USING MUSIC
TO INCREASE VERBAL IMITATION
IN CHILDREN WITH LANGUAGE DELAYS

by

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Previous studies have shown the efficacy of music in the classroom for teaching and reviewing skills, setting a positive tone for the learning environment and for augmenting language development. Students who receive special education services often struggle with delays in basic language skills including imitation, an important prerequisite for communication and social development. Singing may be used as a tool to increase imitation abilities for students in this population if songs are adapted in ways that allow greater access. Knowledge about how to adapt songs that elicit increased verbal imitation may assist in developing and using songs to augment language curriculum for children with language delays.

To determine if song construction had an effect on the rate of imitative verbal response, this pilot study used a quantitative study of song syllables imitated in an alternating treatment design to assess intervention and control conditions with three primary grade children with language delays in a segregated Special Education class. This limited study demonstrated that song construction had a statistically significant effect on the rate of verbal imitation. Specific elements of syllable construction that may have the highest impact on increasing imitation include rhyming, emotive parts of speech, less complex syllable types and specific positioning within a song.
DEDICATION

…to song!

whether in the act of hearing or singing,

in the heart or mind or mouth

with others, by others or alone,

creating a sense of happiness--

I am grateful to be a part of making singing more accessible to every child.”

…to the memory of my dad

who gave me the joy of melody and a sense of humor

to light my path and strengthen my heart.

…in honor of my mom

who let me fall in love

with the richness of piano strings

and my own voice

with which I can create songs

to sing!
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CHAPTER ONE
INTRODUCTION

The purpose or function of literacy and language acquisition is not just the learning of skills in isolation but for communication, understanding others and the understanding of self by others. Children with language delays learn language skills and social interaction skills at a rate slower than typically developing children. Children with language delays are not characterized as being less intelligent; however, they have difficulty expressing their intelligence to the full extent or as quickly as others and are at a disadvantage in most social settings.

When children are delayed in their ability to communicate, their delayed receptive and expressive skills have an impact on their social connections. Impairment of ability and skill in communication can diminish the quality and quantity of social interactions with adults and peers. Likewise, improvement in language acquisition abilities and skills may have a correlation, or relational effect on social skills and quality of life. Children with language delays often develop into adults with lives that are influenced by their ability to perceive and engage in the world at large. Communication is the link that humans have that enables them to participate and thrive in a community existence.

For children with language delays, the ability to learn through imitation is affected by processing and perceptual difficulties. Difficulties include the ability to ascertain correct aural and visual cues and the use of motor planning skills. Imitation is a key element of language development. Imitation is vital in learning
aspects of social exchange and speech idiosyncrasies. With increasing errors in performance, children with disabilities may stop trying to imitate, losing momentum for learning and practicing skills.

Singing may be a tool to reintroduce imitation to children with language delays. Used as an intervention tool, singing emphasizes the singsong qualities of language and is associated with play. Singing can introduce sound imitation in a gradual succession. It can introduce repetitive patterns in an interactive setting. Singing encourages imitation with teacher and peer models at an individual pace allowing children to watch or participate, as they are able. Singing encourages symbolic social interactions and can tie language learning to a natural social setting—group singing, enlarging two skill sets at once.

Using song as a tool for language intervention is ideal if it works. Like language, singing is delayed, perhaps due to the difficulty of the songs. The hypothesis of this pilot study is that if songs were constructed in such a way as to make them easier to imitate, children with language delays could sing them. Singing easier songs may lead to singing more songs—setting up momentum for language acquisition through increased verbal imitation.

This study adds to the current literature on the efficacy of the use of music in the classroom as an effective language intervention medium. This pilot study also presents a new avenue of research emphasis analyzing music as the tool for taking apart and retooling songs to increase effectiveness of use in the classroom for students with language delays.
CHAPTER TWO
LITERATURE REVIEW

Introduction

The literature review will describe several literacy theories and the pedagogy associated with these approaches as it relates to language intervention. Studies of speech and song will be reviewed. Language and music acquisition in typically developing infants will be described next. Then, recent research in the difficulties associated with language development in children exhibiting language delays will be discussed. Finally, the use of song as a tool in language intervention will be described.

Literacy Theory

The field of literacy theory is broad and comprised of many diverse perspectives including behavioral, neurological, linguistic, psycho linguistic, semiotic, cognitive, socio-cultural, and more (Alexander & Fox, 2004). For purposes of this study, only behavioral and cognitive theories will be reviewed along with Multiliteracies, a more recent conceptual framework (Baker, 2010).

Traditional approaches to language education are rooted in behaviorism such as B.F. Skinner’s theory that states all behavior is controlled by consequences, not intentions (Skinner, 1985; Thomas, 1999). Teaching methods based on this theory use definable and measurable goals for observable student behavior outcomes in
specific academic tasks that can be practiced to automaticity (Carnine, Silbert, Kame’enui & Tarver, 2004). Lessons are modeled after a stimulus response model with the teacher directing instruction with a pre-written script (stimulus) requiring answers (response) that, when correct, are given positive feedback (reinforcement) (Thomas, 1999). Viewing teachers as active disseminators of information who guide learning, practice and review, with students seen as passive receivers, this explicit step-by-step approach is effective in teaching basic facts and skills (National Reading Panel, 2000).

This direct style of teaching, applied to language acquisition instruction, focuses on teaching phonemic awareness skills including the recognition of phonemes or sound segments in speech, such as vowels and consonants (Carnine, et.al., 2004). Before other acquisition skills, oral language development requires the processing of linguistic information such as discriminating the individual sounds of language (Ehri, 1993). This theoretical perspective involves the study of phonetics, the sounds human voices make for speech including articulation (the separation of sounds), pitch, tone, and intonations or longer utterances (Jackson, 2007; McIntosh & Halliday, 1967; Bloch & Trager, 1942). Emphasis is also placed on phonology, the study of how sounds form language phonemes, or contrastive sounds, that when changed alter the meaning (Jackson, 2007; McIntosh & Halliday, 1967; Bloomfield, 1933). This type of behavioral instruction focuses on teaching the parts before the whole, a bottom-up style that concentrates on the teaching of foundational mechanics of language such as phonemic awareness and decoding skills (matching sounds to
visual representations of sound) before engaging the students in the overall meaning of the language (Forman & McPhail, 1993).

Cognitive approaches to literacy emphasize student understanding of the overall meaning of language rather than instruction in the details of language production. This is a whole-language approach that draws on Lem Semenovich Vygotsky’s Theory of Cognitive Development (Vygotsky, Hanfmann & Vakar, 1934/1962/1986; Santrock, 2010). This theory proposes a hierarchy of stages within a social setting that motivate development through trial and error activities and encourages reflection on those activities (Thomas, 1999). Vygotsky’s theory features a zone of proximal development that allows students to stretch learning past the typical developmental milestones as they engage in activities that might otherwise be deemed too difficult alone but that can be accomplished with the assistance of others (Valsiner, 1987; Santrock, 2010). An example of this zone of proximal development is exposing children to literature beyond their reading scope by having an adult read it aloud to them. This top-down approach allows students to see an overall view of how and why language is used through exposure to literature-rich environments and experiences such as picture books, oral readings, guided readings, journal writing and storytelling. This occurs before explicitly teaching the structure and rules of language (Baker, 2010; Forman, 1993; Kalantzis, Cope & Clonan, 2010). This type of learning is effective in stimulating student participation and increasing higher level metacognitive or reflective thinking processes in learners but is not effective in
teaching basic skills, especially for struggling learners (Kameenui & Simmons, 1990; National Reading Panel, 2000).

Whole language also uses Piaget’s theory of cognitive development that focuses on the use of physical experience and social interactions to stimulate mental processing in children in order to move them through a series of stages (Piaget, 1951/1999; Forman & McPhail, 1993; Santrock, 2010). The teachers act as passive observers, not active disseminators, who “foster a deep sense of disequilibrium while at the same time constraining it to manageable levels so that the student does not get overwhelmed” by the learning activities that are made available (Gance, 2002, p. 2).

In typical school environments, literacy skills are taught through visual and oral modalities (Kalantzis, et al., 2010). “The International Reading Association (2009) advocates the expansion of literacy curricula to include multimedia. However, the pressures of high-stakes testing seem to (justify) a behavioral, isolated, verbocentric, alphabetic conception…” (Baker, 2010, p. 12). The Multiliteracies perspective challenges traditional linguistic-only teaching styles by presenting seven representation modes of communication: written, oral, tactile, visual, audio, gestural and spatial modes (Kalantzis, et al., 2010). This includes learning communication skills through art, music, gesture, physical contact and experiencing representations of communication such as architecture and drama (Kalantzis, et al., 2010). While engaged in a learning experience, children often use several modalities or shift between modalities when not involved in a traditional school environment (Ehri, 1993; Jackson, 2007; Kalantzis, et al., 2010). Use of gestures, facial expressions,
music and other modalities in language acquisition is effective in conveying meaning and augmenting memory (Hirata & Kelly, 2010).

Studies in multiple intelligences challenge the behaviorist and cognitive approaches identifying seven intelligences including linguistic, logical, musical, kinesthetic, spatial, interpersonal and intrapersonal (Gardner, 1983). This perspective allows for seven types of teaching approaches utilizing creative methods that are difficult to implement with a rigid curriculum model or a single type of assessment requirement (Smith, 2002, 2008). In application in the classroom, this approach employs the arts to develop children’s language skills and understandings within and across disciplines integrating experience, knowledge, skill acquisition and functional application (Smith, 2002, 2008).

Language Interventions

Before referring students for formal cognitive assessments, interventions are used in the general education classroom as part of a pre-referral process with students who are having difficulty learning (Heward, 2006). When the interventions are not successful, the student may be referred for testing in order to recommend further academic supports such as the services of a Speech Pathologist or Education Specialist teacher (Heward, 2006).

Intervention curriculum based on the behavioral model focuses on teaching methods which make information clearer to the learner by use of step-by-step or explicit instructions which learners follow or imitate (Wehmeyer, 2002; Snell & Brown, 2006). Oral skills are taught using teacher scripts, teacher modeling, physical
movements along with aural production, visual prompts and multiple-choice response test choices (Kameenui & Simmons, 1990; Roth, Troia, Worthington & Handy, 2006). Explicit or direct instruction strategies also include precise use of error correction, tests and review strategies at specific time intervals to heighten retention (Cepeda, Vul, Rohrer, Wixted & Pashler, 2008). Six key principals for language intervention using explicit or direct instruction include: teaching phoneme awareness, presenting letter-phoneme relationships, frequently reviewing regular letter sound relationships, modeling the sounding out of words, and using practice texts with words that contain letter-sound correlations (Grossen, 2006).

Intervention curriculum based on the whole language approach focuses on exposing students to a language-rich environment for vocabulary development and increasing comprehension skills by using a variety of supports. These include using visual aides, experiences in the real world or with artifacts, interactions with peer tutors and using rubrics for reflection and analysis (Kameenui & Simmons, 1990). These experiences give students a frame of reference by associating new information with known information. This stimulates metacognitive thought and reduces cognitive demands in trying to make abstract mental connections without concrete examples (Forman & McPhail, 1993). This approach uses manipulatives such as letter blocks or rhythm instruments to give opportunities for exploring language representation and promote participation and student ownership (McDonald & Fisher, 2006; Forman & McPhail, 1993). Reading aloud from interesting texts
facilitates recall, comprehension and connections to life experiences (Grossen, 2006).

Multi-modal and multi-intelligence approaches use cross-disciplinary instruction of general education themes, such as the study of animals or weather, to reinforce and review language skills. These themes are woven into varied experiences such as art, dance and music giving students several ways to attach meaning to language (McDonald & Fisher, 2006). This approach allows for learning best suited to the individual needs of students through the use of a variety of knowledge forms and learning styles that increase both active participation and positive attitude (Kameenui & Simmons, 1990; National Reading Panel, 2000).

Speech and Song

Singing and speech have been viewed as similar and universal communication avenues overlapping one another in the evolution of human intelligence (Gardner, 1983; Koopman, 1999; Wallin, Merker & Brown, 2000; Mithen, 2006; Jordania, 2006). Singing, instead of an articulated speech form, is thought to be the original type of language (Mithen, 2006; Jordania, 2006; Koopman, 1999; Oubre, 1997; Lieberman, 1984). Due to the lyrical continuation of sounds and the lack of defined pronunciations, early singing may have required a less sophisticated use of the larynx, tongue and lips than articulated speech since the larynx, among other physical characteristics of earliest ancestors, had not evolved lower into the throat cavity to make speaking an option (Fitch, 2005; Lieberman, 2007). This proto-language, without articulated words, may have also included
physical movement and gestures to convey meaning (Howell & Vetter, 1985; Shehan, 1990; Fitch, 2005). Earliest songs may have communicated questions and answers through intonation and may have been employed in social settings (Jordania, 2006; Mithen, 2006; Lieberman, 2007).

Speaking and singing are dependent on complex neurological input from both sides of the brain (Denckla, 1990; Belin, Zatorre & Ahad, 2002; Schon, Gordon & Besson, 2005; Dick, et al., 2007; Simpson, et al., 2009). The prosody or inflection of speech, similar to the tune of a song, activates the affective regions or right hemisphere of the brain; the pragmatic aspect of speech and symbolic response to music activate the analytic area of the left hemisphere (Denckla, 1990). Singing combines linguistic information (e.g. phonological and metrical structures) and musical elements (e.g. duration, accentuation, and pitch) that influence one another if either is altered (Schon, et al., 2005). Language and singing are both composed of sounds in a specific order arranged in time (Hulse, 1990). Singing, facilitating a higher level of neurological activity than spoken words, is “from a perceptual and emotional point of view, a sort of super voice” (Schon, et al., 2005).

Language And Music Acquisition in infants

Newborns differentiate nearly all sounds in human languages, favoring speech over other sounds and native tongue over rhythmically different languages (Berk, 2012). After 4 months of age, infants begin to acquire a sense of musical phrasing preferring predictable pauses between phrases (Nazzi, Kemler, Jusczyk & Jusczyk, 2000). A few months later, they begin to distinguish musical tunes on the
basis of variations in rhythmic patterns (Hannon & Johnson, 2004). In language, infants decipher syllable stress patterns and the sounds that are peculiar to speech followed by word units such as syllables (Berk, 2012). Aural discrimination is impacted by aural stimulus and by visual information relayed through gestures, lip and mouth movements (Hirata & Kelley, 2010).

Until their larynx lowers and their slightly slanted vocal tract changes to a right-angle curve, infants are unable to speak (Otto, 2010). Non-reflexive or purposeful vocalizations begin as melodic cooing, isolated elongations of vowels, followed by vocal play (nasal experimentation and some consonant sounds) and then as babbling, repeated consonant-vowel sounds with changes of intonation (Otto, 2010). During the first year of development, infants produce consonant-like sounds that first emerge from the back and then the front of the mouth and vowel-like sounds from the front and later from the back of the mouth to eventually form contrastive sounds that combine the farthest back vowel, /a/ with the farthest front vowel, /p/ as their first word attempts (Lapp & Flood, 1978).

During this maturation process, growing infants are exposed to a special child-directed speech called motherese that uses exaggerated intonations and articulations (Mithen, 2006; Otto, 2010). This melodic language strengthens an interpersonal bond and serves as a precursor to linguistic literacy (Otto, 2010). Child-directed speech is identified with utterances that are short, repetitive, slow in tempo, contain few complex sentences, relate to the immediate context and encourage participation (Otto, 2010). This language expands into lullabies that are
universal forms of communication from parent to child that convey a sense of security and safety through intonation, rhythm and lyrics (Garfias, 1990). Emotional messages are conveyed through both lullabies and early child play songs (Bjorkvold, 1990; Garfias, 1990). The act of listening to music, such as a person singing, stimulates the automatic nervous systems to release chemicals into the blood stream that arouse feelings of euphoria (Salimpoor, Benovoy, Larcher, Dagher & Zatorre, 2011).

As children increase in physical coordination, they increase the rhythmic and intonation complexities in their vocalizations (Neugebauer, 2004). Next, the child repeats sounds as they relate to social interactions and become aware of their ability to create and initiate vocalizations (Neugebauer, 2004). In communication pragmatics in both music and speech, auditory and visual attention behavior in infants is followed by imitation and turn taking (Reiniger & Schroth, 2007). With standing and walking, children begin to use language to communicate by combining melody, phrase and rhythmic vocal structures (Neugebauer, 2004). For typically developing children, the easiest vowel sound to pronounce is “uh” and the most difficult consonant sound is “r” (Abercrombie, 1965). The consonant sounds that typically developing children can correctly pronounce by the age of 3 include m, n, p, b, t, d, k, g, f in several positions of a word (Dawson & Tattersall, 2001).

Language-based disabilities

To identify a student with a learning disability, school districts in the United States require three criteria: 1) there must be a severe discrepancy between
intellectual ability and academic achievement, 2) the disability must not be the result of another known condition, and 3) the student requires special education services (Heward, 2006). Once identified, the student is eligible for special education services as part of an Individual Education Program (IEP) with a case carrier (Heward, 2006).

Language-based learning problems are one of the most prevalent developmental disabilities (Tallal & Gaab, 2006).

A Specific Learning Disability (SLD) is a legal construct originating in 1963 to describe children of normal intelligence with typical functioning capabilities who have a neurologically based learning deficit (Waber, 2010). The term was central to The Children with Specific Learning Disabilities Act of 1969 that provided federal funding for education and research. It was not until 1975 when Congress passed the Public Law 94-142, The Education for All Handicapped Children Act, and later renamed The Individuals with Disabilities Education Act (IDEA) that a Specific Learning Disability was recognized as a disability category (Waber, 2010). It is defined as “a disorder in one or more basic psychological processes involved in understanding or using language, spoken or written, which may manifest itself in an imperfect ability to listen, think, speak, read, write, spell, or to do mathematical calculation” (IDEA, 2004). It was later defined to refer to a heterogeneous group of disorders as typified by significant difficulties in language acquisition (American Speech-Language-Hearing Association, 1991).

Learning disabilities are described as a learning difference or neurological network inefficiency (Waber, 2010). Since the use of brain imaging, neurological
assessments have documented involvement of both hemispheres for language acquisition in students with reading disabilities underscoring the all-pervasive character of the disorder (Waber, 2010). Language acquisition can be traced to several different parts of the brain and seen in neural pathways interworking simultaneously and if need be, alternating and adapting albeit more slowly for deficits (Abrams, 2008; Desroches, 2008).

Once thought to be strictly a visual difficulty, dyslexia and other language disorders are shown to involve auditory processing difficulties with problems perceiving, ordering and recalling of sounds in which the student mixes up the ordinal placements of sounds such as in a consonant, vowel, consonant (CVC) word like “c-a-t” which may be perceived as “t-c-a” or “t-a-c” (Goldsworthy, 1996; Breir, 2003; Tallal & Gaab, 2006). Rapid temporal processing proposes that difficulties may arise for children through delayed auditory feedback in the perception of rapidly presented sounds (Overy, 2003; Tallal & Gaab, 2006; Takaso, Eiser, Wise & Scott, 2010). Short-term memory deficits may also be a byproduct of perceptual processing disorders (Brady, Shankweiler, Mann, 1983; Goldsworthy, 1996).

Language disorders such as dyslexia may also be attributed to an impairment of the procedural neural system, one of three neural systems that provide information processing in the brain (Nicolson, Fawcett, Brookes & Needle, 2010). Semantic impairment, the neural response to contextual incongruence, is often delayed in children with dyslexia (Jednorog, Marchewka, Tacikowski, Grabowska 2010). Associated difficulties also include fine and gross motor skills (Nicolson & Fawcett,
1994; Overy, 2003) as well as a rhythmic timing (Goswami, et al., 2002; Overy, 2003). A timekeeper model of movement suggests that perception and production of rhythm in music and speech require recognition of aural cues that provide a series of temporal reference points that allow coordination of actions involving motor subsystems (i.e. vocal cords, tongue) that can overlap in time providing endpoints for the timing of the next ongoing movement (Desain & Windsor, 2000). Ability to verbally imitate may be compromised due to perceptual production difficulties as well as by a cognitive signal overload akin to a bottleneck where one task must wait while another task is underway (Ruthruff & Pashler, 2010). Children with learning disabilities in language acquisition often have shorter attention spans, short term memory and imitation disparities, work at slower rate with smaller quantities of information, need more frequent and exact repetition of skills and have smaller vocabularies (Clark, 1990; Helenius, Parvianinen, Paetau & Salmelin, 2009; Rasar, 2011).

Use of Song in Education

Speech and singing are linked in many ways due to the fact that they both represent “the most cognitively complex use of acoustic information by humans and both take advantage of dynamic modulation of acoustic parameters. Utilizing one to improve the other seems to be an auspicious and promising approach…” (Tallal & Gaab, 2006, p. 389). Use of music activities in the classroom contributes to emerging language skills in primary age children (Bouldoc, 2008; Butzlaff, 2000; Smith, 2000; Wiggins, 2007). Singing and chanting (rhythmic speaking) has been
used as a tool of education in the primary grade classroom for teaching the rhythm, rhyme and pace of language and developing vocabulary (Anvari, 2002; Lamb & Gregory, 1993; McDonald & Fisher, 2006; Colwell & Murlless, 2002; Wiggins, 2007). When students learn folk songs as a tool to learn music skills, students also show reading improvement (Hurwitz, 1975; Lamb & Gregory, 1993). Music that teaches aural discrimination skills can contribute to students’ recall as well (Gromko, 2009). Music instruction may increase the development of phonemic awareness skills such as phonemic segmentation fluency (Gromko, 2005; Standley & Hughes, 1997). Music interwoven into curriculum can increase skills such as decoding (Steele, 2006; Standley & Hughes, 1997).

Music is used as a therapeutic tool to motivate, reinforce listening, stimulate motor response, promote relaxation, nurture creativity, and offer multi-modal experiences in a group or individual setting (Blacking, 1990; Barton, 2008). Music, particularly singing, is used to assist overall academic success by helping students focus and engage, navigate activity transitions, maintain a positive attitude and regulate or motivate social behaviors (Standley, 1996; Standley & Hughes, 1997; Humpal & Wolf, 2003; Wiggins, 2007; Hallam, 2010). When skills are learned in the music domain, children naturally apply the skills to other domains and similar tasks including language development (Gromko, 2009; Hansen, 2002). Music interventions that strengthen auditory perception skills assist in the formation of new neurological pathways that improve language acquisition skills (Gaab, 2007; Gaab, Gabrieli, Deutsch, Tallal, & Temple 2007; Forgeard, Gottfried, Norton, Rosam, &
Iyengar, 2008). As rhythmic auditory stimulus, singing is used to help the brain gain control of and organize rhythmic movement and speech patterns (Thaut, 2005; Barton, 2010). Teachers augmenting song interventions with multimodal activities including the incorporation of physical movements, visual picture cards and the playing of various musical instruments, review skills as well as stimulate metacognitive processing in students (Shehan, 1990; Kaplan 1976, Heward, 2006; McDonald & Fisher, 2006). Specialists such as speech pathologists, occupational and physical therapists, reading or educational specialists involved with school intervention programs may use music as a tool in their therapy sessions with individual students or small groups of students to facilitate communication skills and social interaction (Standley, 1991; Neugebauer, 2004; Barton, 2008).

Conclusion

Literacy theories describe language acquisition in terms of specific skill training, exploring and reflecting on meaning and communicating in varied modalities. Language intervention involves both a step-by-step instruction based on imitation strategies and an exposure to a language rich environment involving several modalities including music. Not characterized as cognitively delayed, children with language disabilities have difficulty processing, perceiving, ordering and recalling language sounds and symbols. This type of learning difficulty also includes problems with coordination of motor systems and misunderstanding semantics involved in language. Neurological evidence has shown that both hemispheres of the brain are involved in language acquisition and that pedagogy
needs to involve direct instruction and modeling as well as exposure to a multi-modal language rich environment.

Language acquisition begins with oral language development. Learning the sounds of language, phonemic awareness acquisition, overlaps with music development skills including auditory processing, oral perception, the ordering and recalling of sounds. Even though literacy theory integrates a variety of perspectives on language acquisition, imitation remains a pivotal component of early language and music development. Singing is an ancient bridge between the natural voice and articulated speech with singing requiring less complex use of the larynx. Singing, a powerful neurological stimulator, is used by adults to model inflection, rhythm and meaning of speech to infants. Previous studies have shown the efficacy of music in the classroom for teaching and reviewing skills, setting a positive tone for the learning environment and for augmenting language development. Singing, in combination with other scaffolding, is an effective tool in teaching phonemic awareness skills including initial sounds, blending, rhythm and rhyme of speech and meaning of language within the confines of a predictable, paced song. The motivation and good feeling music brings to academic tasks such as skill repetition and review is coupled with the ease of inserting it into daily activities in the classroom.

Singing may be used as a tool to increase verbal imitation for children with language delays if the songs themselves were adapted to allow for perceptual, processing and motor delays? Use of singing as part of a language intervention
program may be successful only if children can verbally imitate the syllables of the songs used. If singing increased verbal imitation in students with language delays and if those skills were transferable to speaking, then singing would improve language literacy. Because language acquisition skills are problematic for students with language delays, singing may be problematic as well since, like speaking, singing requires verbal imitation and aural perception skills. Students with disabilities require more processing time, more repetition of material and pre-teaching of vocabulary and comprehension experiences, visual scaffolding, motor skill planning and explicit skill instruction to acquire language.

Question

How can songs be altered to accommodate students with language delays in order to be used as an effective intervention tool to increase verbal imitation? The central focus of this research study is to examine the components of syllables used in songs sung in the classroom that may increase verbal imitation in children with language delays.
CHAPTER THREE

METHODOLOGY

Participants

Participants were students in a public elementary school of approximately 450 students in a unified school district in a small rural town in Northern California. The district consists of two elementary schools and one junior high school. A convenience sampling of students was selected from a segregated primary grade (K-3) Special Day Class (SDC) of twelve students. The participants include three males between the ages of six and nine years old. Each participant was included in the SDC for a minimum of 51% of the school day. The two younger participants received one-on-one aide support in the classroom but, during the research treatment, the aides were withdrawn. All twelve students in the classroom submitted written approval from their parents/guardians to be part of the study. All participants were involved in the class-wide treatment with the other students in the SDC throughout all phases of the research.

The participants were involved in speech and language intervention by varying degrees. There were no other special factors involved such as need for assistive technology or low incidence services for visual or hearing impairment such as the use of hearing aids or glasses. Hearing and vision tested within normal range
except for participant 2 who may be farsighted. Participant 3 had a history of hearing deficits due to excessive water in his ears but tested within normal range. Each of the three participants had current Individual Education Program plans in place. Each participant received 20 minutes of Speech/Language services on a weekly basis in a group/individual therapy setting. All participants were able to talk with peers and adults to convey their needs, pronounce basic consonant and vowel sounds and repeat a 3-word phrase from a model. All three participants were able to listen to and comply with one and two-step directions.

During prior observations by the researcher, these students were seen within the SDC and general education environments during singing activities. With or without visual cues, it was noted that none of the students were able to verbally imitate an adult or a peer model most of the time. In private interviews, each of the two younger participants (2 & 3) reported that they sang by themselves at home, to the radio and in their general education classes and that singing made them feel happy. The older participant (1) reported not singing alone at home or in the general education class but singing along with the radio or a CD and did know how singing made him feel. When asked to recall or sing a song for the researcher, the participants were unable to, except for participant 3 who sang the ABC song to the tune of “Mary Had A Little Lamb.” (It was noted in previous observations that he often used the ABC song to recall the sequential location of a letter on an alphabet chart when he was unable to identify the name of a letter from memory.)
Participant 1

This participant is a nine-year-old male in the third grade. He qualified for Special Education primarily due to a Specific Learning Disability and secondarily due to a Speech or Language Impairment. He did not qualify based on any known cognitive delays. In his confidential multi-disciplinary triennial evaluation report, he showed the need for cognitive scaffolding supports such as the use of visual supports and the previewing of information to access the general education curriculum. His records revealed a history of significant hearing loss over a five-year period impairing his ability to attend to aural cues at home and at school. He currently had one tube in his hear and was tested to have normal hearing abilities.

During prior observations, this student sang along to or verbally imitated only the ending phrases of “Old MacDonald” when given an adult model, peer models, visual and aural prompts. During a call and response teaching method to review the words of the song, he imitated all words of the first phrase of “Old MacDonald” but in the second and following chaining (e.g. sing the first line only followed by then repeating the first line and adding on the second line, etc.) he did not imitate any words but remained silent.

Participant 2

This participant is a six-year-old male in the first grade. He qualified for Special Education due to a Speech or Language Impairment. He did not qualify based on any known cognitive delays. In his confidential multi-disciplinary triennial evaluation report in pre-school, he showed a history of some challenges in non-
language cognitive activities and a diagnosis of a disorder of Learning Not Otherwise Specified. He was shown to need visual modeling support and opportunities to express in non-verbal modes to demonstrate understanding. He was recently referred for vision testing by the school nurse due to possible far sightedness. A recent speech pathologist evaluation reported that the student was capable of producing all speech sounds but was not in the habit of producing them correctly.

In prior observations, he often moved his feet accurately to the beat of music played or sung by others. In a singing activity with “Old MacDonald” he looked at the adult model and peers but verbally imitated only a few of the syllables when given the adult model, peer models, visual and aural prompts.

*Participant 3*

This participant is a 7-year-old male in the first grade. He was chosen for this research study because he qualified for Special Education primarily due to a Specific Learning Disability and secondarily due to a Speech or Language Impairment. He did not qualify based on any known cognitive delays. In his confidential multi-disciplinary triennial evaluation report, records show a history of poor school attendance, behavioral problems and difficulty in academic focus. Tests showed that he has difficulty with association tasks such as remembering the sounds for letters. Recommended supports included multi-modal learning opportunities with frequent repetition and visual supports.
During prior observations, the student sang along with many but not all of the syllables of “Old MacDonald” when given the adult model and peer models, visual and aural prompts.

**Setting**

The treatment occurred as part of the daily morning routine within the SDC. Treatment sessions lasted for approximately 10 minutes during the initial hour of the class day and occurred once a day. Treatments were conducted over a three-week period. The study was conducted in the last month of the second trimester of the 2010/2011 school years. The researcher, who was also the SDC teacher, conducted the research.

To conduct the treatments, the researcher sat at the front of the SDC room facing the entire class. All students in the class sat behind their separate desks facing the researcher in a semi-circle. All students remained in the desks facing the researcher during each treatment session. The participants were able to view all the other students in the semi-circle. The three participants’ desks were situated next to each other to accommodate simultaneous viewing by a video camera. The video camera, facing the participants, was located behind and to the side of the researcher conducting the treatments. A two-foot high rolling cabinet that held a CD player and the 8 X 10 instruction posters blocked the view of the lower portion of the body of the researcher conducting the treatment activity. The instruction posters were also used to block the researcher’s face during the data collection phase.
Materials

A video camera on a stand was used for data collection and a CD player was used to deliver the treatment songs. Eleven songs were recorded onto a single CD by the researcher, a female soprano (Appendix X). Sheet music of the songs (Appendix A) and a protocol sheet (Appendix B) were available for the researcher to access during treatment. A sign was placed on the outside of the classroom door indicating “testing in process” for the duration of the daily treatment session. Eleven various 8x10 computer generated color pictures (Appendix C) depicting the meaning of the lyrics of the treatment songs were shown to the students before each treatment and during the introduction phase of the treatment. Three 8x10 posters on black background were used during each phase to prompt LISTEN, LOOK, SING verbal instructions (Appendix D).

Dependent Variable

The effect of treatment conditions was assessed by the ability of each participant to imitate syllables of a song by singing along with peers and a CD prerecording of the song. During the data collection phase, participants had no direct view of the researcher’s face and were given no visual or gestural cues of musical pitches, rhythm or lyrics by the researcher. The ability of participants to imitate syllables was based on hearing the CD song recorded stimulus and possible peer prompts. The participants may have recalled previous information from other phases of the protocol including visual and aural descriptions of the lyric meaning, adult
modeling and peer modeling. Participant improvement was based on the number and percentages of syllables imitated.

Independent Variables and Treatment Conditions

Two interventions were implemented in this study to determine which of the two had more significant impact on the percentage of correctly imitated syllables. The first intervention was vocal recordings by the researcher of children’s folk songs that were unfamiliar to the participants. The second intervention was vocal recordings by the researcher of songs composed specifically for this study by the researcher that were unfamiliar to the participants. Using a metronome, all songs were sung and recorded at a constant tempo of 92 beats per minutes, the average heart rate of a child between 6 and 9 years old (Agrawal, 2008; Kaelin, 2011). At the beginning of every song, a steady four beat spoken cue of “ready (rest), begin (rest)” was recorded to cue student response (Carnine, Silbert, Kame’enui & Tarver, 2004). The same CD recording was replayed for each phase of the treatment. There were eleven songs for eleven treatments that equaled 363 syllables presented with approximately the same number of syllables in each of the two treatment conditions. The participants remained seated in desks facing the teacher and the CD player to allow participants to watch modeling prompts and hear aural cues and to allow for data collection from the video camera—frontal view of participants’ mouth and jaw as well as entire body.
Control Treatment

Music selected for the control treatment consisted of traditional folk melodies, an American Folk song, a traditional English rhyme, and a French Folk tune. The songs were chosen from various primary grade level music texts. The songs were not songs included in the current known curriculum at the school the participants were attending. The songs were thought to be unfamiliar to each participant involved. The songs varied in topics including: sleeping, a crazy doctor, raining, a dog, picking cotton, and cabbage. The range of pitch was from 3 to 9 note intervals averaging more than 6 notes starting at middle C, D or F. The meters included 2/4, 2/2 and 4/4. The shortest note duration was a sixteenth note and the longest duration was a half note. The number of syllables involved in each song was 32, 61, 29, 21, 18 and 17 (178 total). The number of measures in each song was 8, 14, 8, 4, 8 and 4. Few rests were included within the songs.

Intervention Treatment

Since the songs were original compositions by the researcher, the intervention songs were unfamiliar to all participants. Based on criteria from experience and the literature review, the intervention treatment songs included rhythms that were closely aligned with the natural rhythm of the lyrics (Bluestine, 2000; Gordon, 2003; Barton, 2008). Lyrics were chosen based on the ease of articulation without use of more difficult or complex speech sounds (Abercrombie, 1965; Dawson & Tattersall, 2001). Lyrics were created with the use of initial and
final consonants to assist auditory differentiation of words (Fennell, 2007; Gradin, 2011).

The songs included initial measures of rhythm sounds in order to begin a shift of attention onto the singing task and to stimulate oral motor planning (Lieberman, 1984; Raffman, 1993; Thaut, 2005; Steele, 2006; Gradin, 2011). Each song was written in the key of D major within the normal speaking range of a child, a note range of 4 or 5 notes from D above middle C to A (Gordon, 2003). Each song contained only two pitches—either D and G or D and A (the interval of a 4th or a 5th)—a distance to exaggerate the tonal difference for easier aural discrimination (Bluestine, 2000; Gordon, 2003). The shortest rhythm was an eighth note and did not typically occur within the first measure. The longest duration was a half note that occurred only in the final measure. Rests and claps were included within each song at the beginning of the song or at points of rhythm changes and between repeating phrases to help cue pattern changes (Raffman, 1993; Steele, 2006). A simple meter of 4/4 was used in all the intervention songs. Even though different for each song, the quantity of syllables and the number of measures were generally similar across intervention and control treatments. The intervention syllables were 15 in the first song, 49 in the second, 49 in the next, 40, and 32 in the last—185 combined total syllables. Measures contained in each song were 8, 24, 20, 16 and 14 respectively.

Experimental Design & Procedures

A single subject design was used due to the small sampling size and inability to generalize findings to the population at large. A multiple baseline design was not
chosen because all the participants were included in each treatment and no one participant was excluded to hold at a baseline. Once taught, the treatment could not be untaught and therefore a reversal design was not applicable. An alternating treatment design was chosen for this research study. The treatment was an AAABAABBBAB format conducted once daily over a three-week period. The design allowed for comparison between treatments and to note whether imitation was contingent on treatment type.

**Before Baseline**

An informal observation period of four days was implemented to introduce the novelty of a video camera to the students in classroom environment so that it would not distract from the treatment session protocols. Once in place, the camera remained in a static location throughout the research study. The CD player was moved from a location behind the teacher chair to a position visibly in front and in view of all students seated in their desks during singing activities before the study so that students were familiar with the movement. Video data was collected during this pre-baseline period when a CD recording of the researcher’s voice singing “Old Mac Donald” was introduced and played so that students were familiarized with hearing the novelty of the researcher’s voice on CD. During this time, a procedure of asking the students to sing and listen to singing was informally introduced.

**Baseline**

Three days of baseline were conducted to ensure successful protocol procedures. During the second day of baseline, visual poster prompts were
introduced to support aural instructions to “Look”, “Listen”, and “Sing”. The aural protocol was then changed to reflect the additional cues. Also, signs were made for the doors regarding “Testing in Progress” and the phone monitored by an adult to minimize environmental interference. All adults and students in the room were familiarized with the protocol during this time.

_Treatment Protocol_

There were five phases of the treatment. Instead of stopping to turn on the camera during the collection phase, the camera was left on throughout the entire treatment in order to be less disruptive. During Phase 1, a color poster depicting the song meaning was put on display. Before and during the playing of each song recording, an 8 X 10 inch instructional poster was either held up or put in a visible location to remind students what they were instructed to do.

Phase 1 included the introduction of the meaning of the song to be learned. During this phase of treatment a picture was shown to the class that had visual components portraying the meaning of the song lyrics. The researcher directed interactive discussion that reviewed the meaning of words in the song and the general idea of the song based on student response. There was no script for this portion of the protocol. The researcher made eye contact during this phase.

Phase 2 began the scripted portion of the protocol. The researcher showed the instruction posters and followed the script to instruct participants to listen to the CD. Students listened to the CD recording with the researcher. After the researcher turned on the CD player, the researcher watched the CD player with a hand cupped over the
ear imitating the instructional poster. At the end of the recording, the researcher turned off the CD player. Then the researcher followed the script to verbally praise participants’ on listening and also looked at each participant and made brief eye contact.

In Phase 3, the researcher showed the instruction posters and followed the script to instruct participants to watch the researcher model singing with the CD. The researcher faced the students and made eye contact with each participant while singing along with the CD recording. The researcher was rhythmically animated and carefully articulated each syllable. Afterwards, the researcher followed the script to verbally praise participants’ for watching.

During Phase 4, the researcher showed instruction posters and followed the script to instruct participants to sing along with the researcher and the CD. During the singing, the researcher articulated the syllables of the lyrics and used rhythmic body movements such as swaying or clapping as appropriate. During the singing, the researcher made eye contact with the participants. After the singing, the researcher followed the script to verbally praise participants’ for their effort.

Phase 5 was the data collection phase. During this phase the researcher showed instruction posters and followed the script to instruct participants to sing along with the CD without the researcher. The researcher’s face was covered with the instruction poster and the researcher’s body was held still during this phase so that no eye contact was made with the participants and no physical gesture seen by the participants. After the singing, the researcher set aside the instruction poster,
stood up and walked up to each participant to state the scripted praise and to give a “high five” clap and make eye contact.

Measurement Summary

The data collection phase was the final phase of the daily treatment. This research study used a quantitative study of syllables to determine which treatment elicited increased verbal imitation. A visible method for measuring imitation consisted of analysis of video recordings of mouth movement and sounds by participants. From video recordings, data was recorded as to how many syllables were imitated orally by the participants. Each syllable, 363 in total, was listed in a data field along with ten syllable coding categories (Appendix F). Coding categories included linguistic and music characteristics. Linguistic characteristics included:

- Parts of Speech (i.e. verb, noun, etc.);
- Word Position (e.g. syllable was the first part of the word);
- Sentence Position (e.g. syllable occurred in a word which is the first word in the sentence);
- Syllable Type (i.e. vowel/consonant; or consonant/vowel/consonant, etc.);
- Repetition (the syllable was the portion of the word that repeats in the song); and
- Rhyming (the syllable is the portion of the word that rhymes).
Musical characteristics coded included:

- Measure Position (syllable occurred on the first, second, third or fourth beat of a measure);
- Song Position (syllable occurred within the first, middle or last measure of a song);
- Rest Location (syllable occurred after a rest or not);
- Clap Location (syllable occurs after a clap or not).

After the video analysis comparing sung and unsung song syllables in both control and intervention treatment conditions, syllables were identified that had the highest frequency of performance, the characteristics of those syllables in terms of linguistic and musical elements and whether or not song construction had a significant affect on verbal imitation.

Reliability

All data was collected on video tape recordings for accuracy. Tests of visual and auditory clarity of the videotape were conducted prior to the first treatment session to assure equipment adequacy. The camera was adjusted daily to ensure full view of the participants and make sure the lens cap was removed before recording. Each entire session was recorded but data was only assessed from the data collection phase.

An observer was trained in the methods of implementing the intervention and control treatment protocols. The observer used the original video taped recording for
assessment. An inter-observer agreement guideline (Appendix G) was followed. The observer, who was the speech pathologist for the participants involved in the study, was familiar with the speech formations of each participant. In both treatment conditions the observer determined the total amount of syllables imitated and not imitated during the data collection phase of the treatments. The observer assessed four songs (two control songs and two intervention songs) totaling 125 syllables (34% of the 363 total syllables in the study). The mean inter-observer agreement was 99% (range 228-229).

To determine whether treatment fidelity was occurring during the research study, a second observer assessed the application of the procedures using the treatment protocol for each treatment and checking a “Yes” or a “No” by each of the specific steps in the procedure (Appendix E). This observer watched the video recording of the application 36% of the time. Inter-observer agreement was obtained by obtaining a frequency ratio (i.e. the number of correct steps divided by the number of total steps times 100). The mean inter-observer agreement was 99% (range 12-13).

Social Validity

During prior observation, general education primary grade teachers cited certain characteristics of songs that they choose or did not choose to use in their class curriculum based on ease of presentation and student preferences. These criteria were used to inform the selection of songs for both treatments in this research along with criteria from generally accepted practices in the literature reviewed. These same
teachers noted the use of and importance of singing in the classroom for academic and social success of their students. Informal interviews of primary grade general education students and students in the SDC class reported that singing made them feel happy or relaxed.

Assumptions

It is assumed that the participants in this study had the ability to respond to the treatment stimuli. This assumption includes the ability to hear syllables sung, see the modeling by the researcher and peers, as well as imitate and pronounce the syllables of the lyrics presented in both the control and intervention songs. It is assumed that the CD recordings were presented at an audible level for participants and that instructional posters were visible to participants.
CHAPTER 4

RESULTS

*Syllable Imitation Analysis Tests*

To determine whether or not the intervention increased the overall rate of syllable imitation response, a two-sample t-test was conducted. Second, to determine whether the intervention songs and control songs differed in the proportional frequency of the use of specific language and music elements, Pearson chi-square tests were conducted. Language elements examined included parts of speech (POS), syllable position in a word (WP) or location in a sentence or phrase (SP), syllable type in terms of consonant and vowel combinations (ST), whether the syllables were rhyming (RY) or repeating (R). Musical elements examined included location of rests (RL) and claps (CL) in relation to syllables as well as the position of the syllable within the measure (MP) and within the song (SOP).

Third, to determine which major variables were performed more frequently than others in terms of overall imitation performance totals (PT), one-way ANOVA tests were conducted to compare the effect of song elements on the performance total of each syllable. Of those that differed, post hoc comparisons using TUKEY HSD tests were conducted on the mean scores of the sub variables to identify the most significant. Last, for both the intervention and control songs, bar graphs were generated to compare the quantity of significant sub variables associated with high performance.
**Intervention and Control Songs**

There was a significant difference in the imitative response performance scores of the intervention and control syllables, $t(102) = 6.65, p < .001$. Results showed that the intervention group of syllables had statistically significantly higher scores ($M = 2.0, SD = 0.63$) than the control group of syllables ($M = 1.2, SD = 0.86$) with a probability value of $< 0.001$. The statistics indicated that syllables in intervention songs were imitated more often than syllables in control songs. T-test, Pearson chi-square, one-way between subject ANOVA and Post hoc results indicated that language and music construction elements significantly differed between the intervention and control songs with sub categories of significance. The specific scores are listed below by conditions.

The bar graph (Figure 4.1) illustrates the percent of imitation across all subjects in the intervention and control songs. A higher level of participation occurred during the five intervention conditions than the six control conditions.

![Percent of imitation in Intervention and Control songs](image)

*Figure 4.1* An overall comparison of imitation across eleven treatments of all three participants. NOTE: C=control song; I=intervention song.
The bar graph (Figure 4.2) illustrates the imitation response count totals in the intervention and control songs. Overall, the intervention songs had more imitation responses of two out of three of the participants than the control songs. Intervention songs also had more imitation by all three participants.

![Imitation Response Totals](image)

*Figure 4.2* An overall comparison of imitation by participants across intervention and control treatments. Syllables with no response imitation by any participant were labeled as No response. Syllables imitated by at least one participant were listed as One. Syllables imitated by any two participants simultaneously were listed as Two. Imitation responses by all three participants were listed as All.
**Parts of speech**

A chi-square test was used to determine if the intervention and control songs differed in the frequency of the use of various parts of speech. The results $X^2 (3, N = 363) = 26.219, p < 0.001$ indicated that the intervention songs are significantly different than the control songs in the proportional frequency of use of specifics parts of speech.

A one-way between subjects ANOVA was conducted to compare the effect of syllable construction on syllable imitation performance in verb, adjective, noun/pronoun and other parts of speech conditions. There was significant difference between syllable type and syllable imitation performance at the $p < .05$ level for the four conditions, $F (6.46, 354) = 6.46, p = 0.001$. Post hoc comparisons using the Tukey HSD test (see Table 4.1) indicated that the mean score for an Other syllable condition ($M = 1.81, SD = 0.88$) was significantly different than the Noun/pronoun syllable condition ($M = 1.50, SD = 0.85$). However, the Verb ($M = 1.52, SD = 0.78$) and Adjective ($SD = 1.72, SD = 0.83$) syllable conditions did not differ from the Noun/Pronoun or Other conditions.

Table 4.1 lists the parts of speech by significance. In the ANOVA/PT column, conditions scores are listed alongside an alphabetical letter. The letter A represents the highest score; the letter B represents lower scores; and, the letter C represents the lowest score. The conditions that share the same letters such as A or B or both do not statistically differ from one another. The scores overlap without a wide gap between them. Conditions not sharing letters do not overlap and are
statistically different. In Table 4.1, Nouns and pronouns (B) differ from Other (A) while all the other conditions overlap scores. This difference refers to the Other (A) condition having a higher performance score because it was imitated more often than the Noun (B) condition. The third and fourth columns labeled Intervention and Control summarize which conditions were used more or less in the respective treatments. In Table 4.1, the intervention songs used more Other conditions than the control songs and the Control song used less. The control songs used more Nouns and the intervention songs used less Noun conditions. The higher performing syllables occurred more often in the intervention treatments.

Table 4.1

*Post Hoc comparisons: Parts of Speech*

<table>
<thead>
<tr>
<th>Parts of Speech (POS)</th>
<th>ANOVA/ PT Tukey HSD</th>
<th>Intervention</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>Verb</td>
<td>1  75  1.5200  A  B</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Noun &amp; Pronoun</td>
<td>2 115  1.4957  B</td>
<td>Less</td>
<td>More</td>
</tr>
<tr>
<td>Adjective</td>
<td>3  92  1.7174  A  B</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other -Preposition, Conjunction, Adverb, Interjection &amp; Misc.</td>
<td>4  81  1.8148  A</td>
<td>More</td>
<td>Less</td>
</tr>
</tbody>
</table>

The bar graph (Figure 4.3) shows a comparison between the intervention song syllables and the control song syllables in the frequency parts of speech conditions. The parts of speech conditions were collapsed from eight categories down to four for comparison analysis. The prepositions, conjunctions, adverbs and interjection conditions did not occur often enough for statistical comparison and were included in a combined Other condition (see Table 4.1 listing). Noun/pronouns
occur less often in the intervention songs than the control songs and Other syllable types occur more often in the intervention songs than the control songs.

![Syllable count by parts of speech](image)

**Figure 4.3** A comparison of the use of four different parts of speech in intervention and control song syllable construction.

**Within word position**

A one-way between subject ANOVA was conducted to compare the effect of syllable placement within words, whether the syllable was positioned in the first, middle, final syllable of a word or as a single word, on imitation performance. There was not a significant effect of syllable construction based on within word position on syllable performance totals at the $p < .05$ level for the four conditions.

**Sentence position**

A chi-square test was used to determine if the intervention and control songs differed in the frequency of use of syllables occurring in a particular location in a sentence. The results $\chi^2 (3, N = 363) = 151.101, p < 0.001$ indicated that the
intervention songs are significantly different than the control songs in the proportion of syllables occurring in a certain location within a sentence.

A one-way between subject ANOVA test was conducted to compare the effect on syllable location within a sentence on syllable imitation performance in the first word, middle word, final word or a single word sentence conditions. There was a significant effect of syllable location within a sentence at the $p < .05$ level for the three conditions, $F(3, 359) = 19.43, p < 0.001$. Post hoc comparisons using the Tukey HSD test (see Table 4.2) indicated that the mean score for the Single word sentence syllable condition ($M = 2.05, SD = 0.58$) was significantly different than the Middle word syllables ($M = 1.34, SD = 0.86$) and Initial word syllables ($M = 1.47, SD = 0.87$). However, the Final word condition ($M = 1.87, SD = 0.82$) did not significantly differ from the Single word and Initial word conditions. Table 4.2 illustrates the syllable position imitated most often was Single word (A) and the position less imitated was in the Middle of a word (C). The third and fourth column summarizes the treatment conditions regarding varying syllable placements. The intervention treatment used more single word syllables than the control treatment.

Table 4.2

<table>
<thead>
<tr>
<th>Sentence Position (SP)</th>
<th>ANOVA/PT Tukey HSD</th>
<th>Intervention</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial word</td>
<td>1 49 1.4694</td>
<td>B C</td>
<td></td>
</tr>
<tr>
<td>Middle word</td>
<td>2 163 1.3374</td>
<td>C Less</td>
<td>More</td>
</tr>
<tr>
<td>Final word</td>
<td>3 47 1.8723</td>
<td>A B</td>
<td></td>
</tr>
<tr>
<td>Single word</td>
<td>4 104 2.0481</td>
<td>More</td>
<td>Less</td>
</tr>
</tbody>
</table>
The bar graph (Figure 4.4) illustrates the comparison between intervention songs and control songs in terms of sentence position conditions. Intervention songs have less middle word syllable conditions than the control songs. Intervention songs have more single word syllable conditions than the control songs.

Figure 4.4 Bar graph showing a comparison of the intervention and control song construction based on syllable position within a sentence. The syllable was either an part of a word in the beginning or initial part of a sentence, middle, end or part of a single word sentence.

Syllable types

A chi-square test was used to determine if the intervention and control songs differed in the frequency of the use of various syllable types. Chi-square results $\chi^2 (4, N=363) = 73.80, p < 0.001$ indicate a significant difference between the frequency syllable types being used between the intervention and control songs.
A one-way between subjects ANOVA was conducted to compare the effect of syllable construction on syllables imitated in Other syllable types, Vowel-consonant (VC), Consonant-vowel (CV), Consonant-consonant-vowel (CCV), Consonant-vowel-consonant (CVC), and Consonant-vowel-consonant-consonant (CVCC) conditions. There was a significant effect of the syllable construction on syllable imitation performance at the $p < .05$ level for the six conditions, $F(9, 353) = 4.05, p < .001$. Post hoc comparisons using the Tukey HSD test (see Table 4.3) indicated that the mean score for the CV condition ($M = 2.07, SD = 0.72$) was significantly different than all the other conditions. The test indicated that the mean score for the CVC condition ($M = 1.68, SD = 0.72$) was significantly different from the CCV condition ($M = 1.11, SD = 1.01$). However, the Other ($M = 1.36, SD = 0.85$), VC ($M = 1.42, SD = 0.79$), CVCC ($M = 1.48, SD = 0.87$) did not significantly differ from the CVC and CCV conditions. Table 4.3 illustrates the performance score comparisons alongside the occurrences in the various treatments.

Table 4.3

*Post Hoc comparisons: Syllable type*

<table>
<thead>
<tr>
<th>Syllable type (ST)</th>
<th>ANOVA/ PT Tukey HSD</th>
<th>Intervention</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>V,C,VCC,CCVC,CCVCC,other</td>
<td>1 22 1.3636</td>
<td>B C</td>
<td></td>
</tr>
<tr>
<td>VC</td>
<td>2 33 1.4242</td>
<td>B C</td>
<td></td>
</tr>
<tr>
<td>CV</td>
<td>3 58 2.0690</td>
<td>A</td>
<td>More Less</td>
</tr>
<tr>
<td>CCV</td>
<td>4 29 1.1034</td>
<td>C</td>
<td>Less More</td>
</tr>
<tr>
<td>CVC</td>
<td>5 173 1.6821</td>
<td>B</td>
<td></td>
</tr>
<tr>
<td>CVCC</td>
<td>6 48 1.4792</td>
<td>B C</td>
<td></td>
</tr>
</tbody>
</table>
The bar graph (Figure 4.5) illustrates the comparison between intervention song treatment and control song treatment in terms of syllable type conditions or syllable count by phoneme type. Intervention songs have less CCV conditions than the control songs. Intervention songs have more CV conditions than the control songs. In comparison with Table 4.3, the intervention songs had more higher performing syllable types (A) than the control songs. The bar graph illustrates that the intervention songs also contained more high performing syllables types (B) than the control songs such as CVC syllables.

![Syllable count by phoneme type](chart)

*Figure 4.5* A comparison of the use of different types of syllables in the song construction of the intervention and control treatments. C=consonant; V=vowel.

**Rhyme**

A chi-square test was used to determine if the intervention and control songs differed in the frequency of the use of rhyme. The results $\chi^2 (1, N = 363) = 21.066, p$
< 0.001 indicate that the intervention songs are significantly different than the control songs in frequency of rhyme.

A one-way between subjects ANOVA was conducted to compare the effect of syllable construction on syllables imitated in rhyme and no rhyme conditions. There was a significant effect of syllable construction on syllable imitation performance at the \( p < .05 \) level for the two conditions, \( F(2, 360) = 8.87, p < 0.001 \). Post hoc comparisons using the Tukey HSD test indicated that the mean score for the Rhyme condition (\( M = 1.95, SD = 0.66 \)) was significantly different than the No rhyme condition (\( M = 1.52, SD = 0.87 \)).

Table 4.4

<table>
<thead>
<tr>
<th>Rhyming (RY)</th>
<th>ANOVA/ PT Tukey HSD</th>
<th>Intervention</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>1 87 1.9540</td>
<td>A</td>
<td>More</td>
</tr>
<tr>
<td>No</td>
<td>2 276 1.5254</td>
<td>B</td>
<td>Less</td>
</tr>
</tbody>
</table>

The bar graph (Figure 4.6) illustrates the comparison between intervention songs and control songs in terms of rhyming syllables. The intervention songs have more syllables that rhyme than the control songs. The control songs have more syllables that do not rhyme. The intervention treatment had more of the highest performing rhyming syllables (A) than the control songs.
A comparison of intervention and control treatments on the use of rhyme or no rhyme in syllable construction.

**Repetition**

A chi-square test was used to determine if the intervention and control songs differed in the frequency of the use of repetition. The results $\chi^2 (4, N = 363) = 154.53, p < 0.001$ indicate that the intervention songs are significantly different than the control songs in frequency of repetition.

A one-way between subjects ANOVA was conducted to compare the effect of syllable construction on syllable imitation performance in Initial occurrence of a repeating word, the repeated word, Initial occurrence of a repeating phrase, repeated phrase, No repetition conditions. There was a significant effect of syllable construction on syllable imitation performance at the $p < .05$ level for the five conditions $[F (4, 362) = 8.52, p < 0.001]$. Post hoc comparisons using the Tukey HSD test indicated that the mean score for the Repeated word condition ($M = 2.08$,
SD = 0.62) was significantly different than the Initial phrase (M = 1.42, SD = 0.96), Repeating phrase (M = 1.50, SD = 0.81) and No repetition conditions (M = 1.50, SD = 0.81). However, the Initial repeated word (M = 1.80, SD = 0.61) was not significantly different than the other syllable conditions.

A t-test showed no significant performance effect of the use of repetition or no repetition in the construction of syllables.

**Rests**

A chi-square test was used to determine if the intervention and control songs differed in the frequency of the use of rests. The results \(\chi^2(1, N = 363) = 63.47, p < 0.001\) indicate a higher frequency of rests are used in the intervention songs than the control songs.

A one-way between subjects ANOVA was conducted to compare the effect of rest placement on syllables imitated in four conditions: (1) the use of rests before a syllable; (2) rests after a syllable; (3) no rests used; (4) rests before and after a syllable. There was a significant effect of syllable placement on syllable imitation performance at the \(p < .05\) level for the four conditions, \(F(3, 359) = 8.82, p < 0.001\). Post hoc comparisons using the Tukey HSD test indicated that the mean score for the rests after a syllable condition (\(M = 2.07, SD = 0.73\)) was significantly different than the no rest condition (\(M = 1.47, SD = 0.87\)). However, the use of rests before a syllable (\(M = 1.77, SD = 0.84\)) and before & after rest (\(M = 1.66, SD = 0.54\)) conditions did not significantly differ from the rest after a syllable and before & after a syllable conditions.
A t-test between Rest (1, 2, 4) condition and No rest (3) condition showed no significant difference between Rest and No rest conditions in terms of total performance, \( t(171) = 1.42, p < 0.16 \).

**Claps**

Chi-square results showed no significant difference between control and intervention songs on the frequency of syllables occurring with or without claps.

There was a significant effect for the clap condition, \( t(25) = -1.95, p < .06 \), with No clap condition receiving higher imitation performance than clap conditions.

**Measure position**

A chi-square test was used to determine if the intervention and control songs differed in the frequency of the use of measure position, whether syllables occurred in the first, middle or last measure of a song. The results \( \chi^2(3, N = 363) = 50.35, p < 0.001 \) indicate that the intervention songs are significantly different than the control songs in frequency of measure position.

A one-way between subjects ANOVA was conducted to compare the effect of measure position on syllable imitation performance in first beat of a measure, second beat of a measure, third beat of a measure and fourth beat of a measure conditions. There was a significant effect of syllable location on syllable imitation performance at the \( p < .05 \) level for the four conditions, \( F(3, 359) = 7.62, p < 0.001 \). Post hoc comparisons using the Tukey HSD test (see Table 4.5) indicated that the mean score for the syllables occurring on the first beat of a measure (\( M = 1.67, SD = 0.83 \)) or second beat (\( M = 1.73, SD = 0.87 \)) or third beat (\( M = 1.69, SD = 0.77 \)) had a
significantly higher mean scores than syllables occurring on the final beat ($M = 1.00, SD = 0.77$).

Table 4.5

*Post Hoc comparisons: Syllable position within a measure of music*

<table>
<thead>
<tr>
<th>Measure Position (MP)</th>
<th>ANOVA PT/Tukey HSD</th>
<th>Intervention</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>First beat</td>
<td>1 155 1.6774</td>
<td>more</td>
<td>less</td>
</tr>
<tr>
<td>Second beat</td>
<td>2 98 1.7347</td>
<td>more</td>
<td>less</td>
</tr>
<tr>
<td>Third beat</td>
<td>3 75 1.6800</td>
<td>more</td>
<td>less</td>
</tr>
<tr>
<td>Final beat</td>
<td>4 35 1.0000</td>
<td>less</td>
<td>more</td>
</tr>
</tbody>
</table>

The bar graph (Figure 4.7) illustrates the comparison between intervention songs and control songs in the terms of measure position (MP). Intervention songs had less final beat syllables (4) and more first (1), second (2) and third (3) beat syllable conditions than the control songs.

*Figure 4.7 A comparison of intervention and control treatments on syllable placement within measures of the song.*
**Song position**

A chi-square test was used to determine if there was a significant difference between the intervention and control songs in the frequency of the syllables in a particular song position, whether the syllable occurred within the first, middle or last measures of a song. The results $X^2 (2, N = 363) = 17.75, p < 0.001$ indicate a difference between the intervention and control songs in the frequency of a particular syllable position in a song.

A one-way between subjects ANOVA was conducted to compare the effect of syllable location in the song on syllable imitation in first measure, middle measure and final measure conditions. There was a significant effect of song position on syllable imitation performance at the $p < .05$ level for the three conditions, $F (2, 360) = 3.70, p < 0.026$. Post hoc comparisons using the Tukey HSD test indicated that the mean score for Middle measure condition ($M = 1.65, SD = 0.85$) and Final measure condition ($M = 1.75, SD = 0.80$) were significantly different that the Initial measure condition ($M = 0.70, SD = 0.70$). However, the Middle measure condition did not significantly differ from the Final measure condition.

Table 4.6

**Post Hoc comparisons: Syllable position within the song**

<table>
<thead>
<tr>
<th>Song Position (SOP)</th>
<th>ANOVA/PT Tukey HSD</th>
<th>Intervention</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>First measure</td>
<td>1 25 1.2000</td>
<td>less</td>
<td>more</td>
</tr>
<tr>
<td>Middle measures</td>
<td>2 306 1.6503</td>
<td>more</td>
<td>less</td>
</tr>
<tr>
<td>Final measure</td>
<td>3 32 1.7500</td>
<td>more</td>
<td>less</td>
</tr>
</tbody>
</table>

The bar graph (Figure 4.8) illustrates the comparison between the intervention songs and the control songs in terms of measure position conditions.
(MP). Intervention songs have less syllables occurring within the first measure of a song than control songs. Intervention songs have more syllables within the middle and final measure than control songs.

![Figure 4.8](image)

**Figure 4.8** A comparison between treatments of the syllable position within the beginning, middle or end of a song.

Due to the low frequency, initial song syllables could not be measured statistically. Therefore, an informal observation was conducted to compare the effect of syllable construction on syllables imitated in terms of syllables placed as the first or initial syllable in a song. Results indicated a higher level of performance (PT) in the intervention songs ($PT = 9$, $N = 5$) than the control songs ($PT = 4$, $N = 6$). Further observation indicated several differences between the intervention and control songs in the initial syllable in terms of song position (SOP), repetition (R) and claps (CL) conditions. In song position and clap conditions, none of the control syllables but
four out of five intervention syllables occurred in the middle measures preceded by a clap. In repetition conditions, none of the control syllables but all of the intervention initial syllables were occurrences of a repeated word.
CHAPTER 5
ANALYSIS

Review

Employing an ABBAAB design, standard classroom songs were alternated with intervention songs designed to increase imitation behaviors by including features that were identified from the literature and experience. An analysis of the video of students engaged in the singing was conducted using the syllable as the unit of analysis for whether or not children were imitating that portion of the song. As each syllable requires a unique and distinct vocalization, this provides the best detail for measuring verbal imitation. The data suggest that the intervention song syllables had an overall higher performance of verbal imitation than the control songs syllables. Types and conditions of syllables proved to be significant in their effect on imitation. The intervention songs contained a higher frequency of syllables found to be associated with imitation.

Syllable types

Intervention songs had a higher frequency of higher performance CV syllables and less lower performing CCV syllables than the control songs that might have led to higher levels of imitation in the intervention songs. The CV syllables may be less difficult to articulate than the CCV syllables that may require a more sophisticated position of the tongue and lips as well as the throat. The CV syllables may be associated with familiar sounds that the students may have had practice
hearing and pronouncing more than the CCV words. The CV sounds may be easier
to imitate because it involves external lip movement that is easy to model by a
teacher and peers because it does not require unseen tongue movement inside the
mouth. The CV syllables were often associated with repetition in the intervention
songs that may have increased their imitation response.

*Parts of speech*

Another possible reason the intervention songs had a higher level of imitation
response was that the intervention songs had less nouns and pronouns than the
control songs. Remembering names of objects might be more difficult than recalling
an action or emotive response, whether it is common or novel. It might be more
difficult to remember “Brother John” if you don’t really have a brother named John
than “jump down”, a generic activity that the student may have experienced at one
time and therefore able to create a mental picture of the word for easy recall.

Of the overall higher performing syllables that were contained more often in
the intervention songs, the parts of speech condition sub category of Other was
significant. One possible reason the intervention songs had higher levels of imitation
response was that the intervention songs had more syllables categorized as Other
than the control songs. The Other category contained interjections and nonsense
syllables. The use of emotive words might have contributed to the higher
performance bringing a higher level of attention and focus to the task. Also, the use
of nonsense syllables such as “buh” might have been easier to imitate since this is a
consonant-vowel (CV) syllable type that is also a higher performing sub category.
These syllables might have been easier to imitate because they were often used in repetition and that might build upon other syllables to prime or set up another syllable for imitation.

Sentence position

The intervention songs had higher levels of imitation possibly due to the fact that they contained more single word syllables and less middle word syllables than the control songs. Imitation of single word syllables may be due to a lower amount of perceptual content involved in a single word syllable than a series of syllables. Single word syllables may be easier to articulate. Not statistically relevant, rests and rhythmic clapping were often used prior to single word syllables and sentences that could have given opportunity for conceptual development, auditory processing and motor planning especially after the learning phases of the treatment conditions.

Measure position

Another possible reason the intervention songs have higher levels of imitation may be that the intervention songs have more first, second, third beat syllable conditions and less beat occurring on the fourth beat than the control songs. This may be due to the rhythmic effect of predictability of the first beat of a measure following the previous beats once the rhythm pattern has begun. It may also be because the intervention songs had rests instead of syllables on the fourth beat to allow for auditory processing and motor planning in order to imitate the forthcoming first beat of the next measure.
**Song position**

The control songs had more low performance syllables occurring within the first measure of a song than the intervention songs. One possible reason intervention songs had higher levels of imitation may be that intervention songs had more of the high performing middle and final measure syllables than the control songs. This might also be because the initial measures of intervention songs included rhythmic clapping to introduce musical ideas without requiring verbal imitation and assisted students in gaining confidence to anticipate and attempt forthcoming syllables.

**Repetition**

The use of repetition was not statistically significant and is suggested to not aide in increasing imitative responses.

**Rhyming**

One other possible reason the intervention songs had higher levels of imitation might be that the intervention songs had more rhyming syllables than control songs. Rhyming syllables may be easy to predict because the vowel sounds are similar within the syllables. They may be easier to produce because auditory cues are the same and the auditory processing is similar between syllables with less need to process new auditory information. The syllables may be easier to imitate because the syllables have similar motor planning requirements involved as well as auditory stimuli. Rhyming syllables may also increase social motivation to imitate as students attempt to anticipate syllables with higher accuracy than peers. Rhyming may also
increase imitation due to the humorous nature of the nonsensical rhyming words that students can sense and share with peers as they sing.

*Rests & Claps*

The frequent use of rests and claps within the intervention songs was not suggested to increase imitation responses. It may be possible that the use of clapping inhibited immediate syllable imitation, but may have served to ignite a snowball effect of engaging gross motor skills of the torso and then the motor skills used in articulation of syllables. The use of rests within the song, even though not statistically significant, may have an effect of creating an opportunity for allowing students to catch up on processing auditory information and planning motor movements for oral imitation that may not be immediately recorded in the success at imitating the successive or preceding syllable.

*The perfect syllable*

A syllable most likely to be imitated in this study might have been one that had several characteristics: 1) rhyming; 2) consonant vowel (CV) construction; 3) emotive verb or adjective; 4) first beat of a measure; 5) part of a single word sentence; 6) occurring in a middle measure of a song. Songs written with few words such as repeated single word sentences with rhyming humor precipitated by a rhythmic pattern might be the most accessible to students with language delays. The auspicious use of rests and claps that allow for auditory and motor processing as well as cognitive rehearsal time may be important to increase verbal imitation.
CHAPTER SIX
CONCLUSION

Design effectiveness

The alternating treatment design was effective in comparing the use of intervention and control songs over a short period of time and within brief intervals of treatments allowing the research to be conducted in a natural environment with few interruptions. This was conducive to a supportive learning environment for the participants. It was also effective in gathering consistent and reliable data.

Questions explored

This research explored how songs can be altered to accommodate students with language delays and be an effective intervention tool to increase verbal imitation. In this limited study, it was found that adjusting the song construction increased imitation by the participants. This research demonstrated that adjusting the song construction increased verbal imitation by the participants as seen by increased response performance of the intervention treatment songs. The study addressed the type of adjustments that may need to occur to assist students to verbally imitate the lyrics of songs alongside peers. Adjustments include the use of lyrics with simple linguistic construction that may include syllables built with CV or CVC format and pronunciations limited to basic sounds such as “uh” vowels and /b/, /p/ consonants. Another adjustment was the use of rhyming lyrics that may assist motor planning and memory. The use of preliminary measures of rhythms or sounds to focus students on
the forthcoming singing task may or may not be advantageous. The use of emotive and expressive words such as verbs and adjectives may help boost student focus and memory through word association and attachment to meaning or humor. Single word sentences may also enhance the ability to recall and anticipate verbal production tasks.

**Limitations of the study**

Students with language delays may have other disabilities that may affect their ability to verbally imitate including short attention spans, distractibility, physical discomfort and anxiety. During the data collection phase of this study, one participant stopped singing to play with a button and look at the patterns on his new shirt. Another participant turned around several times to look at an adult special circumstances aide because he was afraid she would leave the room and not take him to his next activity.

A natural context brings environmental problems including conflicting noises and distractions. A student arriving sleepy or irritated disrupts full participation. Several times participants were observed yawning or putting their head down on their desks. At other times the treatment was postponed due to scheduling changes or the school intercom or participant absences. Also, a non-participating student in the rear of the classroom made loud fitful noises that distracted focus on the treatment on one occasion.

Size was another limitation of this pilot study. Findings are limited to the three participants in this study and cannot be generalized. The first person effect and
the enthusiasm of the researcher as the composer of the intervention songs may have biased the research data even though precautions were taken to address this possibility. Also, the researcher as teacher may have also had an impact on the study.

There was an overall upward trend in performance for all students in the study (see Figure 6.1).

![Percent of imitation in all song conditions](image1)

**Figure 6.1** Percent of imitation by participants across all treatments.

![Percent of imitation in Control songs](image2)

**Figure 6.2** Percent of imitation by participants across control songs.
In the control songs, students 2 and 3 seem to have an upward trend (see Figure 6.2). However, the degree of the upward trend for student 2 is misleading as further research observation showed that student 2 had already learned Control song 6 in his general education class prior to this study. Student 3 varied back and forth with no particular upward trend.

![Percent of imitation in Intervention songs](image)

*Figure 6.3 Percent of imitation across intervention songs by participant.*

In the intervention conditions (see Figure 6.3), there is a dip in imitation performance for student #1. Video observation revealed the introduction of a novel rhythmic activity in the first measures of the song (rubbing hands instead of clapping) that the student performed instead of singing during the data collection phase of the condition—skewing the results. Video data shows the student in the preceding phase imitating all syllables of this song.
Implications for Future Research

Future research needs to be conducted to verify these results on more student populations including students with other language disabilities including Autism Spectrum disorders. Also, research with the general student population of emerging readers would increase the research findings as well. Future research needs to be conducted using certain intervention components to isolate which are the most vital and necessary for use in constructing songs to be used to stimulate and increase verbal imitation.

Implications for Educators

Primary grade teachers, intervention staff, Education Specialists and speech pathologists may use the ideas of this study to inform their use of singing for language enrichment. They may also use the findings to develop or adapt songs to use with children especially those students with language delays.

Final Thoughts

Music, like any tool, needs to be adjusted, sharpened and sometimes retooled to be more effective in the classroom. The construction of songs needs to be scrutinized as one aspect of creating appropriate curriculum for all children, especially those with language delays.
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APPENDIX A

Intervention Treatment Sheet Music

1. Basketball
2. Bubble Gum Pop
3. Doggie Pops
4. Me, Me, Meow
5. Run
Basketball

Pitch range: D1-A1
MM: 92  Andante

Soprano

Percussion

Bas-ket-ball  Bas-ket-ball

Claps  Claps

S

Bas-ket-ball  Bas-ket-ball!

Claps  Claps

Bas-ket-ball!
Bubble Gum

Pitch range: D1-A1
MM: 92 Andante

J.B. Brayfindley
03/13/2011

Soprano

Percussion

Tap chest

buh, buh, buh. Buh, buh, buh, buh. Bub-ble, bub-ble, gum!

S

Perc.

bub-ble, bub-ble, gum! Pink Pink bub-ble gum! Pink Pink

S

Perc.

bub-ble gum! Gum! Gum... bub-ble bub-bble gum! Gum! Gum...

S

Perc.

Slap thighs

bub - ble bub - ble gum! Bub ble, bub - ble POP!
Doggie Pops

Soprano
Pitch range: D1-A1
MM: 92 Andante

Percussion
rub hands together

Yum, yum!  Yum, yum!

S

Yum-my, yum-my, yum!

Perc.

Yum-my, yum-my, yum!

S

Yum-my, yum-my, yum!

Perc.

Yum-my, yum-my, yum!

S

Dogs lick...  Dogs lick...  Dog-gie pops!  Dogs lick...  Dogs lick...

Perc.

S

Dog-gie pops!  Lick, lick Lick, lick Lick, lick Lick, Chomp!

Perc.
Me Me Meow

J.B. Brayfindley

Soprano

Me, me me.  Me, me me.  Me-ow!  Me-ow!  Me, me me.
Me, me me.  Me-ow!  Me-ow!  Give me more...  Give me more...
More milk!  More milk!  Me, me me.  Me, me me!  Me-ow!
Me-ow!
Run!

Pitch range: D1-G1
MM: 92 Andante

J.B. Brayfindley
3/20/11

Voice

Percussion

Clap

Clap

Bat a ball  Bat a ball and run!  Bat a ball and run!  Run!  Run!

Clap

Bat  Bat  Bat a ball  Bat  Bat  Bat a ball
APPENDIX B

Research Treatment Protocol

1. INTRO PHASE:
   Put descriptive color picture poster on display in front of students. Turn on video camera. Say,
   "We are going to learn a new song today."
   Show picture to each student depicting the meaning of the song and discuss what the song is about. (Do NOT read lyrics aloud ahead of time) Put away picture. Show instruction cards one by one and ask,
   "What are you going to do first? What are you going to do next? Then what will you do? And, last, what will you do?"

2. LISTEN PHASE:
   "Put your listening ears on as I play a CD of the song."
   Play the CD and lean ear into it exaggerating the act of listening. Nod to the beat holding up LISTEN instruction card. Stop CD. Say,
   "Great listening!"

3. WATCH & LISTEN PHASE:
   "What are you going to do next?"
   Show instruction card for LOOK.
   "Yes, watch me as I sing it for you."
   Turn on CD and face children as sing aloud and exaggerating enunciation. Turn off CD. Say,
   "Good watching!"

4. SING-A-LONG PHASE:
   "What are you going to do next?"
   Show instruction card for SING.
   "Yes, sing with me!"
   Turn on CD and hold up sing card, facing the students and exaggerating the enunciation. Turn off CD at end of song.
   "... Great work!"

5. SING WITH PEERS & DATA COLLECTION PHASE:
   "What are you going to do now?"
   Hold up SING card.
   "Yes, I will be quiet and you will sing. Sing loud so I can hear you. Ready? O.k.!!"
   Turn on CD and hide face behind the SING instruction card. Do not sing along. Do not move head or body to the beat of the music. DATA COLLECTION BEGINS. Turn off CD at end and say,
   "Fantastic. Give me a high five!"
   Give each student a high five. Turn off video camera.
APPENDIX C

Descriptive Color Picture Prompts

Song treatments in order:

1. Are You Sleeping?
2. Doctor Knickerbocker
3. It’s Raining
4. Basketball
5. Jump Down
6. Rover
7. Doggie Pops
8. Bubble Gum
9. Me Me Meow
10. Red Cabbage Hot
11. Run
1. Are You Sleeping?
2. Doctor Knickerbocker Number Nine
3. It’s Raining, It’s Pouring The Old Man Is Snoring
4. Basketball
5. Jump Down, Turn Around, Pick a Bale of Cotton
6. Rover
7. Doggie Pops
8. Bubble Gum
9. Red Cabbage Hot
10. Me, Me, Meow
11. (Bat and Ball and)
Instructional Posters

1. Listen
2. Look
3. Sing

NOTE: Icons (Boardmaker, 2002) were cut out and glued onto an 8 by 10 inch piece of black construction paper and laminated.
1. Listen

listen
2. Look (or watch)
3. Sing (or sing-a-long)
### APPENDIX E: Fidelity Check Off Sheet

<table>
<thead>
<tr>
<th></th>
<th>YES</th>
<th>NO</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. INTRO PHASE:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Put descriptive color picture poster on display in front of students.</td>
<td></td>
<td></td>
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<tr>
<td>- Turn on video camera.</td>
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<tr>
<td>- Say, “We are going to learn a new song today.”</td>
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<tr>
<td>- Discuss pictures and what song is about;</td>
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<tr>
<td>- Show instruction cards one by one</td>
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<tr>
<td>- Ask, “What are you going to do first? ... next? Then...? And, last, what will you do?”</td>
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<tr>
<td><strong>2. LISTEN PHASE:</strong></td>
<td></td>
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<tr>
<td>- Say, “Put your listening ears on as I play a CD of the song.”</td>
<td></td>
<td></td>
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<tr>
<td>- Turn on CD</td>
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<td></td>
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<tr>
<td>- Hold up LISTEN card</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Look at and lean down towards CD player cupping ear</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Turn off CD</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Say, “Great listening!”</td>
<td></td>
<td></td>
</tr>
<tr>
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<td></td>
</tr>
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<td></td>
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<tr>
<td>- Turn on CD</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Face children and sing aloud exaggerating enunciation and rhythm.</td>
<td></td>
<td></td>
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<tr>
<td>- Turn off CD</td>
<td></td>
<td></td>
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<tr>
<td>- Say, “Good watching!”</td>
<td></td>
<td></td>
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<tr>
<td><strong>4. SING-A-LONG PHASE:</strong></td>
<td></td>
<td></td>
</tr>
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<td>- Show instruction card for SING.</td>
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</tr>
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<tr>
<td>- Turn on CD</td>
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<tr>
<td>- Hold up SING card and cover face. Do not move body or mouth.</td>
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<tr>
<td>- Turn off CD</td>
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<tr>
<td>- “Fantastic. Give me a high five!”</td>
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<tr>
<td>- Give each student a high five. Turn off video camera.</td>
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<tr>
<td>- Turn off video camera</td>
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</tbody>
</table>
APPENDIX F

Data Coding Key

1. **NO.**-Number of data field

2. **SYL**-The actual syllable letters

3. **P1-Student Participant 1**: verbalization response: 1=yes, 0=no

4. **P2-Student Participant 2**: verbalization response: 1=yes, 0=no

5. **P3-Student Participant 3**: verbalization response: 1=yes, 0=no

6. **PT-Students Total response per syllable**: 0-3 range

7. **POS-Parts of speech**: *Syllable occurs as part of 8 basic parts of speech*
   - Initial Coding:
     - 1=verb
     - 2=noun
     - 3=pronoun
     - 4=adjective
     - 5=preposition
     - 6=conjunction
     - 7=adverb
     - 8=interjection
     - 9=other
   - Collapsed Coding:
     - 1=verb
     - 2=noun (Previous codes 2 & 3)
     - 3=adjective
     - 4=Other (Previous codes 5,6,7,8,9)
   - *(NOTE: POS data collapsed because numbers were too small for accurate statistical calculations)*

8. **WP-Word position**: *Syllable occurs in what position of a word?*
   - 1=beginning syllable of a word
   - 2=middle syllable of a word
   - 3=end syllable of a word
   - 4=one syllable word

9. **SP-Sentence position**: *Syllable occurs in what position of a sentence?*
   - 1=syllable as part of initial word of the sentence
2 = syllable a part of a middle word in the sentence
3 = syllable part of the final word in a sentence
4 = syllable part of a one word sentence

10. MP-Measure position: Syllable in what location of the musical score?
   1 = occurs on first beat
   2 = occurs on second beat
   3 = occurs in third beat
   4 = occurs on final beat

11. SOP-Song position: Syllable occurs in what location of the entire song?
   1 = within first measure
   2 = within middle measures
   3 = within last measure

12. R-Repetition: Does the syllable occur in repetition?

   Initial coding:
   1 = Yes, initial occurrence of a single word or syllable to be repeated
   2 = Yes, the repeated occurrence of a word or syllable
   3 = Yes, initial occurrence as part of a repeating phrase
   4 = Yes, the repeated occurrence of repeating phrase
   5 = No

   Collapsed coding:
   1 = Yes (Previous codes 1,2,3,4)
   2 = No (Previous code 5)

   (NOTE: Data was also collapsed into two categories to clarify results.)

13. ST-Syllable type: based on aural perception of the syllable (e.g. No CVCe,
   or CVVCe as the double vowels are perceived as a singular sound—also
   “kn” is coded as a single consonant, etc.) What type of linguistic syllable is
   it?

   Initial coding
   1 = vowel only
   2 = consonant only
   3 = VC
   4 = VCC
   5 = CV
   6 = CCV
   7 = CVC
   8 = CCVC
   9 = CVCC
   10 = CCVCC;
11. OTHER- includes contractions, etc.

Collapsed coding:
1= other (Previous codes 1,2,4,8,10,11)
2= VC
3= CV
4= CCV
5= CVC
6= CVCC

(NOTE: Because the numbers were too small for statistical calculations, the OTHER category collapsed data from codes 1,2,4,8,10 & 11 into one code.)

14. RL- Rest location: Are there rests occurring with the syllable?

Initial coding:
1= syllable occurs after a rest
2= syllable occurs before a rest
3= syllable occurs between other syllables
4= syllable occurs before and after a rest

Collapsed coding:
1= Yes (Previous codes 1,4)
2= No (Previous codes 2,3)

(NOTE: Data collapsed to clarify analysis.)

15. CL- Clap location: Does the syllable occur near a clapping response?

Initial coding:
1= syllable occurs after a clap
2= syllable occurs before a clap
3= syllable occurs between other syllables
4= syllable occurs before and after a clap
5= syllable occurs after and before a clap
6= no clap

Collapsed coding:
1= Yes (Previous codes 1,4,5)
2= No (Previous codes 2,3)

(NOTE: Data collapsed to clarify results)

16. I- Intervention: Is the syllable a part of an intervention song?

1= Yes, this is part of the intervention.
2= No.

17. RY- Rhyming: Does the syllable rhyme with other syllables?

Initial coding:
1= Yes, initial introduction of a sound rhyme
2= Yes, rhymes with previous sound
3=No
Collapsed coding:
1=Yes (Previous codes 1, 2)
2=No (Previous code 3)

(NOTE: Codes collapsed to clarify results.)
APPENDIX G

Interobserver Agreement

1. Data is either yes (cross out the syllable) or no (circle the syllable or leave blank—whichever is easier to decipher);

2. Yes- if the student moved their lips or twitched their lips or seemed to say the sound;

3. Yes- if the student said the sound approximately around the same time as the recording (within a second of the recorded aural model);

4. Yes- even if mouth was partially covered by their hand if you could still see mouth or jaw movement;

5. Yes- if the mouth didn’t move per se but the syllable did not require a lip movement;

6. No- if the participant mouth was shut;

7. No- if the participant kept mouth widely open or open with no lip movement for more than a second in no correlation to the syllables presented;

8. No- if the participant looked up at the ceiling obscuring mouth from view;

9. No- if the student turns around in the chair and looks behind themselves, obscuring the mouth from view;

10. No- if the participant makes exaggerated mouth movements with no relation to the syllables presented (i.e. smiling, open/shut repetition with no bearing on the rhythm of the syllables);

11. No- if the participant puts his head down on his desk and his mouth is obscured and there is no mouth movement seen in the jaw area.
APPENDIX H

Bar graph of imitation performance by syllable by song
(NOTE: if no student sang, the graph is at zero; if any one participant sang the
syllable, the graph shows a 1; if any two participants sing, the graph shows 2; if all
the participants sang, the graph shows a 3.)

SONG 1: Control Song #1- Are You Sleeping

![Performance Totals for Are You Sleeping]

SONG 2: Control Song #2- Doctor Knickerbocker

![Performance Totals for Doctor Knickerbocker]
SONG 3: Control Song #3 - It's Raining

Performance Totals

SONG 4: Intervention #1 - Basketball

Performance Totals

SONG 5: Control #4 - Jump Down

Performance Totals
SONG 6: Control Song #5 - Rover

SONG 7: Intervention Song #2 - Doggie Pops

SONG 8: Intervention Song #3 - Bubblegum
SONG 9: Intervention Song #4 - Cat's Meow

Performance Totals

SONG 10: Control Song #6 - Red Cabbage Hot

Performance Totals

SONG 11: Intervention Song #5 - Bat A Ball

Performance Totals