixed Effect Omnibus tests

	F	Num df	Den df	р
RHYMING CONDITION	6.144	2	100	0.003
RELATIVE RECENCY	3.159	1	100	0.079
SYLLABLE COUNT	0.174	1	100	0.677
RHYMING CONDITION * RELATIVE RECENCY	0.143	2	100	0.867

Note.	Satterthwaite	e method	for c	legrees	of	freed	lom
-------	---------------	----------	-------	---------	----	-------	-----

Random Components								
Groups	Name	SD	Variance	ICC				
WORD PARTICIPANTS Residual	(Intercept) (Intercept)	0.121 0.106 0.342	0.0146 0.0113 0.1167	0.1114 0.0882				

*Table 3. Linear mixed effects model for the Nursery Rhyme Task. The table shows the fixed and random effect factors used in the model.* 

Post hoc Comparisons were run on the Rhyming Conditions (Table 4). The pairwise tests indicated that the significant main effect derives from the difference between the better recall in the rhyming condition ("rhyme") and poorer recall of the unrhyming words in the random positions condition ("random positions"), whereas the two other differences were not significant.

Thus, a phonologically predictable (rhyming) word form in a rhythmically salient position was easier to recall immediately than a phonologically unpredictable (unrhyming) word in a rhythmically non-salient position. Somewhat unintuitively, a phonologically unpredictable (unrhyming) word in a rhythmically salient position was not significantly harder than a phonologically predictable one.

Post Hoc Comparisons - RHYMING CONDITION

Com	pai	rison					
RHYMING CONDITION		RHYMING CONDITION	Difference	SE	t	df	p <sub>bonferroni</sub>
random positions random positions rhyme	- - -	rhyme unrhyme unrhyme	-0.1271 -0.0619 0.0652	0.0363 0.0363 0.0363	-3.50 -1.71 1.80	99.4 99.4 99.4	0.002 0.273 0.226

*Table 4. Post Hoc Comparison for the rhyming conditions from the linear mixed effect model for the nursery rhyme task.* 

#### 3.3 Word Recognition Task

The data for 3 participants could not be included in this task due to technical difficulties with experiment equipment.

The overall proportions of correctly recognized words did not demonstrate any effect deriving from the different rhyming conditions (Figure 7). On average, words presented in the rhyming condition were recognized at chance with a mean accuracy of 0.50 (Median = 0.5; SD = 0.17). Words originally presented in the unrhyming condition were recognized with a mean accuracy of 0.53 (Median = 05; SD = 0.7). Finally, words presented in the random position condition were recognized with a mean accuracy of 0.49 (Median = 0.5; SD = 0.17).



Figure 7. Word Recognition Task, long term memory performance on the proportions of correctly recognized foreign words. Each dot on the plotted graph is an individual data point. The horizontal lines within the boxes represent the medians for each condition. The X within each box represents the mean for that condition. The vertical lines (whiskers) represent the lower and upper 25% of scores. Therefore, individual data points (dots) occurring outside of the whiskers are considered to be outliers.

The sensitivity index (d') was calculated for this task based on the proportions of Hits (correct identifications of words heard) and False Alarms (incorrect identifications of words not heard). An ANOVA was conducted on the d' to compare the effect of the rhyming conditions on the ability to later recognize foreign words. Comparisons were made between the rhyming condition, unrhyming condition, and random position condition. The results did not reveal a significant difference in recognition among the 3 different conditions, F(2, 78) = 19.8; p = 1.00).

To further explore this lack of effect and seemingly chance performance, a linear mixed effects model (Table 5) was run on the d' data. The fixed effects were 1) Rhyming Condition; 2) Syllable Count (to examine an effect of the target word being 1 or 2 syllables long). Random intercepts were also included in the model. Individual WORDS and PARTICIPANTS were added as intercepts. The only significant fixed effect on the long-term ability to recognize foreign words was word length in syllables (1 or 2), where shorter words were recognized more accurately than longer words.

Fixed Effect Omnibus tests							
	F	Num df	Den df	р			
Rhyming Condition	1.13	2	207	0.325			
Syllable length	6.14	1	207	0.014			

Note. Satterthwaite method for degrees of freedom

Random	Components
--------	------------

Groups	Name	SD	Variance	ICC
Word	(Intercept)	0.142	0.0202	0.0870
Participant	(Intercept)	0.132	0.0174	0.0759
Residual		0.460	0.2115	

Table 5. Linear mixed effects model for the Word Recognition Task. The table shows the fixed and random effect factors used in the model.

The reaction times in this task were also analyzed. The mean response time to recognize words was 2.3 seconds long. An ANOVA was conducted to compare the effects of the rhyming conditions on reaction times to recognizing foreign words. Comparisons were made between the rhyming condition, unrhyming condition, and random position condition. The results demonstrated no significant difference in recognition among the 3 different conditions, F(2, 78) = 0.26; p = 0.77).

#### **3.4 Correlations Between Tasks**

A correlation matrix was run between tasks to test for individual differences (Table 6). Only the BAT was found to be significantly correlated with overall performance on the nursery rhyme task when using Pearson's r (r = 0.329; p = 0.047). However, statistically significant correlations were not found with Spearman's rho.

#### M.Sc Thesis - F. Ahmad, McMaster University - Cognitive Science of Language

Correlation Matrix				
		Beat Alignment Task	Nursery Rhyme Task	Word Recognition Task
Beat Alignment Task	Pearson's r	_		
	p-value	-		
	Spearman's rho	_		
	p-value	_		
Nursery Rhyme Task	Pearson's r	0.329 *	_	
	p-value	0.047	_	
	Spearman's rho	0.099	_	
	p-value	0.561	_	
Word Recognition Task	Pearson's r	0.075	0.268	_
	p-value	0.660	0.108	—
	Spearman's rho	0.070	0.262	—
	p-value	0.680	0.118	_

*Note*. \* p < .05, \*\* p < .01, \*\*\* p < .001

*Table 6. Correlation matrix comparing all 3 tasks: Beat Alignment Test, Nursery Rhyme Task, Word Recognition Task.* 

#### **4** Discussion

#### **4.1 Interpretation of Results**

This study used three tasks to understand the following questions: 1) How do prosodic cues facilitate memory for foreign words? 2) How may the findings bridge the gap between models of working memory and attending? 3) Does individual rhythmic ability impact the efficiency of phonological short-term memory? 4) Are nursery rhymes an effective language teaching tool for adults?

The Beat Alignment Task tested individuals' beat perception ability. Overall, participants performed best during the slow speed condition of the task. Next, participants performed second-best on the medium speed condition, and the fast speed condition resulted in the worst performance overall. However, task performance was close to ceiling for many participants as seen by the right-skewed distribution of scores. These results are consistent with the norms for

this task, as published by its creators. The participants in this study had overall even better performance than those in the original study.

The Nursery Rhyme Task used English rhymes as a vehicle to teach participants immediate recall of foreign Urdu words. Nursery rhymes were chosen because they allowed the experimenter to manipulate 2 levels of prosodic cues: Temporal context priming and rhythmic/phonological priming. By placing the foreign target word at the place of the original rhyming word, the participant's ability to attend to temporal cues could be analyzed. It was hypothesized that if recall for the target word improved when it was temporally located at the place of the expected rhyming word irrespective of whether the foreign word included the expected rhyme or not, then participants were relying on that cue to make temporal predictions about the target word. Rhythmic/phonological priming cues were analyzed by manipulating the phonological rhyming of the target word. It was hypothesized that if phoneme segmentation is a reliable cue to facilitate pSTM, then immediate word recall would improve in the presence of rhyming compared to not rhyming. The results for this task indicated that pSTM for foreign words was best in the rhyming condition, where both temporal context and rhythmic/phonological cues were present. Word recall was second best for the unrhyming condition, where temporal context cues were present, but rhythmic/phonological cues were not, although the difference between rhyming and unrhyming words did not reach significance. Finally, word recall performance was worst for the random position condition, where neither temporal context nor rhythmic/phonological cues were present to facilitate pSTM.

A central research question had been: How do prosodic cues facilitate memory for foreign words? It was found that the presence of a combination of temporal context and rhythmic/phonological cues significantly facilitated pSTM for foreign words. The exact

mechanism of prosodic facilitation in the phonological loop is outlined in a model proposed by this paper (Figure 8). This paper proposes that in nursery rhymes, pSTM is modulated by both temporal context and rhythmic/phonological cues in a hierarchical manner. While hearing a nursery rhyme auditory input, temporal context cues are extracted from the stimuli and allow the listener to entrain to the material. This allows the listener to make predictions about when critical information will occur temporally within the upcoming nursery rhyme. These predictions facilitate the attentional selection in processing of the stimuli, which aids WM. Next, rhythmic-phonological cues, such as rhyming, can be extracted from the stimuli to guide the listener's attention toward salient information. This allows the listener to focus on what critical phonological and prosodic information is being presented, further facilitating the processing and memory of the stimuli. The proposed model suggests an interaction between models of working memory and attending. The model also includes the process of articulatory rehearsal, as included in the original Phonological Loop Model. Post-study results demonstrated that participants were actively rehearsing the foreign words. When asked about their choice of strategy for the nursery rhyme task, 72% of participants stated that they were listening for the foreign words, and repeating them back to themselves. In the context of the proposed model, articulatory rehearsal is also impacted by rhythmic/phonological cues as it involves the use of a prosodic template to internally reproduce a specific word.



Figure 8. A proposed model of the role of prosodic cues in pSTM. pSTM is effected by temporal context cues, which allow the listener to make predictions about WHEN critical information will occur. Next, pSTM is modulated by rhythmic/phonological cues, which allow the listener to anchor WHAT critical information is occurring.

The proposed model also explains the disparity between the effect of rhythmic regularity on processing and memory. As outlined in the introduction, in DAT (Jones et al., 2002; Kösem et al., 2018; Morillon et al., 2015), rhythmic regularity is proposed to facilitate processing, whereas in WM research, rhythmic regularity has not been found to facilitate memory (Kimball et al., 2019; Hunt, 1995). The hierarchical structure of the proposed models accounts for this inconsistency. Rhythmically regular temporal cues first facilitate processing through temporal expectations, which indirectly facilitates WM. During this study, it was the rhythmically regular structure of the nursery rhymes which aided in establishing temporal expectations. On the other hand, rhythmically salient information that stands out contextually facilitates attention and memory. During this study, it was the rhythmic/phonological rhyming which saliently aided in capturing attention and facilitating memory. Therefore, to answer the research question: Are nursery rhymes an effective language teaching tool for adults? One can conclude that the results suggest that participants were able to effectively use the temporal and rhythmic context created by English nursery rhymes as a vehicle to learn the forms of foreign Urdu words.

The Word Recognition Task aimed to test long-term memory for the words learned in the Nursery Rhyme Task. No effect was found for the different rhyming conditions. Overall, the d' values for correctly recognized words suggests that the results were completely at chance. In other words, participants were guessing on most of the words and were not prepared for a long-term memory task. This is confirmed by post-test data, where 66% of participants claimed that they guessed during the majority of the task. It is concluded that the experimental design did not accurately capture the long-term memory for foreign words following the Nursery Rhyme Task.

This study also asked: Does individual rhythmic ability impact the efficiency of phonological short-term memory? A statistically significant correlation was found between the performance of the BAT and the Nursery Rhyme Task (Pearson's r). However, the same statistically significant correlation was not found with Spearman's rho, likely due to both the skewed distributions in the BAT (at ceiling). Although the correlation result must be treated with caution, it suggests that individuals with better beat perception abilities also may have better memory for foreign word forms in Nursery Rhyme contexts. It is possible that rhythmic ability is a predictor for word learning ability. Therefore, similar cognitive mechanisms may be used in perceiving musical beat alignment and in establishing pSTM representations for foreign words. Recent developmental neuroscience evidence pinpoints temporal sampling deficits as a possible cause for developmental dyslexia (Goswami, 2011; Lehongre et al., 2011). The results from this thesis provide a rationale for using rhythmic training to aid language processing and acquisition, for both neurotypical adults and individuals with Developmental Language Disorder (DLD). To

further test how individual rhythmic ability correlates with WM and language skills, future research should include more tasks that assess an individual's rhythmic aptitude.

During participation, all 42 participants did not qualify to complete every single task, though their data was still included in the analysis. Specifically, 1 participant's data was excluded from the BAT due to technical difficulties, 2 participants' data was excluded from the Nursery Rhyme Task due to language history, and 3 participants' data were eccluded from the Word Recognition Task due to language history and technical difficulties. However, this should not be considered a limitation of this study as each task was analyzed separately. In the correlational analysis, those 4 participants, were not included.

#### 4.2 Limitations

A few shortcomings should be addressed for this study. When choosing the nursery rhyme stimuli, efforts were made to ensure that the rhymes were not traditionally popular among participants. By choosing unfamiliar nursery rhymes, the task would not be subject to familiarity effects. However, in the post-study survey, some participants indicated that at least one of the nursery rhymes was familiar, although the specific nursery rhyme was not consistently familiar between participants. In future studies, it may be beneficial to curate new nursery rhymes to avoid any familiarity effects.

Similarly, familiarity of foreign words could also be a confounding factor. Because this study used real foreign target words, it is possible that the words were similar to those in individual participants' lexicons. This is relevant as the research was conducted in Southern Ontario, where the population speaks many different languages. The post-study survey indicated that 5 participants felt the foreign language was similar to a language they knew, despite the languages not belonging to the Indo-Aryan family.

Finally, the Word Recognition Task did not reflect expected results for long-term memory of foreign words. After completing the Nursery Rhyme Task, participants may not have attempted to maintain the target words in their memory. This may have been because participants were not aware that an upcoming long-term memory task would occur. Such explicit knowledge would likely have changed how participants interacted with the stimuli in the previous task. However, it could also have directed attention away from the temporal structure of the nursery rhymes.

#### **5** Conclusion

This study explored the impact of prosodic cues on memory for foreign words in a nursery rhyme context. This thesis provided novel language learning data on adults. The results demonstrated a significant effect for prosodic cues' influence on foreign word memory. Specifically, temporal and rhythmic cues may hierarchically facilitate phonological short-term memory, as represented in a proposed theoretical model. The results also suggested that nursery rhymes can be used as a language learning tool for adults. Finally, a potential link was found between individual rhythmic ability and immediate memory for foreign words. Such results suggest that rhythmic training might aid language processing and acquisition, for both neurotypical adults and individuals with DLD or other developmental language disorders. Future research should continue to use nursery rhymes as a vehicle to teach adults foreign languages. The nature of nursery rhymes will also allow future work to explore how temporal and rhythmic ability align with working memory and language skills.

#### References

Altman, G., & Carter, D. (1989). Lexical stress and lexical discriminability: Stressed syllables are more informative, but why?. *Computer Speech & Language*, *3*(3), 265-275.

Baddeley, A. (1986). Working memory. Clarendon Press/Oxford University Press.

- Baddeley, A. D. (1983). Working memory. Philosophical Transactions of the Royal Society of London. B, Biological Sciences, 302(1110), 311-324.
- Baddeley, A. D., & Hitch, G. (1974). Working Memory. In G. H. Hower (Eds.), The psychology of learning and motivation (pp. 47–89). Academic Press, Inc. <u>https://doi.org/10.1016/S0079-7421(08)60452-1</u>.
- Baddeley, A. D., Thomson, N., & Buchanan, M. (1975). Word length and the structure of short-term memory. Journal of Verbal Learning and Verbal Behavior, 14(6), 575–589. <u>https://doi.org/10.1016/S0022-5371(75)80045-4</u>.
- Baddeley, Alan, 'The phonological loop: Challenges and growing points', *Working Memory, Thought, and Action*, Oxford Psychology Series (Oxford, 2007; online edn, Oxford Academic, 22 Mar. 2012), <u>https://doi.org/10.1093/acprof:oso/9780198528012.003.0003</u>.
- Bradley, L., & Bryant, P. E. (1983). Categorizing sounds and learning to read—a causal connection. Nature, 301, 419-421.
- Bradley, L., & Bryant, P. E. (1985). Rhyme and reason in reading and spelling. Anne Arbor: University of Michigan Press.

- Bryant, P. E., MacLean, M., Bradley, L. L., & Crossland, J. (1990). Rhyme and alliteration, phoneme detection, and learning to read. *Developmental Psychology*, 26(3), 429–438. <u>https://doi.org/10.1037/0012-1649.26.3.429</u>.
- Caplan, D., Rochon, E. and Waters, G. S. (1992). Articulatory and phonological determinants of word-length effects in span tasks. *Quarterly Journal of Experimental Psychology*, 45A, 177–92.
- Cason, N., & Schön, D. (2012). Rhythmic priming enhances the phonological processing of speech. *Neuropsychologia*, 50(11), 2652–2658. <u>https://doi.org/10.1016/j.neuropsychologia.2012.07.018</u>.
- Cowan N. (2014). Working Memory Underpins Cognitive Development, Learning, and Education. *Educational psychology review*, *26*(2), 197–223. https://doi.org/10.1007/s10648-013-9246-y.
- Cyrille Magne, Corine Astésano, Mitsuko Aramaki, Sølvi Ystad, Richard Kronland-Martinet,
   Mireille Besson, Influence of Syllabic Lengthening on Semantic Processing in Spoken
   French: Behavioral and Electrophysiological Evidence, *Cerebral Cortex*, Volume 17,
   Issue 11, November 2007, Pages 2659–2668, <u>https://doi.org/10.1093/cercor/bhl174</u>.
- Dalla Bella, S., Farrugia, N., Benoit, C-E., Bégel, V., Verga, L., Harding, E., & Kotz, S.A.
  (2017). BAASTA: Battery for the Assessment of Auditory Sensorimotor and Timing Abilities. Behavior Research Methods, 49(3), 1128-1145.
- Dalla Bella, S., Foster, N.E.V., Laflamme, H., Zagala, A., Kadi, M., Komeilipoor, N., Blais, M., Rigoulot, S., & Kotz, S.A. (2024). Mobile version of the Battery for the Assessment of

Auditory Sensorimotor and Timing Abilities (BAASTA): Implementation and adult norms. Behavior Research

- Endress, A. D., & Hauser, M. D. (2010). Word segmentation with universal prosodic cues. *Cognitive psychology*, *61*(2), 177–199. <u>https://doi.org/10.1016/j.cogpsych.2010.05.001</u>.
- Goswami U. A temporal sampling framework for developmental dyslexia. Trends Cogn. Sci. 2011; 15:3–10.
- Guéron, Jacqueline. "Children's Verse and the Halle-Keyser Theory of Prosody." Children's Literature, vol. 2, 1973, p. 197-208. Project MUSE, <a href="https://dx.doi.org/10.1353/chl.0.0503">https://dx.doi.org/10.1353/chl.0.0503</a>.
- Harper, L. J. (2011). Nursery rhyme knowledge and phonological awareness in preschool children. The Journal of Language and Literacy Education [Online], 7(1), 65-78.
- Hery, I. S. P. & Arshad, I. (2020). USING NURSERY RHYMES TO ENHANCE
  VOCABULARY AMONG YOUNG ENGLISH LEARNERS IN INDONESIA. *International Journal of Management, 11*(9), 212-226. DOI:10.34218/IJM.11.9.2020.022.
- Hickok, G., Farahbod, H., & Saberi, K. (2015). The Rhythm of Perception: Entrainment to Acoustic Rhythms Induces Subsequent Perceptual Oscillation. Psychological Science, 26(7), 1006-1013. <u>https://doi.org/10.1177/0956797615576533</u>.
- Hunt, R.R. The subtlety of distinctiveness: What von Restorff really did. *Psychonomic Bulletin* & Review 2, 105–112 (1995). <u>https://doi.org/10.3758/BF03214414</u>.
- Jain, D., & Cardona, G. (2004). The Indo-Aryan Languages (1st ed.). Routledge. https://doi.org/10.4324/9780203945315.

Jerrold, W., & Robinson, C. (1903). The Big Book of Nursery Rhymes. E.P Dutton & Co.

Jones, M. R. (2019). Time will tell: A theory of dynamic attending. Oxford University Press.

- Jones, M. R., Moynihan, H., MacKenzie, N., & Puente, J. (2002). Temporal Aspects of Stimulus-Driven Attending in Dynamic Arrays. Psychological Science, 13(4), 313-319. <u>https://doi.org/10.1111/1467-9280.00458</u>.
- Khorasgani, A. T, (2016). Teaching English through Songs for Iranian Young EFL Learners.First National English Language Conference, The New Directions in ELT and Literature.Ardabil, Iran.
- Kimball, A. E., Yiu, L. K., & Watson, D. G. (2019). Word recall is affected by surrounding metrical context. *Language, Cognition and Neuroscience*, 35(3), 383–392. <u>https://doi.org/10.1080/23273798.2019.1665190</u>.
- Kösem, A., Bosker, H. R., Takashima, A., Meyer, A., Jensen, O., & Hagoort, P. (2018). Neural Entrainment Determines the Words We Hear. *Current biology : CB*, 28(18), 2867–2875.e3. <u>https://doi.org/10.1016/j.cub.2018.07.023</u>.
- Kovelman, I., Baker, S. A., & Petitto, L. A. (2008). Bilingual and monolingual brains compared: a functional magnetic resonance imaging investigation of syntactic processing and a possible "neural signature" of bilingualism. Journal of cognitive neuroscience, 20(1), 153–169. <u>https://doi.org/10.1162/jocn.2008.20011</u>.
- Langus, A., Mehler, J., & Nespor, M. (2017). Rhythm in language acquisition. *Neuroscience & Biobehavioural Reviews, 81,* 158-166.

Lehongre K, Ramus F, Villiermet N, et al. Altered low-y sampling in auditory cortex accounts for

- Li, X., Shao, X., Xia, J., & Xu, X. (2019). The cognitive and neural oscillatory mechanisms underlying the facilitating effect of rhythm regularity on speech comprehension. Journal of Neurolinguistics, 49, 155–167. <u>https://doi.org/10.1016/j</u>.
- Lonigan, C. J., Burgess, S. R., & Anthony, J. L. (2000). Development of emergent literacy and early reading skills in preschool children: Evidence from a latent-variable longitudinal study. Developmental Psychology, 36, 596-613.
- Maclean, M., Bryant, P., & Bradley, L. (1987). Rhymes, Nursery Rhymes, and Reading in Early Childhood. Merrill-Palmer Quarterly, 33(3), 255–281. http://www.jstor.org/stable/23086536.
- MacLean, M., Bryant, P.E., & Bradley, L. (1987). Rhymes, nursery rhymes and reading in early childhood. Merrill-Palmer Quarterly, 33, 255-281.
- Mehler, J., Jusczyk, P., Lambert, G., Halsted, N., Bertoncini, J., & Amiel-Tison, C. (1988). A precursor of language acquisition in young infants. *Cognition*, 29(2), 143-178. <u>https://doi.org/10.1016/0010-0277(88)90035-2</u>.
- Morillon, B., & Schroeder, C. E. (2015). Neuronal oscillations as a mechanistic substrate of auditory temporal prediction. *Annals of the New York Academy of Sciences*, 1337(1), 26–31. <u>https://doi.org/10.1111/nyas.12629</u>.
- Mueller, S. T., Seymour, T. L., Kieras, D. E., & Meyer, D. E. (2003). Theoretical Implications of Articulatory Duration, Phonological Similarity, and Phonological Complexity in Verbal Working Memory. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 29*(6), 1353–1380. <u>https://doi.org/10.1037/0278-7393.29.6.1353</u>.

- Norton, D. E., & Norton, S. E. (2011). Through the eyes of a child: An introduction to children's literature (8th ed.). Pearson, Boston.
- Pourkalhor, O. & Tavakoli, M. (2017). Impact of Nursery Rhymes on Iranian EFL Learners' Listening Comprehension Skill Improvement-A Study. *International Journal of English Language & Translation Studies*. 5(2), 01-09.
- Ranganath, C., & Rainer, G. (2003). Neural mechanisms for detecting and remembering novel events. *Nature reviews. Neuroscience*, *4*(3), 193–202. https://doi.org/10.1038/nrn1052.
- Rothermich, K., Schmidt-Kassow, M., & Kotz, S. A. (2012). Rhythm's gonna get you: regular meter facilitates semantic sentence processing. *Neuropsychologia*, 50(2), 232–244. <u>https://doi.org/10.1016/j.neuropsychologia.2011.10.025</u>.
- Saffran, J. R., Newport, E. L., & Aslin, R. N. (1996). Word Segmentation: The Role of Distributional Cues. Journal of Memory and Language, 35(4), 606–621. <u>https://doi.org/10.1006/jmla.1996.0032</u>.
- Sayakhan, N. I., & Bradley, D. H. (2019). A Nursery Rhymes as a Vehicle for Teaching English as a Foreign Language. Journal of University of Raparin, 6(1), 44–55. <u>https://doi.org/10.26750/paper</u>
- Service, E. (1998). The effect of word length on immediate serial recall depends on phonological complexity, not articulatory duration. Quarterly Journal of Experimental Psychology: Human Experimental Psychology, 51A, 283-304.
- Shwetha, R., & Phil., M. (2013). Nursery Rhymes as an Effective Instructional Material for Young Language Learners.
- Temple, C., Martinez, M., & Yokota, J. (2011). Children's Books in Children's Hands: An Introduction to Their Literature (4th Ed.). Pearson, New York.

the three main facets of dyslexia. Neuron. 2011; 72:1080-1090.

Vloedgraven, J. M., & Verhoeven, L. (2007). Screening of phonological awareness in the early elementary grades: An IRT approach. Annals of Dyslexia, 57, 33-50.

English Rhyme	Urdu Rhyme Condition (A)	Urdu Unrhyme Condition (B)	Urdu Displaced Condition (C)
PRACTICE		PRACTICE	
	Hickory dickory dock!		Twinkle twinkle little star,
Hickory dickory dock!	(chaahat) جاہیت The mouse ran up	Twinkle twinkle little star,	How I wonder what you are:
The mouse ran up the clock:		How I wonder what you are:	
	The clock struck one, the mouse		Up above the world so high,
The clock struck one, the mouse	ran down,	Up above the world so high,	Like a diamond in the شمين
ran down,	Hickory dickory dock!	Like a diamond in the sky.	(shams)
Hickory dickory dock!			
R1 Pg.35 Doctor	V1	V2	V3
-	دفتر Doctor Mufter went to the	غريت Doctor Mufter went to the	Doctor Mufter went to the
Doctor Mufter went to the cluster,	(daftar)	(ghurbat)	cluster,
In a shower of rain;	In a shower of rain;	In a shower of rain;	In a کوشش (koshish) of rain;
He stepped in a jumble right up to	He stepped in a jumble right up to	He stepped in a jumble right up to	He stepped in a jumble right up
his middle,	his کمیل (kambal)	his شید ( <u>shehed)</u>	to his middle,
And never went there again.	And never went there again.	And never went there again.	And ياني (paani) went there again.
R2 Pg.48 Tom	V3	V1	V2
	Tom, Tom, the piper's son,	Tom, Tom, the piper's son,	Tom, Tom, the piper's son,
Tom, Tom, the piper's son,	(mann) بين Stole a pig and away he	(maar) پار (stole a pig and away he	لالي (laal) a pig and away he run!
Stole a pig and away he run!			
	The pig was <u>eat</u> and Tom was <del>جيبي</del>	The pig was <u>eat</u> and Tom was <mark>پهايئ</mark>	The pig was <u>سخت</u> ( <u>sakht</u> ) and
The pig was eat and Tom was beat,	(jeet)	(bhai),	Tom was beat,
And Tom went howling down the	And Tom went howling down the	And Tom went howling down the	And Tom went howling down the
street.	street.	street.	street.
R3 Pg.88 Hubby	V2	V3	V1
	My kind hubby, he minds the کیپی	My kind hubby, he minds the ڍنيا	My kind hubby, گینڈیا (gainDaa)
My kind hubby, he minds the	(kabhee)	(dunxaa)	the shrubby,
shrubby,	While I go mowing each morn;	While I go mowing each morn;	While I go mowing each morn;
While I go mowing each morn;			
	Gaily run the reel and the little	Gaily run the reel and the little	Gaily run the reel and the نازي
Gaily run the reel and the little	spinning <u>وکيل</u> (vakeel)	spinning <u>مسکان (muskaan)</u>	(naazuk) spinning-wheel,
spinning-wheel,	Whilst I am hoeing my corn.	Whilst I am hoeing my corn.	Whilst I am hoeing my corn.
Whilst I am hoeing my corn.			

APPENDIX	A: Ful	l list of	nursery	rhyme	task	stimul	i
			•	•			

English Rhyme	Urdu Rhyme Condition (A)	Urdu Unrhyme Condition (B)	Urdu Displaced Condition (C)
R4 Pg.38 Kittens	V1 Two little kittens one stormy night,	V2 Two little kittens one stormy night,	V3 Two little kittens one stormy
Two little kittens one stormy night,	They began to quarrel, they began	They began to quarrel, they began	night,
They began to quarrel, they began to fight;	to شکلیت (shikaait)	to (ghussa)	They <u>کمیکی (chamak)</u> to quarrel, they began to fight;
One had a mouse and the other	One had a mouse and the other	One had a mouse and the other	One had a mouse and the other
had none,	had none,	had none,	had none,
And that's the way the quarrel	And that's the way the quarrel	And that's the way the quarrel	And that's the way the
begun.	(vatan)	(19,9,155) Sale	(ehsaas) begun.
R5 Pg.43 Gavel	V3		
Cavel Cavel	Come under my dele (chapyal)	Come under my ut (Tonce)	Come (t + t (cheeche) my flannel
Come under my flannel	I'll give you a slice of bacon:	I'll give you a slice of bacon:	I'll give you a slice of bacon:
I'll give you a slice of bacon:	The you a since of <u>Decont</u>		
	And when I bake.	And when I bake.	And when I bake.
And when I bake,	l'll give you a نيک (neik)	l'll give you a غم (ghum)	انلگ (rang) you a cake,
I'll give you a cake,	If I am not mistaken.	If I am not mistaken.	If I am not mistaken.
If I am not mistaken.			
R6 Pg.46 Green	V2	V3	V1
-	Sweet old man and I <u>fell</u> green,	Sweet old man and I <u>fell green</u> ,	Sweet old man and I <u>fell</u> green,
Sweet old man and I fell green,	زیپن How shall I bring this matter	آواز How shall I bring this matter	How shall I bring this ينكها
How shall I bring this matter between?	(zameen)	(aaxaaz)	(pankhaa) between?
			Bring it between as well as you
Bring it between as well as you can,	Bring it between as well as you can,	Bring it between as well as you can,	can,
Get you gone <u>you</u> sweet old man.	Get you gone you sweet old نهين (لعطيم)	Get you gone you sweet old پنیپه (banda)	Get kawa (mazkoot) you sweet old man.

English Rhyme	Urdu Rhyme Condition (A)	Urdu Unrhyme Condition (B)	Urdu Displaced Condition (C)
R7 Pg.141 Dollar	V1	V2	V3
	A dillar a dollar,	A dillar a dollar,	A dillar a dollar,
A dillar a dollar,	A ten o'clock يکز (pakaR)	A ten o'clock واقف (vaagif)	A ten <u>کیزی (ghaRee</u> ) <u>scholar:</u>
A ten o'clock <u>scholar:</u>			
	What makes you come so soon?	What makes you come so soon?	What makes you come so soon?
What makes you come so soon?			
	You used to come at ten o'clock,	You used to come at ten o'clock,	You used to come at ten o'clock,
You used to come at ten o'clock,	But now you come at <u>خون (khoon)</u>	<u>چواپ</u> But now you come at	But now you 🤙 📩 (khof) at noon.
But now you come at noon.		(khwaab)	
R8 Pg.165 Cobbler	V3	V1	V2
0	There was a cobbler clouting shoe,	There was a cobbler clouting shoe,	There was a cobbler clouting
There was a cobbler clouting shoe.	When they were mended, they	When they were mended, they	shoe.
When they were mended, they	(jaadoo) جادو	(jazbaat) جذبات	When they were وقفه (vagfa),
were two:			they were two:
	There was a horse in the mill,	There was a horse in the mill,	
There was a horse in the mill,	When he went on, he stood محفل	when he went on, he stood شيوقين	There was a horse in the mill,
When he went on, he stood not	(mehfil)	(shokeen)	When he <u>خلاف (khilaaf)</u> , he stood
still.			not still.
R9 Pg.149 Robin	V2	V3	V1
	Robin and Richard felt a little bore.	Robin and Richard felt a little bore.	Robin and Richard felt a little
Robin and Richard felt a little bore,	They did not awake 'till the clock	They did not awake 'till the clock	bore,
They did not awake 'till the clock	struck جوڑ (joB)	struck جان (jaan)	They did not awake 'till the ياؤي
struck four:			(paun) struck four:
	Then up starts Robin, and looks to	Then up starts Robin, and looks to	
Then up starts Robin, and looks to	the bog,	the bog,	Then up starts Robin, and looks to
the bog,	O! Brother Richard, the swamp is	O! Brother Richard, the swamp is	the bog,
O! Brother Richard, the swamp is a	(dimaagh) دماغ	energy (maseem)	O! Brother Richard, مثهاي
fog.	-		(miThaai) is a fog.

Child Pg.232 November       Ote Simplifie Controller (y)       Ote Simplifie Controller (y)       Ote Simplifie Controller (y)         R11 Pg.232 November       Dull November brings the gloss       Then the leaves are falling code       Dull November brings the gloss         Chill December brings the sleet,       Blazing fire and Christmas treat.       Chill December brings the sleet,       Blazing fire and Christmas treat.       Chill December brings the sleet,       Blazing fire and Christmas treat.       Chill December brings the sleet,       Blazing fire and Christmas treat.       Chill December brings the sleet,       Blazing fire and Christmas treat.       Chill December brings the sleet,       Blazing fire and Christmas treat.       Chill December brings the sleet,       Blazing fire and Christmas treat.       Chill December brings the sleet,       Blazing fire and Christmas treat.       Chill December brings the sleet,       Blazing fire and Christmas treat.       Chill December brings the sleet,       Blazing fire and Christmas treat.       Chill December brings the sleet,       Blazing fire and Christmas treat.       Chill December brings the sleet,       Blazing fire and Christmas treat.       Chill December brings the sleet,       Blazing fire and Christmas treat.       Chill December brings the sleet,       Blazing fire and Christmas treat.       Chill December brings the sleet,       Blazing fire and Christmas treat.       Chill December brings the sleet,       Blazing fire and Christmas treat.       Chill December brings the sleet,       So the bought a sheep-skin and ma	English R	hyme	Urdu Rhyme Condition (A)	Urdu Unrhyme Condition (B)	Urdu Displaced Condition (C)
Interspect to the serverDuil November brings the gloss Then the leaves are falling to seed:Duil November brings the gloss Then the leaves are falling to seed:Duil November brings the gloss Then the leaves are falling to seed:Duil November brings the gloss Then the leaves are falling to seed:Duil November brings the gloss Then the leaves are falling to seed:Duil November brings the gloss Then the leaves are falling to seed:Duil November brings the gloss Then the leaves are falling to seed:Duil November brings the gloss Then the leaves are falling to seed:Duil November brings the gloss Then the leaves are falling to seed:Duil November brings the gloss Then the leaves are falling to seed:Duil November brings the gloss Then the leaves are falling to seed:Duil November brings the gloss Then the leaves are falling to seed:Duil November brings the gloss Then the leaves are falling to seed:Duil November brings the gloss Then the leaves are falling to seed:Duil November brings the gloss Then the leaves are falling to seed:Duil November brings the gloss Then the leaves are falling to seed:Duil November brings the gloss Then the leaves are falling to seed:Duil November brings the gloss Then the leaves are falling to seed:Duil November brings the gloss Then the leaves are falling to seed:Duil November brings the gloss The the leaves are falling to seed:Duil November brings the gloss The the leaves are falling to seed:Duil November brings the gloss The the leaves are falling to seed:Duil November brings the gloss The the leaves are falling to seed:Duil November brings the gloss The the leaves are falling to seed:Duil November brings the gloss The the leaves are falling to seed: <t< td=""><td>R10 Pg 23</td><td>32 November</td><td>V1</td><td>V2</td><td>V3</td></t<>	R10 Pg 23	32 November	V1	V2	V3
Dull November brings the gloss Then the leaves are falling cossed:Durn the function of might the gloss then the leaves are falling cossed:Durn the function of might the gloss then the leaves are falling cossed:Durn the function of might the gloss then the leaves are falling cossed:Chill December brings the sleet, Blazing fire and Christmas treat.Chill December brings the sleet, Blazing fire and Christmas coss (cosst)Chill	1101 8.23		Dull November brings the gloss	Dull November brings the gloss	Dull November brings the gloss
Then the leaves are failing based; Itheas:Itheas: Itheas:to sead: Itheas:Chill December brings the sleet, Blazing fire and Christmas treat.Chill December brings the sleet, Blazing fire and Christmas sub; (dect)Chill December brings the sleet, Blazing fire and Christmas sub; (dect)Zim Main christmas fire and Christmas sub; (dect)Zim Main christmas fire and Christmas sub; (dect)Zim Main christmas fire and C	Dull Nove	omber brings the gloss	Then the leaves are falling	Then the leaves are falling	Then the $(iaR)$ are falling
Chill December brings the sleet, Blazing fire and Christmas treat.Chill December brings the sleet, Blazing fire and Christmas super (dated)Chill December brings the sleet, Blazing fire and Christmas fieldChill December brings the sleet, Blazing fire and Christmas fieldChill December brings the sleet, Blazing fire and Christmas fieldChill December brings the sleet, Brian QLin, had no breeches to scrub, Super field and made a drub;Chill December brings the sleet, Brian QLin, had no breeches to scrub, Super field and made a drub;Chill be child and field and the 	Then the	leaves are falling tossed:	(khaas)	(honT)	tossed:
Chill December brings the sleet, Blazing fire and Christmas treat.Chill December brings the sleet, Blazing fire and Christmas support (datd)Chill December brings the sleet, Blazing fire and Christmas support Spi he bught a sheep-skin and made a fub; (hat hat hat's warm!'' said Brian all gring fire hat hat's warm!'' said Brian all gring			10000000	10000000	
Blazing fire and Christmas treat.       Blazing fire and Christmas (act)       So fire and Christmas (act)       So fire and fire and fire and fire and fire and fir	Chill Dece	ember brings the sleet.	Chill December brings the sleet.	Chill December brings the sleet.	Chill December brings the sleet.
R12 Pg.187 DoggyV2V3V4R12 Pg.187 DoggyV2Ilike little doggy, her pout is so calm, And if 1 do not hurt her, she'll do me no harm;V3V3So I'll not pull her tail, nor drive her away, But doggy and 1 very gently will play.V2So I'll not pull her tail, nor drive her away, But doggy and 1 very gently will play.V3R12 Pg.187 DoggyV2Ilike little doggy, her pout is so calm, And if 1 do not hurt her, she'll do me no harm;V3So I'll not pull her tail, nor drive her away, But doggy and 1 very gently Sile play.V3V1R12 Pg.187 DoggyV2Ilike little doggy, her pout is so calm, And if 1 do not hurt her, she'll do me no harm;V3So I'll not pull her tail, nor drive her away, But doggy and 1 very gently Sile play.V3R12 Pg.187 DoggySo I'll not pull her tail, nor drive her away, But doggy and 1 very gently Sile (ghanta)V3R12 Pg.187 DoggyV2Ilike little doggy, her pout is so calm, And if 1 do not hurt her, she'll do me no harm;So I'll not pull her tail, nor drive her away, But doggy and 1 very gently Sile (ghanta)V3R12 Pg.187 DoggySo I'll not pull her tail, nor drive her away, But doggy and 1 very gently Sile (ghanta)V3R12 Pg.187 DoggyV2Ilike little doggy and 1 very gently Sile (ghanta)So I'll not pull her tail, nor drive her away, But doggy and 1 very gently Sile (ghanta)V3R12 Pg.187 DoggyV3Into pull her tail, nor drive her away, But doggy and 1 very gently Sile (ghanta)V3	Blazing fir	re and Christmas treat.	گیت Blazing fire and Christmas	Blazing fire and Christmas ڊرڊ	Blazing جاند (chaand) and
R11 Pg.220 BrianV3 Brian Q'Lin, had no breeches to scrub, So he bought a sheep-skin and made a drub;V1 Brian Q'Lin, had no breeches to scrub, So he bought a sheep-skin and made a drub;V2 Brian Q'Lin, had no breeches to scrub, So he bought a sheep-skin and made a drub;V2 Brian Q'Lin, had no breeches to scrub, So he bought a sheep-skin and made a drub;V2 Brian Q'Lin, had no breeches to scrub, So he bought a sheep-skin and made a drub;V2 Brian Q'Lin, had no breeches to scrub, So he bought a sheep-skin and made a drub;V2 Brian Q'Lin, had no breeches to scrub, So he bought a sheep-skin and made a drub;V2 Brian Q'Lin, had no breeches to scrub, So he bought a sheep-skin and made a drub;V2 Brian Q'Lin, had no breeches to scrub, So he bought a sheep-skin and made a drub;V2 Brian Q'Lin, had no breeches to scrub, So he bought a sheep-skin and made a drub;V2 Brian Q'Lin, had no breeches to scrub, So he bought a sheep-skin and made a drub;V2 Brian Q'Lin, had no breeches to scrub, So he bought a sheep-skin and made a drub;V2 Brian Q'Lin, had no breeches to scrub, So he bought a sheep-skin and made a drub;V2 With the skinny side out, and the woolly side in, "A, ha, that's warm!" said Brian all the skinny side out, and the woolly side in, "A, ha, that's warm!" said Brian all the skinny side out, and the woolly side in, "A, ha, that's warm!" said Brian all the skinny side out, and the woolly side in, "A, ha, that's warm!" said Brian all the skinny side out, and the the skinny side out, and the the skinny side out, and the woolly side in, "A ha, that's warm!" said Brian all the skinny side out, and the the skin	Ŭ		(geet)	(dard)	Christmas treat.
Image: constraint of the sector of the sec					
R11 Pg.220 BrianV3 Brian Q/Lin had no breeches to scrub, So he bought a sheep-skin and made a drub;V2 Brian Q/Lin had no breeches to scrub, So he bought a sheep-skin and made a drub;V2 Brian Q/Lin had no breeches to scrub, So he bought a sheep-skin and made a drub;V2 Brian Q/Lin had no breeches to scrub, So he bought a sheep-skin and made a drub;V2 Brian Q/Lin had no breeches to scrub, So he bought a sheep-skin and made a drub;V2 Brian Q/Lin had no breeches to scrub, So he bought a sheep-skin and made a drub;V2 Brian Q/Lin had no breeches to scrub, So he bought a sheep-skin and made a drub;V2 Brian Q/Lin had no breeches to scrub, So he bought a sheep-skin and made a drub;V2 Brian Q/Lin had no breeches to scrub, So he bought a sheep-skin and made a drub;V2 Brian Q/Lin had no breeches to scrub, So he bought a sheep-skin and made a drub;V2 Brian Q/Lin had no breeches to scrub, So he bought a sheep-skin and made a drub;V2 Brian Q/Lin had no breeches to scrub, So he bought a sheep-skin and made a drub;V2 Brian Q/Lin had no breeches to scrub, So he bought a sheep-skin and made a drub;V2 Brian Q/Lin had no breeches to scrub, So he bought a sheep-skin and made a drub;V2 Brian Q/Lin had no breeches to scrub, So he bought a sheep-skin and made a drub;V2 Brian Q/Lin had no breeches to scrub, So he bought a sheep-skin and made a drub;V2 Brian Q/Lin had no breeches to scrub, So he bought a sheep-skin and made a drub;V2 Brian Q/Lin had no breeches to scrub, So he bought a sheep-skin and made a drub;V2 Brian Q/Lin had no breeches to scrub, So he bo					
Brian Q', Lin, had no breeches to scrub, So he bought a sheep-skin and made a drub;Brian Q', Lin, had no breeches to scrub, So he bought a sheep-skin and made a drub;Brian Q', Lin, had no breeches to scrub, So he bought a sheep-skin and made a drub;Brian Q', Lin, had no breeches to scrub, So he bought a sheep-skin and made a drub;Brian Q', Lin, had no breeches to scrub, So he bought a sheep-skin and made a drub;Brian Q', Lin, had no breeches to scrub, So he bought a sheep-skin and made a drub;Brian Q', Lin, had no breeches to scrub, So he bought a sheep-skin and made a drub;Brian Q', Lin, had no breeches to scrub, So he bought a sheep-skin and made a drub;Brian Q', Lin, had no breeches to scrub, So he bought a sheep-skin and made a drub;Brian Q', Lin, had no breeches to scrub, So he bought a sheep-skin and made a drub;Brian Q', Lin, had no breeches to scrub, So he bought a sheep-skin and made a drub;Brian Q', Lin, had no breeches to scrub, So he descrub, And if I do not, hurt her, she'll do me stat (khushboo)Brian Q', Lin, had no breeches to scrub, So he descrub, And if I do not hurt her, she'll do me stat (khushboo)Brian Q', Lin, had no breeches to scrub, So he descrub, And if I do not hurt her, she'll do me stat (khushboo)Brian Q', Lin, had no breeches to scrub, Mith the skinny side out, and the woolly side in, "And if I do not hurt her, she'll do me stat (khushboo)Brian Q', Lin, had no breeches to scrub, "And if I do not hurt her, she'll do me stat (khushboo)Brian Q', Lin, had no breeches to scrub, "And if I do not hurt her, she'll do me stat (khushboo)Brian Q', Lin, had here tail, nor drive away, But doggy and I v	R11 Pg.22	20 Brian	V3	V1	V2
Brian Q'Lin, had no breeches to scrub, So he bought a sheep-skin and made a drub;scrub, So he degree drub, made a drub;scrub, drub, drub, made a drub;scrub, drub, drub, made a drub;scrub, drub, drub			Brian Q'Lin had no breeches to	Brian Q'Lin had no breeches to	Brian Q'Lin had no breeches to
scrub, So he bought a sheep-skin and made a drub;So he decide drub;With the skinny side out, and the woolly side in, "A, ha, that's warm!" said Brian all grin.With the skinny side out, and the woolly side in, "A, ha, that's warm!" said Brian all grin.With the skinny side out, and the woolly side in, "A, ha, that's warm!" said Brian all grin.With the skinny side out, and the woolly side in, "A, ha, that's warm!" said Brian all grin.With the skinny side out, and the woolly side in, "A, ha, that's warm!" said Brian all grin.With the skinny side out, and the woolly side in, "A, ha, that's warm!" said Brian all grin.With the skinny side out, and the woolly side in, "A, ha, that's warm!" said Brian all grin.With the skinny side out, and the woolly side in, "A, ha, that's warm!" said Brian all grin.With the skinny side out, and the woolly side in, "A, ha, that's warm!" said Brian all grin.With the skinny side out, and the woolly side in, "A, ha, that's warm!" said Brian all grin.With the skinny side out, and the woolly side in, "A, ha, that's warm!" said Brian all grin.Itike little doggr, her pout is so calm, And if I do not hurt her, she'll do me swate (khushboo)Itike little doggr	Brian Q'Li	in had no breeches to	scrub,	scrub,	scrub,
So he bought a sheep-skin and made a drub;       with the skinny side out, and the woolly side in, "A, ha, that's warm!" said Brian all grin.       with the skinny side out, and the woolly side in, "A, ha, that's warm!" said Brian all grin.       With the skinny side out, and the woolly side in, "A, ha, that's warm!" said Brian all grin.       With the skinny side out, and the woolly side in, "A, ha, that's warm!" said Brian all grin.       With the skinny side out, and the woolly side in, "A, ha, that's warm!" said Brian all grin.       With the skinny side out, and the woolly side in, "A, ha, that's warm!" said Brian all grin.       With the skinny side out, and the woolly side in, "A, ha, that's warm!" said Brian all grin.       With the skinny side out, and the woolly side in, "A, ha, that's warm!" said Brian all grin.       With the skinny side out, and the woolly side in, "A, ha, that's graw, (kbus)       With the skinny side out, and the woolly side in, "A, ha, that's graw, and if I do not hurt her, she'll do me no harm;       I like little doggy, her pout is so calm, And if I do not hurt her, she'll do me no harm;       I like little doggy and I very gently sug, But doggy and I very gently sug, But doggy and I very gently sug, (ghanta)       So I'll not pull her tail, nor drive her away, But doggy and I very gently sug, (ghanta)       So I'll not pull her tail, nor drive her away, But doggy and I very gently sug, (ghanta)       So I'll not pull her tail, nor drive her away, But doggy and I very gently sug, (ghanta)       So I'll not pull her tail, nor drive	scrub,		So he bought a sheep-skin and	So he bought a sheep-skin and	<u>So</u> he <u>دکھ (dukh)</u> a sheep-skin and
made a drub;With the skinny side out, and the woolly side in, "A, ha, that's warm!" said Brian all grin.With the skinny side out, and the woolly side in, "A, ha, that's warm!" said Brian all woolly side in, "A, ha, that's warm!" said Brian all grin.With the skinny side out, and the woolly side in, "A, ha, that's warm!" said Brian all grin.With the skinny side out, and the woolly side in, "A, ha, that's warm!" said Brian all grin all grin.With the skinny side out, and the woolly side in, "A, ha, that's warm!" said Brian all grin all grin.With the skinny side out, and the woolly side in, "A, ha, that's warm!" said Brian all grin all grin.With the skinny side out, and the woolly side in, "A, ha, that's warm!" said Brian all grin all grin.With the skinny side out, and the woolly side in, "A, ha, that's warm!" said Brian all grin all grin.With the skinny side out, and the woolly side in, "A, ha, that's warm!" said Brian all grin all grin.With the skinny side out, and the woolly side in, "A, ha, that's warm!" said Brian all grin all grin.With the skinny side out, and the woolly side in, "A, ha, that's warm!" said Brian all grin all grin.With the skinny side out, and the grin all grin.With the skin the sol all tike little doggy, her pout is so calm, An	So he bou	ught a sheep-skin and	made a <u>شبب (shab)</u>	made a <u>ناکي (naak)</u>	made a drub;
With the skinny side out, and the woolly side in, "A, ha, that's warm!" said Brian all grin.With the skinny side out, and the woolly side in, "A, ha, that's warm!" said Brian all (A, ha, that's warm!" said Brian all (B, ha, that's	made a d	rub;			
With the skinny side out, and the woolly side in,       "A, ha, that's warm!" said Brian all       woolly side in,       "A, ha, that's warm!" said Brian all       woolly side in,       "A, ha, that's warm!" said Brian all       woolly side in,       "A, ha, that's warm!" said Brian all       Woolly side in,       "A, ha, that's warm!" said Brian all       Woolly side in,       "A, ha, that's warm!" said Brian all       Woolly side in,       "A, ha, that's warm!" said Brian all       Woolly side in,       "A, ha, that's warm!" said Brian all       Woolly side in,       "A, ha, that's warm!" said Brian all       Woolly side in,       "A, ha, that's warm!" said Brian all       Woolly side in,       "A, ha, that's warm!" said Brian all       Woolly side in,       "A, ha, that's warm!" said Brian all       Woolly side in,       "A, ha, that's warm!" said Brian all       Woolly side in,       "A       "A       Ha, that's warm!" said Brian all       Woolly side in,       "A       "A       Ha, that's warm!" said Brian all       Woolly side in,       "A       "A       Ha, that's warm!" said Brian all       "A       "A       Ha       Ha<				With the skinny side out, and the	With the skinny side out, and the
woolly side in, "A, ha, that's warm!" said Brian all grin.woolly side in, "A, ha, that's warm!" said Brian all (A, ha,	With the	skinny side out, and the	With the skinny side out, and the	woolly side in,	woolly side in,
"A, ha, that's warm!" said Brian all grin.       "A, ha, that's warm!" said Brian all grin.       Brian all grin.         R12 Pg.187 Doggy       VI       Ilike little doggy, her pout is so calm, And if I do not hurt her, she'll do me no harm:       Ilike little doggy and I doggy and I very gently sul, bhaagey)       VI       Ilike little doggy and I very gently will play.       So I'll not pull her tail, nor drive her away, But doggy and I very gently will play.       So I'll not pull her tail, nor drive her away,       So I'll not pull her tail, nor drive her away,       So I'll not pull her tail, nor drive her away,       So I'll not pull her tail, nor drive her away,       So I'll not pull her tail, nor drive her away,       So I'll not pull her tail, nor drive her away,       So I'll not pull her tail, nor drive her away,       So I'll not pull her tail, nor drive her away,       So I'll not pull her tail, nor drive her away,	woolly sic	de in,	woolly side in,	" <u>A</u> , ha, that's warm!" said Brian all	" <u>A,</u> ha, that's <u>موټ</u> (mot)" said
grin.     نهن (din)     V3     V1       R12 Pg.187 Doggy     V2     I like little doggy, her pout is so calm, And if I do not hurt her, she'll do me no harm:     V3     I like little doggy, her pout is so calm, And if I do not hurt her, she'll do me xbit (ghulaam)     V3     I like little doggy, her pout is so calm, And if I do not hurt her, she'll do me xbit (ghulaam)     I like little doggy, her pout is so calm, And if I do not hurt her, she'll do me xbit (ghulaam)     So l'II not pull her tail, nor drive her away, But doggy and I very gently the tail, nor drive gently the tail, nor drive gently the tail, nor drive gently the tail, her away, But doggy and I very gently will     So l'II not pull her tail, nor drive her away, But doggy and I very gently the tail, her away, But doggy and I very gently the tail, nor drive gently the tail, her away,     So l'II not pull her tail, nor drive her away, But doggy and I very gently the tail, her away,     So l'II not pull her tail, nor drive her away, But doggy and I very gently the tail, her away,     So l'II not pull her tail, nor drive her away, But doggy and I very gently the tail, her away,     So l'II not pull her tail, nor drive her away, But doggy and I very gently the tail, her away,     So l'II not pull her tail, nor drive her away,	" <u>A,</u> ha, th	at's warm!" said Brian all	"A, ha, that's warm!" said Brian all	(khel) کھیل	Brian all grin.
Kike     V2     V3     V4       1 like little doggy, her pout is so calm,     1 like little doggy and i very gent/y     1 like little doggy and i very gently sugges     1 like little doggy and i very gently sugges     1 like little doggy and i very gently sugges     1 like little doggy and i very gently sugges     1 like little doggy and i very gently sugges     1 like little doggy and i very gently sugges     1 like little doggy and i very gently sugges     1 like	grin.		يري (din)		
R12 Pg.187 Doggy     V2     V3       I like little doggy, her pout is so calm, And if I do not hurt her, she'll do me no harm;     I like little doggy, her pout is so calm, And if I do not hurt her, she'll do me no harm;     I like little doggy, her pout is so calm, And if I do not hurt her, she'll do me subact (khushboo)     I like little doggy, her pout is so calm, And if I do not hurt her, she'll do me subact (khushboo)     I like little doggy, her pout is so calm, And if I do not hurt her, she'll do me subact (khushboo)     I like little doggy, her pout is so calm, And if I do not hurt her, she'll do me subact (khushboo)     I like little doggy, her pout is so calm, And if I do not hurt her, she'll do me subact (khushboo)     And if I do not <u>luke (kaadal)</u> , she'll do me no harm;       So I'll not pull her tail, nor drive her away, But doggy and I very gently will play.     So I'll not pull her tail, nor drive her away, (khaaggy)     So I'll not pull her tail, nor drive her away, (khaaggy)     So I'll not pull her tail, nor drive her away, (khaaggy)     So I'll not pull her tail, nor drive her away, (khaaggy)     So I'll not pull her tail, nor drive her away, (khaaggy)     So I'll not pull her tail, nor drive her away, (khaaggy)     So I'll not pull her tail, nor drive her away, (khaaggy)     So I'll not pull her tail, nor drive her away, (khaaggy)     So I'll not pull her tail, nor drive her away, (khaaggy)     So I'll not pull her tail, nor drive her away, (khaaggy)     So I'll not pull her tail, nor drive her away, (khaaggy)     So I'll not pull her tail, nor drive her away, (khaaggy)     So I'll not pull her tail, nor drive her away, (khaaggy)     So I'll not pull her tail, nor drive away, (khaaggy)     So I'll not pull her away, (					
NI 2 rg.107 Doggy       Ike little doggy, her pout is so         1 like little doggy, her pout is so       calm,       Ike little doggy, her pout is so       Ike little doggy, her pout is so       calm,         And if I do not hurt her, she'll do       And if I do not hurt her, she'll do       And if I do not hurt her, she'll do       And if I do not hurt her, she'll do       And if I do not hurt her, she'll do         So I'll not pull her tail, nor drive her away,       So I'll not pull her tail, nor drive her away,       So I'll not pull her tail, nor drive her away,       So I'll not pull her tail, nor drive her away,       So I'll not pull her tail, nor drive her away,       So I'll not pull her tail, nor drive her away,       But doggy and I very gently suit       Image: So I'll not pull her tail, nor drive her away,         But doggy and I very gently suit       Image: So I'll not pull her tail, nor drive her away,       So I'll not pull her tail, nor drive her away,       So I'll not pull her tail, nor drive her away,         But doggy and I very gently suit       Image: So I'll not pull her tail, nor drive her away,       Image: So I'll not pull her tail, nor drive her away,         But doggy and I very gently suit       Image: So I'll not pull her tail, nor drive her away,       Image: So I'll not pull her tail, nor drive her away, </th <th>D12 Da 10</th> <th>27 Deami</th> <th>N/2</th> <th>V2</th> <th>241</th>	D12 Da 10	27 Deami	N/2	V2	241
I like little doggy, her pout is so         calm,       And if I do not hurt her, she'll do       And if I do not hurt her, she'll do       And if I do not hurt her, she'll do       And if I do not hurt her, she'll do         So I'll not pull her tail, nor drive her away,       So I'll not pull her tail, nor drive her away,       So I'll not pull her tail, nor drive put is so       So I'll not pull her tail, nor drive her away,       So I'll not pull her tail, nor drive her away,       So I'll not pull her tail, nor drive her away,       So I'll not pull her tail, nor drive her away,       So I'll not pull her tail, nor drive her away,       So I'll not pull her tail, nor drive her away,       So I'll not pull her tail, nor drive her away,       So I'll not pull her tail, nor drive her away,       So I'll not pull her tail, nor drive her away,       So I'll not pull her tail, nor drive her away,         But doggy and I very gently will play.       (bhaagex)       But doggy and I very gently title       So I'll not pull her tail, nor drive her away,	K12 Pg.10	SY DOBBA	VZ	V3	VI
Inite filte dogg, he poul is so alm, and if 1 do not hurt her, she'll do me no harm:       And if 1 do not hurt her, she'll do me thill do not hurt her, she'll do not hurt her, she'l	Lliko littlo	doggy has not is so	salm	calm	colm
And if I do not hurt her, she'll do me no <u>harm:</u> So I'll not pull her tail, nor drive her away, But doggy and I very gently sile play.	calm	e doggy, her pout is so	And if I do not burt her, she'll do	And if I do not burt her she'll do	And if I do not the (handal) she'll
So I'll not pull her tail, nor drive her away, But doggy and I very gently will play.     So I'll not pull her tail, nor drive her away, But doggy and I very gently fue (bhaagey)     So I'll not pull her tail, nor drive her away, But doggy and I very gently fue (ghanta)     So I'll not pull her tail, nor drive her away, But doggy and I very gently fue (ghanta)     So I'll not pull her tail, nor drive her away, But doggy and I very gently fue (mattab) will play.	And if I do	o not hurt her she'll do	me Né (ghulaam)	me autorio (khushboo)	do me no harm:
So I'll not pull her tail, nor drive her away, But doggy and I very gently will play.     So I'll not pull her tail, nor drive her away, But doggy and I very gently file (bhaagex)     So I'll not pull her tail, nor drive her away, But doggy and I very gently file (bhaagex)     So I'll not pull her tail, nor drive her away, But doggy and I very gently file (bhaagex)     So I'll not pull her tail, nor drive her away, But doggy and I very gently file (bhaagex)     So I'll not pull her tail, nor drive her away, But doggy and I very gently file (bhaagex)     So I'll not pull her tail, nor drive (bhaagex)	menoha	rm.	The fact (allocation)	100000000	do me no <u>marm</u> ,
So I'll not pull her tail, nor drive her away, But doggy and I very gently will play.     away, But doggy and I very gently (bhaagey)     But doggy and I very (bhaagey)     But doggy and I very (bhaagey)     But doggy (bhaagey)     But dogg			So I'll not pull her tail nor drive her	So I'll not null her tail nor drive her	So I'll not pull ber tail nor drive
away, But doggy and I very gently will play. But doggy and I very gently Lew (bhaagey) But doggy and I very gently Lew (chanta) But doggy and I very gently Lew (chanta)	So I'll not	null her tail nor drive her	away	away	ber away
But doggy and I very gently will (bhaagey) (bhaagey) (bhaagey) (bhaagey) (bhaagey) (bhaagey) (bhaagey) (bhaagey)	away	punner tan, nor unverner	But doggy and I very gently Slav	But doggy and I very gently 41145	But doggy and I very
play.	But dogo	and I very gently will	(bhaagey)	(ghanta)	(matlab) will play.
	play.	, and i very genery will	10000000000	10	torreact the projection
	,				

English Rhyme	Urdu Rhyme Condition (A)	Urdu Unrhyme Condition (B)	Urdu Displaced Condition (C)
R13 Pg.268 Farmer	V1	V2	V3
	Farmer went trotting upon his grey	Farmer went trotting upon his grey	Farmer went trotting upon his
Farmer went trotting upon his grey	mare,	mare,	آنکھ (aankh) mare,
mare,	Bumpety, bumpety, pop!	Bumpety, bumpety, ٹھنڈ (ThanD)	Bumpety, bumpety, pop!
Bumpety, bumpety, pop!			
	His daughter behind him so rosy	His daughter behind him so rosy	His daughter behind 🧏 (ghar) so
His daughter behind him so rosy	and شير (sher)	and fair,	rosy and fair,
and fair,	Lumpety, lumpety, <u>min (saanp)</u>	Lumpety, lumpety, دوست (dost)	Lumpety, lumpety, chop!
Lumpety, lumpety, chop!			
D14 D= 217 Line	10		
R14 Pg.217 Lion	V3 The lies and the unisers ware	VI The lies and the unicess wave	V2 The lies and the unicess were
The lies and the unicess were	fighting for the how	finiting for the hour	fighting for the hour
fighting for the how	The liep heat the unicern all	The liep heat the unicern all	The liep best the unicern all a i
The lion heat the unicorn all around	around the MaS (khaao)	around the itle (isaiz)	(neechay) the show:
the show:			(Uccouldy) the show,
	Some gave them brown bread, and	Some gave them brown bread, and	Some gave them brown bread.
Some gave them brown bread, and	some gave them green.	some gave them green.	and some gave them green.
some gave them green.	Some gave them plum-cake, and	Some gave them plum-cake, and	Some gave them (paagal), and
Some gave them plum-cake. and	sent them (haseen)	sent them <u>برمست</u> (sarmast)	sent them upstream.
sent them upstream.			
	V2	V3	V1
R15 Pg.175 Barber	Barber, Barber, shave a piggy,	Barber, Barber, shave a piggy,	Barber, Barber, shave a piggy,
	How many hairs will make a	How many hairs will make a	How many hairs
Barber, Barber, shave a piggy,	(zindagi)	(iballak)	(mehsoos) a wiggy?
How many hairs will make a wiggy?	<i>"</i> =	<i>"</i> = 1	<i>"-</i>
<i>"</i>	"Four and twenty, that's not all,"	"Four and twenty, that's not all,"	"Four and twenty, that's not all,"
"Four and twenty, that's not all,"	Give the barber a pinch deal a	Give the barber a pinch	Give the (sautan) a pinch of
Give the barber a pinch of ball.	(ULCARU)	Igatkowassi	Dall.
1			

English Rhyme	Urdu Rhyme Condition (A)	Urdu Unrhyme Condition (B)	Urdu Displaced Condition (C)
R16 Pg.82 Dingty	V1	V2	V3
	Dingty, diddledy, my mammy's	Dingty, diddledy, my mammy's	Dingty, diddledy, my mammy's
Dingty, diddledy, my mammy's	maid,	maid,	maid,
maid,	<mark>یبفید</mark> She stole oranges, I'm	She stole oranges, I'm <u>آسمان</u>	She stole <u>يجنن</u> ( <u>bartan</u> ), I'm <u>afraid:</u>
She stole oranges, I'm <u>afraid;</u>	(saffaid)	(aasmaan)	
			Some in her pockets, some in her
Some in her pockets, some in her	Some in her pockets, some in her	Some in her pockets, some in her	sleeve,
sleeve,	sleeve,	sleeve,	(aitbaar) oranges I do
She stole oranges I do believe.	شريفي She stole oranges I do	(zeher) زیپر She stole oranges I do	believe.
	(shareef)		
P17 Pg 119 Special	V2	V1	1/2
KI7 Fg.116 Special	There was a special woman as I've	There was a special woman as I've	There was a special woman as
There was a special woman as l've	been told	heen told	l've been told
been told	Who was not very young nor yet	Who was not very young nor yet	Who was not very till (DaanT)
Who was not very young, nor yet	verv دهول (Dhol)	very سانس (saans)	nor vet very old:
very old:		100000000	
	Now this special woman, her living	Now this special woman, her living	Now this special woman, her
Now this special woman, her living	got,	got,	living ببيب (saib)
got,	By selling pumpkins, hot, hot, hot,	By selling pumpkins, hot, hot, hot, يهيك	By selling pumpkins, hot, hot, hot,
By selling pumpkins, hot, hot, hot.	(chaaT)	(Theek)	
R18 Pg.126 Boys			
Deve and side some out to also	Boys and girls come out to play,	Boys and girls come out to play,	Boys and girls come out to play,
Boys and girls come out to play,	The moon doth shine as bright as	the moon doth shine as bright as	(tarboar) as day:
day:	Carrier (Descripto)	Latas (KOUSUGE)	(Lation as day:
uay.	Come with a whoon and come	Come with a whoon and come	Come with a whoen and come
Come with a whoon and come	with a call	with a call	with a call
with a call	Come with a good will or come not	Come with a good will or come not	Come with a good will or arise
Come with a good will or come not	at (maal)	at دخت (drakht)	(ponchb) not at all
at all	44 665 (00680)	an active remember	least and in the arean.

English Rhyme	Urdu Rhyme Condition (A)	Urdu Unrhyme Condition (B)	Urdu Displaced Condition (C)
R19 Pg.131 Pussycat	V1	V2	V3
	Pussycat Mew jumped over a coal,	Pussycat Mew jumped over a coal,	Pussycat Mew jumped over a
Pussycat Mew jumped over a coal,	And in her best petticoat burnt a	And in her best petticoat burnt a	coal,
and in her best petticoat burnt a	Blear 02 (000	great con (tall)	(bhoon) a great hole:
Bicut India.	Poor pussy's weeping, she'll have	Poor pussy's weeping, she'll have	(SUISSUI) a Breat Hore,
Poor pussy's weeping, she'll have	no more milk,	no more milk,	Poor pussy's weeping, she'll have
no more milk,	Until her best petticoat's mended	Until her best petticoat's mended	no more milk,
Until her best petticoat's mended	with <del>شرکي (shirk)</del>	with <mark>روري (soch)</mark>	Until her <u>ذابت (zaat)</u> petticoat's
with silk!			mended with silk!
R20 Pg.188 Punch	V3	V1	V2
	Punch and Judy fought for a pie,	Punch and Judy fought for a pie,	Punch and Judy fought for a pie,
Punch and Judy fought for a pie,	Punch gave Judy a knock in جدائ	Punch gave Judy a knock in	Punch gave Judy a 💥 (thapaR) in
Punch gave Judy a knock in the eye;	Uudaall	(Jawan)	the eve:
Says Punch to Judy, "Want any	Says Punch to Judy, "Want any	Says Punch to Judy, "Want any	Says Punch to Judy, "Want any
more?"	more?"	more?"	more?"
Says Judy to Punch, "My eye is too	Says Judy to Punch, "My eye is	Says Judy to Punch, "My eye is	Says Judy to Punch, <mark>"مجفوظ</mark>
sore."	(maroR)	(fazool) فضيول	(mehfooz) is too sore."
R21 Pg.228 Misty	V2	V3	V1
	One misty morning, when cloudy	One misty morning, when cloudy	One misty morning, when cloudy
One misty morning, when cloudy	was the climate,	was the climate,	was the climate,
I met an old man, clothed in all	i met an old man, clotned in all	i met an old man, clothed in all روپی (zevar)	all violet:
violet:		(6568667)	the second secon
	He began to dance, and I began to	He began to dance, and I began to	He began to dance, and I began
He began to dance, and I began to	sob,	sob,	to sob,
sob,	"How do you do? Where do you	"How do you do? Where do you	"How do you do? Where do
"How do you do? Where do you	go? Why does your heart	go? Why does your heart	(Jasoos) Why does your
gor why does your heart throb?	uaxaaw		

English Rhyme	Urdu Rhyme Condition (A)	Urdu Unrhyme Condition (B)	Urdu Displaced Condition (C)
R22 Pg.146 Evil	V1	V2	V3
	For every evil under the sun,	For every evil under the sun,	For every evil under the sun,
For every evil under the sun,	There is a remedy, or there is 😓	There is a remedy, or there is روپي	There is a remedy, or صرح المح
There is a remedy, or there is none:	(dhann)	(1993)	(ihooT) is none;
If there be one, seek 'till you find it,	If there be one, seek 'till you find it,	If there be one, seek 'till you find it,	If there be one, seek 'till you find
If there be none, never mind it.	If there be none, never mind-	قيد If there be none, never mind	it,
	(chiT)	(qaid)	maang), never) مانک
			mind it.
R23 Pg.167 Monday			
Manufactore Million Company Children Children	Monday's child is free of blemish,	Monday's child is free of blemish,	Monday's child is free of blemish,
Monday's child is full of chorish.	الالتين I uesday's child is full of	(medad)	herich
ruesday's child is full of <u>cherish;</u>	(Statustu)	(((14940)	<u>cherish;</u>
Wednesday's child is full of woe	Wednesday's child is full of woe	Wednesday's child is full of woe	Wednesday's child is full of woe
Thursday's child has far to go	Thursday's child has far $\sqrt{2}$ (bhigo)	Thursday's child has far a (garam)	Thursday's child telety (naBhaai)
			to go
			10 50.
R24 Pg.177 Merry	V2	V3	V1
	Merry are the bells, and merry had	Merry are the bells, and merry had	Merry are the bells, and merry
Merry are the bells, and merry had	they rung,	they rung,	had they rung,
they rung,	Merry was myself, and merry could	Merry was myself, and merry could	Merry بيار (pyaar) myself, and
Merry was myself, and merry could	(zang) زنیگ	(yaad) پاد ا	merry could I flung:
l <u>flung;</u>			
	With a merry ding-dong, happy,	With a merry ding-dong, happy,	With a merry ding-dong, happy,
With a merry ding-dong, happy,	sweet, and free,	sweet, and free,	sweet, and free,
sweet, and free,	And a merry sing-song, happy let	And a merry sing-song, happy let	And a merry sing-song, happy 🔬
And a merry <u>sing-song</u> , happy let us	us چې (jee)	us پھینیں (bhens)	(khair) us be!
be!			

English Rhyme	Urdu Rhyme Condition (A)	Urdu Unrhyme Condition (B)	Urdu Displaced Condition (C)
R25 Pg.180 Curly Curly locks! Curly locks! Wilt thou be mine? Thou shall not wash dishes, nor yet feed <u>swine;</u> Sit on a cushion, sew a fine seam, And feed on strawberries, sugar and cream!	V1 Curly locks! Curly locks! Wilt thou be mine? Thou shall not wash dishes, nor yet کار (سلامیت) Sit on a cushion, sew a fine seam, And feed on strawberries, sugar	V2 Curly locks! Curly locks! Wilt thou be mine? Thou shall not wash dishes, nor yet معطیت ( <u>khaamosh</u> ) Sit on a cushion, sew a fine seam, And feed on strawberries, sugar <u>week (bachpan)</u>	V3 Curly locks! Curly locks! Wilt thou be mine? Thou shall not wash (هوزنه) nor yet feed <u>swine:</u> Sit on a cushion, sew a fine seam, And مليني (Dassand) strawberries, sugar and cream!
R26 Pg.199 Bunny Bless you, bless you, bunny bee, Say, when will your wedding be? If it be to-morrow day, Take your wings and fly away.	V3 Bless you, bless you, bunny bee, Say, when will your wedding ليتها (Ratchee) If it be to-morrow day, Take your wings and fly	V1         Bless you, bless you, bunny bee,         Say, when will your wedding رویید         (sooral)         If it be to-morrow day,         Take your wings and fly رویید         (subpost)	V2 Bless you, bless you, bunny bee, Say, when will your شیکی (mangni) be? If it be to-morrow day, Take میکی (begum) and fly away.
R27 Pg.203 Cushy Cushy Cow, bonny, let down thy critter, And I will give thee a gown of <u>zipper:</u> A gown of silk and a silver tee, If thou wilt let down thy milk to me.	V2 Cushy Cow, bonny, let down thy critter, And I will give thee a gown of کی (زاری) A gown of silk and a silver tee, If thou wilt let down thy milk کی (sabzee)	V3 Cushy Cow, bonny, let down thy critter, And I will give thee a gown of منیفی (rishta) A gown of silk and a silver tee, If thou wilt let down thy milk منیفی (tamaam)	V1 Cushy Cow, bonny, let down thy critter, And I will (عوازه) a gown of <u>zipper:</u> A gown of silk and a silver tee, If thou wilt let down محمد (laber) to me.

English Rhyme	Urdu Rhyme Condition (A)	Urdu Unrhyme Condition (B)	Urdu Displaced Condition (C)
	V1	V2	V3
R28 Pg.210 Ride			
	Ride away, ride away, Jonny shall	Ride away, ride away, Jonny shall	Ride away, ride away, Jonny shall
Ride away, ride away, Jonny shall	ride off,	ride off,	ride off,
ride off,	He shall have a <u>pussy-cat</u> tied to	He shall have a <u>pussy-cat</u> tied to	He shall have a <u>پچين (baychain)</u>
He shall have a <u>pussy-cat</u> tied to	one جايداد (jaaidaad)	one <u>دهکا (dhakka)</u>	tied to one side <u>all;</u>
one side all;			
	And he shall have a little dog tied	And he shall have a little dog tied	And he shall have a little dog tied
And he shall have a little dog tied to	to the other,	to the other,	to the other,
the other,	And Jonny shall ride to see his جادِر	And Jonny shall ride to see his نيهاؤ	And Jonny shall آنسو (aansoo) to
And Jonny shall ride to see his	(chaadar)	(nikhao)	see his grandmother.
grandmother.			
	V3	VI	VZ
R29 Pg.218 Egg			
Liberty and the Real and the Liberty Hard	I have seen your little egg yolks	I have seen your little egg yolks	I have seen your little egg yolks
Durating all about the collower	Running all about the (alsos)	Running all about the User (Strakkal)	(vageen) all about the
Running all about the gallows:	Thursday has been used a large	Thus we have had a very little law	gallows:
Thusuah the hele your little les	In the weineest possing (	In the university of the log,	
In the weinseet peeping peg	(ababak)	(hillon)	In the in the (fitret) peeping peg
in the wainscot peeping peg.	(cuenak)	(surge)	in the cose (ittrat) peeping peg.
R30 Pg 224 Kingston	V2	V/3	V1
Noo I Bizz I Kingston	"Old woman old woman shall we	"Old woman old woman shall we	"Old woman old woman shall
"Old woman old woman shall we	go to Kingston?"	go to Kingston?"	we go to Kingston?"
go to Kingston?"	"Speak a little louder sir it's verv	"Speak a little louder sir it's verv	(roshan) sir
"Speak a little louder, sir, it's very	hard to حسن (hussan)	hard to cemacily coosri)	it's very hard to listen."
hard to listen."			
	"Old woman, old woman, shall I	"Old woman, old woman, shall I	"Old woman, old woman, shall I
"Old woman, old woman, shall I	kiss you dearly?"	kiss you dearly?"	kiss you dearly?"
kiss you dearly?"	"Thank you, kind sir, I hear you	"Thank you, kind sir, I hear you	"Thank you, يندوق (bandook), I
"Thank you, kind sir, I hear you very	very تهرک (Tharki)	very بمت (himmat)	hear you very clearly."
clearly."			

# M.Sc Thesis - F. Ahmad, McMaster University - Cognitive Science of Language

English Rhyme	Urdu Rhyme Condition (A)	Urdu Unrhyme Condition (B)	Urdu Displaced Condition (C)
	V1	V2	V3
R31 Pg.248 Brethren	"We are three brethren out of	"We are three brethren out of	"We are three brethren out of
	Italy,	Italy,	Italy,
"We are three brethren out of Italy,	Come to court your daughter, نِقِلِي	Come to court your daughter, پیاڼ	یلچل Come to court your
Come to court your daughter,	(nagli)	(baxaan)	(hullchull), Tiffany."
Tiffany."			
	"My daughter girl, she is too	"My daughter girl, she is too	"My daughter girl, she is too
"My daughter girl, she is too young,	young,	young,	young,
She has no skill in a flattering	She has no skill in a flattering	She has no skill in a flattering	She has no skill in a clube
tongue.	(malang)	(namak)	(Knaandaan) tongue.
	V3	V1	V2
R32 Pg.260 Billy	-	-	
	"Billy, Billy, come out to play,	"Billy, Billy, come out to play,	"Billy, Billy, come out to play,
"Billy, Billy, come out to play,	لفيصل While the sun shines bright	while the sun shines bright شويير	While عينك (ainak) shines bright
While the sun shines bright as day."	(faislax)	(shohar)	as day."
"Yes, my Polly, so I will,	"Yes, my Polly, so I will,	"Yes, my Polly, so I will,	"Yes, my Polly, so I will,
For I love to please you still."	For I love to please (mushkil)	For I love to please (ungli)	For I love to (mehboob)
			still."
	V2	V3	V1
R33 Pg. 271 Fox	_	_	_
	The fox and his wife they had a	The fox and his wife they had a	The fox and his wife they had a
The fox and his wife they had a	great strife,	great strife,	great strife,
great strife,	They never ate mustard in all of	They never ate mustard in all of	(sailaab) in سيلاب (sailaab)
They never ate mustard in all of	their طوائف (tavaaif)	their (sohbat) منجيت	all of their <u>life;</u>
their <u>life;</u>			
They are their meet without fark or	iney ate their meat without fork or	I ney ate their meat without fork or	i ney ate their meat without fork
shoop	And they went to hed singing a	And they went to had singing a	And they went to had cal th
And they went to bed singing a	sweet in Sur (sukoon)	sweet like (manzil)	(shaadi) a sweet tupe
sweet tune.			Neuropean a sweet tune.

English Rhyme	Urdu Rhyme Condition (A)	Urdu Unrhyme Condition (B)	Urdu Displaced Condition (C)
R34 Pg.277 Pippin	VI	V2	V3
	King Pippin built a fine new hall,	King Pippin built a fine new hall,	King Pippin built a fine new hall,
King Pippin built a fine new hall,	Pastry and <u>pie-crust</u> were <u>کِمِال</u>	Pastry and <u>pie-crust</u> were <u>کیزور</u>	<mark>jaanvar) جانور</mark> Pastry and
Pastry and <u>pie-crust</u> were the wall;	(kamaal)	(kamzar)	the <u>wall:</u>
Windows made of pudding, shiny	Windows made of pudding, shiny	Windows made of pudding, shiny	Windows made of pudding, shiny
as a rock,	as a rock,	as a rock,	as a rock,
Slates were pancakes, such a tasty	Slates were pancakes, such a tasty	Slates were pancakes, such a tasty	Slates were قِبَل (gatal), such a
stock!	(Reszem) مناق	(totaa) طوطا	tasty stock!
	V3	V1	V2
R35 Pg.299 Hart			
	The hart he loves the pourin'	The hart he loves the pourin'	The hart he loves the pourin'
The hart he loves the pourin'	The hare she loves the mister	The hare she loves the mister	The hare she loves the mister
The nare she loves the mister	The knight he loves the hei (foran)	The knight he loves the chile	the loves the
The knight he loves the notion	The lady she loves her سنة (histar)	(taaruf)	notion
The lady she loves her master.	(bistar)	The lady she loves her es (karam)	The lady مايوس (maayoos) her
······································			master.
	V2	V3	V1
R36 Pg.307 Cobra			
Hiskoty, pickoty, my black cobra	Hickety, pickety, my black cobra,	Hickety, pickety, my black cobra,	Hickety, pickety, my black cobra,
She lays eggs for october	She lays eggs for a the landar	She lays eggs for a Cole, Kulloku	She was to add the to accord.
She lays ess for October	Gentlemen come everyday.	Gentlemen come everyday.	Gentlemen come everyday.
Gentlemen come everyday.	کاڈ To see what my black cobra	کرہے، To see what my black cobra	(allag) what my black cobra
To see what my black cobra lay.	(kaaTey)	(kursi)	lay.

Urdu Rhyming		Urdu Unrhyming		Urdu Random	
<mark>PRACTICE</mark> چاہت Desire	снаанат [ <mark>t]a:bət</mark> ]	PRACTICE شمس Sun	SHAMS [[ams]		
دفتر Office	DAFTAR [dʌftəɾ]	غریت Poverty	GHURBAT [ <u>scrbat]</u>	کوشش Effort	Koshish [koʃtʃ]
<mark>*V1</mark> کمبل Blanket	KAMBAL [kambəl]	<mark>*V2</mark> شہد Honey	SHEHED [ʃɛhəd]	<mark>*V3</mark> پانی Water	PAANI [pa:ni]
من Heart		مار Hit	MAAR [maːr]	لال Red	LAAL [la:l]
<mark>*V3</mark> جیت Win	JEET [d͡ʒit]	<mark>*V1</mark> بهائ Brother	BHAI [bʰai]	<mark>*V2</mark> سخت Hard	SAKHT [sʌxt]
کبھی Sometimes	KABHEE [kabʰi]	دنیا World	DUNYAA [donia:]	گینڈا Rhino	GAIN <u>D</u> AA [genda:]
<mark>*V2</mark> وکیل Lawyer	VAKEEL [vəkil]	* <mark>V3</mark> مسکان Smile	MUSKAAN [muska:n]	<mark>*V1</mark> نازک Delicate	NAAZUK [na:zok]
<mark>*V1</mark> شکایت Complain	SHIKAAIT [[Ika:It]	<mark>*V2</mark> غصہ Angry	GHUSSA [ʁʊ̯sə]	<mark>*V3</mark> چمک Sparkle	CHAMAK [t]amək]
وطن Homeland	VATAN [vətʌn]	ضرور Definitely	ZAROOR [zəcur]	احساس Sentiment	EHSAAS [ɛbsaːs]
<mark>*V3</mark> چاول Rice	CHAAVAL [t͡t͡aːvəl]	<mark>*V1</mark> ٹوپی Hat	<u>T</u> OPEE [topi]	<mark>*V2</mark> شیشه Glass	SHEESHA [〔〔〔a〕

APPENDIX B: Full list of word recognition task stimuli

Urdu Rhyming		Urdu Unrhyming		Urdu Random	
ن <i>یک</i>	NEIK	غم	[rvw]	رنگ	RANG
Virtue	[nek]	Sadness	Chnw	Colour	[rang]
<mark>*V2</mark> زمین Land	ZAMEEN [zəmin]	<mark>*V3</mark> آواز Sound	AAVAAZ [a:va:z]	<mark>*V1</mark> پنکها Fan	PANKHAA [pənkʰaː]
يېن	BEHEN	بندہ	BANDA	مضبوط	MAZBOOT
Sister	[behen]	Man	[banda]	Strong	[məzbut]
پکڑ	paka <u>r</u>	واقف	VAAQIF	گهڑی	GHA <u>R</u> EE
Grab	[ <mark>pakər</mark> ]	Acquaintance	[va:ktf]	Clock	[gʰəɾi]
<mark>*V1</mark> خون Blood	KHOON [ <mark>xun</mark> ]	<mark>*V2</mark> خواب Dream	KHWAAB [xwa:b]	خوف Fear	*V3 KHOF [xof]
جادو	JAADOO	جذبات	JAZBAAT	وقفه	VAQFA
Magic	[d͡ʒaːdu]	Feelings	[d͡ʒəzbaːt]	Pause	[vakfa]
<mark>*V3</mark> محفل Gathering	MEHFIL [mshfil]	<mark>*V1</mark> شوقين Fan	SHOKEEN [[okin]	<mark>*V2</mark> خلاف Against	KHILAAF [xıla:f]
جوڑ	JO <u>R</u>	جان	JAAN	پاؤں	PAUN
Joint	[dʒor]	Soul	[d͡ʒaːn]	Foot	[pa;õ]
<mark>*V2</mark> دماغ Brain	DIMAAGH [dɪmaːʁ]	<mark>*V3</mark> معصوم Innocent	MASOOM [ <u>məsum]</u>	<mark>*V1</mark> مٹھائ Sweets	MI <u>T</u> HAAI [mɪtʰaːi]

Urdu Rhyming		Urdu Unrhyming		Urdu Random	
<mark>*V1</mark> خاص Particular	KHAAS [xəːs]	<mark>*V2</mark> ہونٹ Lips	HON <u>T</u> [bent]	<mark>*V3</mark> جڑ Root	JA <u>R</u> [d͡ʒʌː]
گیت	GEET	درد	DARD	چاند	CHAAND
Song	[git]	Pain	[dacd]	Moon	[t]a:nd]
<mark>*V3</mark> شب Night	SHAB [ʃʌb]	<mark>*V1</mark> ناک Nose	NAAK [na:k]	<mark>*V2</mark> دکھ Pain	DUKH [dʊkʰ]
دن	DIN	کھیل	KHEL	موت	MOT
Day	[dɪŋ]	Game	k'el]	Death	[mot]
<mark>*V2</mark> غلام Servant	GHULAAM [scla:m]	<mark>*V3</mark> خوشبو Smell	KHUSHBOO [ <mark>X¤[bu]</mark>	<mark>*V1</mark> بادل Cloud	BAADAL [ba:dəl]
بھا <u>ک</u>	BHAAGEY	گھنٹه	GHAN <u>T</u> A	مطلب	MATLAB
Run	[bʰaːge]	Hour	[gʰʌntə]	Meaning	[mat.lab]
شير	SHER	ٹھنڈ	<u>T</u> HAN <u>D</u>	آنکھ۔	AANKH
Lion	[[eː]	Cold	[tʰʌnd]	Eye	[ãː ŋkʰ]
<mark>*V1</mark> سانپ Snake	SAANP [şãːp]	<mark>*V2</mark> دوست Friend	DOST [dost]	<mark>*V3</mark> گهر House	GHAR [gʰʌː]
کھاؤ	KHAAO	جائز	JAAIZ	نیچ	
Eat	[kʰaːo]	Permissible	[d͡ʒaːɪz]	Under	

Urdu Rhyming		Urdu Unrhyming		Urdu Random	
* <mark>V3</mark> حسين Beautiful	HASEEN [bəsin]	<mark>*V1</mark> سرمست Drunk	SARMAST [sacmast]	<mark>*V2</mark> پاگ <i>ل</i> Crazy	PAAGAL [pa:gəl]
زندگی Life	ZINDAGI [ <mark>zındəgi</mark> ]	جهلک Glimpse	JHALLAK dstalek]	محسوس Feel	MEHSOOS [ <u>mɛhsus</u> ]
<mark>*V2</mark> فی الحال Currently	FILHAAL [filha:]]	<mark>*V3</mark> درخواست Request	DARKHWAAST	<mark>¥V1</mark> سوتن Co-wife	SAUTAN [sotən]
<mark>*V1</mark> سفید White	SAFFAID [səfed]	<mark>*V2</mark> آسمان Sky	AASMAAN [aːsmaːn]	<mark>*V3</mark> برتن Dishes	BARTAN [bactan]
شريف Respected	SHAREEF [jæcif]	زہر Poison	ZEHER [zɛhəː]	اعتبار Trust	AITBAAR [et.bair]
<mark>*V3</mark> ڈھول Drum	DHOL [dʰol]	<mark>*V1</mark> سانس Breath	SAANS [şãːs]	<mark>*V2</mark> ڈانٹ Yell	<u>D</u> AAN <u>T</u> [da:nt]
چاٹ Snack	CHAA <u>T</u> [t]a:t]	ٹھیک Alright	<u>T</u> HEEK [thik]	سيب Apple	SAIB [seb]
<mark>*V2</mark> پیچھے Behind	PEECHAY [pit]he]	<mark>*V3</mark> خوشی Happiness	KHUSHEE [XQ[i]	<mark>*V1</mark> تربوز Melon	TARBOOZ [tərbuz]
مال Money	MAAL [mail]	درخت Tree	DRAKHT [draxt]	پونچھ Tail	PONCHH [põnt] <sup>[</sup> ]

Urdu Rhyming		Urdu Unrhyming		Urdu Random	
بول Speak	BOL [bol]	رىيت Sand	RAIT [ret]	بھون Cook	BHOON [bʰun]
<mark>*V1</mark> شرک Associate	SHIRK [ʃɪ̯ːːk]	<mark>*V2</mark> سوچ Think	socн sotD	<mark>*V3</mark> زيري Caste	ZAAT [zaːt]
جدائ Separation	JUDAAII [d͡ʒʊdaːi]	جوان Young	JAWAAN [d͡ʒəxaːn]	تهپڑ Slap	THAPA <u>R</u> [tʰʌpəɾ]
<mark>*V3</mark> مروڑ Twist	Maro <u>r</u> [məcor]	<mark>*V1</mark> فضول Unnecessary	FAZOOL [fəzul]	<mark>*V2</mark> محفوظ Safe	MEHFOOZ [ <u>mɛhfuz</u> ]
طاقت Strength	TAAQAT [ta:kət]	زیور Jewellery	ZEVAR [zevəc]	تصویر Picture	TASVEER [təsxic]
<mark>*V2</mark> جواب Answer	JAVAAB [d͡ʒəxə:b]	<mark>*V3</mark> عزت Respect	IZZAT [ <u>IZƏt</u> ]	<mark>*V1</mark> جاسوس Spy	JASOOS [d͡ʒasus]
<mark>*V1</mark> دهن Wealth	DHANN [dʰʌn]	<mark>*V2</mark> روپ Appearances	ROOP [rup]	<mark>*V3</mark> جھوٹ Lie	лноо <u>т</u> [d͡ʒˈut]
چٹ Paper	сні <u>т</u> [t͡ʃɪt]	قید Prisoned	QAID [ked]	مانگ Ask	MAANG [maːng]
<mark>*V3</mark> بارش Rain	BAARISH [ba:m]	<mark>*V1</mark> مدد Help	MADAD [mædad]	<mark>*V2</mark> امید Hope	UMEED [umid]

Urdu Rhyming		Urdu Unrhyming		Urdu Random	
بهگو	BHIGO	گرم	GARAM	پڙهائ	PA <u>r</u> haai
Wetten	[bʰɪɡo]	Hot	[garam]	Study	[parha:i]
<mark>*V2</mark> زنگ Rust	ZANG [ZANG]	<mark>*V3</mark> یاد Remember	YAAD [ja:d]	<mark>*V1</mark> پیار Love	PYAAR [pia:c]
جی	JEE	بھینس	BHENS	خير	KHAIR
Yes	[d͡ʒi]	Buffalo	[bʰēs]	Good	[xec]
ملائم	MULAAIM	خاموش	KHAAMOSH	سوزش	SOZISH
Soft	[mula:1m]	Quiet	[ <u>xa:mo[</u> ]	Swelling	[ <mark>SOZI]</mark> ]
<mark>*V1</mark> حکيم Doctor	HAKEEM [ <mark>həkim]</mark>	<mark>*V2</mark> بچپن Childhood	BACHPAN [bʌt͡ʃpən]	<mark>*V3</mark> پ <i>سند</i> Like	PASSAND [pəsand]
پرچی	PARCHEE	سورج	SOORAJ	منگنی	MANGNI
Paper	[pərt]i]	Sun	[suced]	Engagement	[mangni]
<mark>*V3</mark> سامنے In front	SAAMNEY [sa:mne]	<mark>*V1</mark> ثبوت Proof	SUBOOT [subut]	<mark>*V2</mark> بیگم Lady	BEGUM [begam]
ذکر	ZIKAR	رشته	RISHTA	آتش	AATISH
Mention	[ <mark>ZIKƏ</mark> []	Relationship	[rɪ[tə]	Fire	[aːtɪʃ]
<mark>*V2</mark> سبزی Vegetable	SABZEE [səbzi]	<mark>*V3</mark> تمام Complete	TAMAAM [təmaːm]	<mark>*V1</mark> جہیز Dowry	JAHEZ [dʒəhez]

Urdu Rhyming		Urdu Unrhyming		Urdu Random	
<mark>*V1</mark> جائداد Property	JAAIDAAD [d͡ʒaːɪdaːd]	<mark>*V2</mark> دهک Push	DHAKKA [dʰʌka]	<mark>*V3</mark> جچين Restless	BAYCHAIN [bet]en]
چادر	CHAADAR	نبهاؤ	NIBHAO	آنسو	AANSOO
Sheet	[t][a:dəː]	Fulfil	[nɪbʰaːo]	Tears	[ãːsoo]
<mark>*V3</mark> افسوس Condolence	AFSOS [ <del>ə̯fsos</del> ]	<mark>*V1</mark> شکل Face	SHAKKAL [[ʌkəl]	<mark>*V2</mark> یقین Believe	YAQEEN [iəkin]
چہک	CHEHAK	بجلی	BIJLEE	فطرت	FITRAT
Chirping	[t]ehek]	Light	[brd3li]	Nature	[fitcet]
<mark>*V2</mark> حسن Beauty	HUSSAN [husen]	<mark>*V3</mark> دوسری Second	DOOSRI [dusri]	<mark>*V1</mark> پیشن Bright	ROSHAN [rolen]
ٹھرکی	<u>t</u> harki	یمیت	HIMMAT	يندوق	BANDOOK
Flirty	[tʰʌcki]	Strength	[himat]	Handgun	[banduk]
نقلی	NAQLI	پیان	BAYAAN	پلچل	HULLCHULL
Fake	[nakəli]	Statement	[bəja:n]	Chaos	[balt[a]]
<mark>*V1</mark> ملنگ Careless	MALANG [mələng]	<mark>*V2</mark> نیمک Salt	NAMAK [namək]	<mark>*V3</mark> جاندان Family	KHAANDAAN [xa:nda:n]
فیصلے	FAISLAY	شوییر	SHOHAR	عینکی	AINAK
Decisions	[fesle]	Husband	[[ohər]	Glasses	[enək]

Urdu Rhyming		Urdu Unrhyming		Urdu Random	
*V3 مشکل Difficult	MUSHKIL [mʊʃkɪl]	<mark>*V1</mark> اینگی Finger	UNGLI [ʊ̯ŋgli]	<mark>*V2</mark> کیچیو Lover	MEHBOOB [ <u>mehbub]</u>
طوائف Prostitute	TAVAAIF [təvaːɪf]	<del>میجینی</del> Company	SOHBAT [sohbət]	سیلاپ Flood	SAILAAB [sela:b]
<mark>*V2</mark> سکون Peace	SUKOON [ <mark>sukun</mark> ]	<mark>*V3</mark> منزل Destination	MANZIL [manzil]	<mark>*V1</mark> شادی Wedding	SHAADI [(a:di]
<mark>*V1</mark> کمال Wonder	kamaal [kəma:1]	<mark>*V2</mark> کیزور Weak	Kamzor [kəmzor]	<mark>*V3</mark> چانور Animal	JAANVAR [d͡ʒaːnvəɾ]
مذاق Joke	MAZAAQ [ <u>məza:k</u> ]	طوطا Parrot	TOTAA [tota:]	قتل Murder	QATAL [kʌtəl]
<mark>*V3</mark> فوراً Soon	FORAN [focen]	<mark>*V1</mark> تعارف Introduction	TAARUF [ta:cof]	<mark>*V2</mark> کلئنات Universe	KAAINAAT [ka:ina:t]
یستر Bed	BISTAR [bistər]	یکچ Favor	KARAM [karæm]	مايوس Disappointed	MAAYOOS [ma:jus]
<mark>*V2</mark> چيٹل Jaw	JAB <u>R</u> AA [d͡ʒəbraː]	<mark>*V3</mark> کهڑی Window	KHI <u>R</u> KI [kʰɪɾki]	<mark>*V1</mark> داڑھی Beard	DAA <u>R</u> HI [da:rʰi]
کل Bite	KAA <u>t</u> ey [ <u>ka:te</u> ]	کریپی Chair	kursi [kursi]	الکی Different	ALLAG [əlʌɡ]