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An Integrative Review of Direct and Indirect Pathways for Development of Spoken Language, Through Dance/Movement Therapy

A Thesis

Submitted to the Faculty

of

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by

Aditi Vipul Trivedi

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of

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in

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Department of Creative Arts Therapies

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Dedications

I would like to dedicate this thesis to all the people that were a part of my life for these two years. You have not only helped me develop as a therapist but also a person.

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Table of Contents

List of Tables

List of Figures

Abstract

An Integrative Review of Direct and Indirect Pathways for Development of Spoken Language, through Dance/Movement Therapy

Aditi Vipul Trivedi

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The profession of dance/movement therapy (DMT) has not recognized expressive, spoken language as an independent, viable outcome. The presence of only a single published case study on co-treatment of DMT and speech therapy highlights the glaring gap in the existing literature on this topic. While dance/movement therapists are trained to communicate with clients nonverbally, most individuals rely on spoken communication for everyday interactions. Hence, expanding the scope of practice from nonverbal to verbal expression is essential to facilitate generalization of therapeutic gains to settings beyond a DMT session.

The purpose of this thesis was to systematically review and integrate literature from DMT and related fields (i.e., music therapy, speech and language therapy, human development, and special education) to understand how DMT could support the development of spoken language. Expressive aspects of spoken communication and a concentration on childhood were chosen as delimitations. An integrative review was undertaken to answer the research question 'What are the pathways through which dance/movement therapy can contribute to interventions for expressive, spoken language?"

Following the organization of data into a literature matrix and a thematic analysis of it, four themes were identified: 1. Physiological basis of speech, 2. Cognitive processes involved in expressive, spoken language, 3. Social factors related to expressive, spoken language, and 4.

Techniques for intervention. The first three themes indicated a need for bio-psycho-social goals and interventions. Physiological factors such as posture and breath support were recognized as directly addressing speech sound production. Cognitive and social factors including memory, regulation and expression of emotion, turn-taking, joint attention, and reading social cues were found to indirectly target the outcome. A combination of the factors under these themes affects what, when, and how a person chooses to communicate. The literature behind the fourth theme suggested techniques for interventions. Creativity, rhythm, synchrony, scaffolding, and client-directed approaches were found to be prevalent in interventions across multiple fields. These techniques, inherent in DMT, highlight its capacity to address expressive, spoken language as an outcome. Foundational concepts of dance/movement therapy and case vignettes based on clinical work were used to illustrate this argument.

CHAPTER 1: INTRODUCTION

1.1 Problem, Purpose, and Rationale

1.1.1 Problem

The problem addressed by this thesis was delays in language development, and speech and communication disorders. While language is a codified system of symbols used for communication, speech refers to production of sounds that are meaningful, i.e. adhere to the codes of a given language (Rosenbaum et al., 2016). Disorders of language and speech may prevent or alter the extent to which spoken language can be produced, with language disorders additionally impacting production of written language and comprehension of spoken and written language (Rosenbaum et al., 2016). The focus of the thesis was on expressive language, i.e. production of language, specifically in the spoken form. It comprises verbal language (use of words) as well as paralinguistic elements and pragmatics. The use of words and paralinguistic features are a part of speech production while pragmatics affect the way in which speech is used (see Appendix A: Different Forms of Communication). Focusing on the latter is as important as focusing on actual speech sound production as it, too, lends ecological validity to an intervention targeting speech.

One estimate suggests that the prevalence rate for speech and language disorder in children is 4.8% and that there might be more children with language impairments and delays that do not qualify for a clinical diagnosis based on current criteria (Rosenbaum et al., 2016). Further, language impairments may accompany other diagnoses such as autism spectrum disorder (American Psychiatric Association, 2013) and attention-deficit/hyperactivity disorder (De Diego-Balaguer, Martinez-Alvarez & Pons, 2016). For children, acquisition of language is a

key developmental task (Newman & Newman, 2015). A deficit in spoken language affects the effectiveness with which one can express themselves and communicate their needs. It may indirectly play a role in how an individual forms relationships with others and understands the world. Vygotsky (1978, as cited in Vandervert, 2017), for example, was one of the theorists who postulated that language plays a central role in scaffolding a child through the zone of proximal development, especially with regards to learning about one's culture and norms. Hence, the process of socialization may also be adversely affected by language deficits.

1.1.2 Purpose

The purpose of this thesis was to explore if and how a dance/movement therapy intervention can be useful for children that struggle with expressive, spoken language. The aim was to create a strong theoretical base upon which clinical work can be built. The thesis did not study the topic in a clinical context but was rather an assimilation of literature from fields like dance/movement therapy, music therapy, speech and language pathology/therapy, psycholinguistics, developmental psychology, neuroscience, cognitive psychology, evolutionary psychology, etc. While the other fields were used to support the thesis, the emphasis was placed on literature within dance/movement therapy itself and from music therapy and speech and language therapy, due to their relevance to the topic.

1.1.3 Rationale

Scholars in the field of psychology, linguistics and communication have suggested that all behavior is a form of human communication but spoken communication has risen to prominence because of how human beings have evolved their linguistic abilities (Watzlawick, Bavelas & Jackson, 2011). Dance/movement therapy champions the idea of viewing all

behavior as being inherently communicative. However, that overshadows the role dance/movement therapy can play in development of language-based communication, especially that which is spoken in nature.

It has been widely acknowledged that human beings interact with body language and understand it intuitively to communicate with one another (Watzlawick, Bavelas & Jackson, 2011; Knapp, Hall & Horgan, 2014). Hence, just as people use folk psychology to understand other people's thinking patterns, maybe there exists folk movement analysis to comprehend nonverbal behavior. However, a conscious analysis of that behavior and a refinement in the observation process of collecting movement data is what allows dance/movement therapists to reach the depths where movements originate from.

Dance/movement therapists can be more intentional in reflecting on the meaning of movements and use them in interventions. As a result, when a client presents with an issue, the dance/movement therapist has an additional layer of knowledge to work with. However, when that client steps out of the therapeutic space and returns to the various ecological contexts that they are a part of, the expectation to communicate with words is waiting for them. It is important to be mindful of that because the basic unit of survival might be a person and their environment together, not an individual in isolation from any context (Kent, 1984). Working on expressive, spoken language can lend ecological validity and applicability to an intervention. Hence, while movement data is important, and may even form the primary means through which we communicate, words cannot be escaped from, especially in the spoken form. Within dance/movement therapy, verbal processing has been acknowledged through a pioneering article in the field (Stark & Lohn, 1993). In facilitating development of spoken language in individuals,

dance/movement therapists can pave the way for verbalization and enrich the therapeutic process itself.

1.2 Operational Definitions of Terms

Dance/movement therapy – The psychotherapeutic use of movement to promote emotional, social, cognitive and physical integration of the individual (American Dance Therapy Association, n.d.).

Expressive language – Sharing thoughts ideas, and feelings (American Speech-Language-Hearing Association, 2016)

Language – System for communicating ideas and feelings using sounds, gestures, signs, or marks (National Institute on Deafness and Other Communication Disorders, 2016); At its most specific level, it may refer to the concrete act of speaking, writing or signing in a given situation – the notion of parole, or performance (Crystal, 2008, p. 265).

Music therapy – Music therapy is the clinical and evidence-based use of music interventions to accomplish individualized goals within a therapeutic relationship by a credentialed professional who has completed an approved music therapy program (American Music Therapy Association, n.d.).

Receptive language – Trouble understanding others (American Speech-Language-Hearing Association, 2016)

Speech – One interpretation is from the viewpoint of phonetics: here, speech is seen as a medium of transmission for language – the spoken medium or phonic substance of language (as opposed to writing; Crystal, 2008, p. 445); The other interpretation is from the viewpoint of

linguistics, where spoken language (performance, or parole) can be analyzed in phonological, grammatical and semantic, as well as phonetic terms (Crystal, 2008, p. 445).

Speech and language therapy – Speech and language therapy provides treatment, support and care for children and adults who have difficulties with communication, or with eating, drinking and swallowing (Royal College of Speech and Language Therapists, 2017).

For additional definitions see Table 2 (Functional Definitions of Parent and Child Codes).

1.3 Uncovering the Gap in Existing Research

Spoken language is crucial for development of various areas of life but the minimal focus on it in dance/movement therapy literature is a striking gap in the existing body of work. Research in dance/movement therapy has not explored expressive, spoken language in isolation, especially not as the main focus on an intervention. While there may be dance/movement therapists that have focused on it in their clinical work, published literature, at least, has not extensively investigated it. Only one case study has been published where dance/movement therapy and speech and language therapy were used in conjunction (Schmerling & Kerins, 1987), giving rise to the need for further research on this topic.

The case study by Schmerling and Kerins (1987), with a child with elective mutism, was has not been replicated or expanded upon. However, that study did provide an insight into how dance/movement therapy can work as an intervention through individual or group sessions and by itself or in tandem with speech and language therapy. Additionally, there is some research in the field of dance/movement therapy, especially that focusing on children with special needs and research based on movement development, where development of expressive, spoken language was seen as one of the by-products of the having achieved certain goals or targeted behaviors.

The interventions employed by these studies were extracted in the thematic analysis process to create a set of thematically-linked techniques that can potentially be used as tools in clinical practice. These techniques could also serve as independent variables in future studies that investigate the role that dance/movement therapy can play in interventions for spoken language.

1.4 Research Question and a Summary of the Research

The research question addressed by the thesis was, "What are the pathways through which dance/movement therapy can contribute to interventions for expressive, spoken language?". The objective was to understand how dance/movement therapy may play a role in fostering the ability to use expressive, spoken language, both as a stand-alone intervention and by facilitating achievement of goals in allied therapies.

No specific hypothesis was established before starting the research. Rather, a tentative framework was used to guide the process of data collection and analysis. That framework comprised finding direct and indirect pathways which may underlie a dance/movement therapy interventions for expressive, spoken language. Spoken language is the realm of speech and language therapy so the literature from it was directly relevant and helped establish the more direct pathways for intervention. On the other hand, work done through the creative arts therapy specialties of music and dance provided an understanding of the indirect pathways which concerned psychosocial development. The direct pathways provided an understanding of physiological and neurological basis through which dance/movement therapy can support development of expressive, spoken language. Indirect pathways, on the other hand, lent insight into how psychosocial development achieved in creative arts therapies can allow for experiences that facilitate acquisition of spoken language and how that psychosocial development may even

complement the treatment provided by a speech and language therapist. Cross-overs between these pathways were uncovered as these processes do not occur in isolation.

In terms of the population, an initial delimitation was the age since the chosen literature primarily focused on development in children. However, the literature moved beyond typically developing children to include work done on children with language and communicative disorders, or developmental disorders that include an element of struggle with spoken language. The language in which the literature is published was an additional delimitation, since only work done in the English language was referenced and the literature itself targeted acquisition of the English language. This choice was based on the author's familiarity with the English language and because acquisition of other languages may follow a different process, based on the linguistic structure and the culture in which it is acquired. The medium of language itself was also a delimitation as the emphasis was on spoken language over expressive language in the written form.

The methodology used for the thesis was an integrative review, which is considered to be a qualitative research method that permits the use of various literary sources to enable a systematic, literature-based research (Whittemore & Knafl, 2005). To ensure that the thesis met the rigor of a research study, additional methods were used to support the process of the integrative review. These methods comprised Garrard (2014)'s matrix method and thematic analysis as framed by Braun and Clarke (2006). Integrative review is a framework for research but does not have a concrete set of procedures which have to be followed. Thus, the matrix method and thematic analysis were used as a part of some of the substages of the integrative review, to provide more structure to the research. Many of the fields listed previously informed

literature review for the thesis but the sources used as a part of the integrative review were primarily from dance/movement therapy, music therapy and speech and language therapy.

Based on the literature that was analyzed using thematic analysis, the themes that surfaced were:

- Physiological basis of speech
- Cognitive processes involved in expressive, spoken language
- Social factors related to expressive, spoken language
- Techniques for intervention

The first three themes provided an insight into factors that need to be addressed by interventions. These factors might co-exist as the ability to speak and do so in a socially acceptable way is a complex process. The fourth theme provided suggestions for how interventions could be designed. An attempt was then made to connect these themes to existing dance/movement therapy theory and literature to understand how the modality might already have the ability to target the areas identified by the first three themes.

The larger consequence of synthesizing the data was the creation of a theoretical framework upon which a future research can be built, eventually resulting in development of a clinical method or an intervention protocol. The thesis, at this stage, was intended to serve as a stepping stone for further research. While other facets of child development are discussed in dance/movement therapy, language development seems to be overlooked because of the spoken and verbal elements involved in language. Hence, the results brought forth another area of intervention where dance/movement therapy may prove to be effective. Related to it is also the potential of highlighting the role of movement development within the context of holistic

development of a child. When these applications were viewed in tandem, the possibility of expanding the use of dance/movement therapy as an early intervention emerged.

CHAPTER 2: LITERATURE REVIEW

2.1 Evolution of Shared Components of Movement and Language Systems

There have been debates on the origins of human language. While one school of thought suggests that it might be an exclusively human ability which emerged due to human beings developing a new neural substrate, other suggest that it may be an evolved version of communication systems already existing in other primates (Fadiga et al., 2006). Instead of treating these as irreconcilable viewpoints, some researchers have tried to study how the two may be co-occurring. Research in neuroscience and evolution has found shared neural pathways and regions for movement and language (Fadiga et al., 2006). But scholars have also found additional areas of the brain which are only present in human beings and support language acquisition and production (Fadiga et al., 2006).

Corballis (2003) proposed that manual gestures used for communication started being supported with vocalization as humans evolved from primates. Initially, gestures and visuofacial movements may have been used for communication, both of which were controlled by the primate homologue of Broca's area (Corballis, 2003). Actions such as lip smacking, tongue smacking and chattering of teeth may have provided sounds to accompany communication, even if they were not intended to create a specific vocal impact (Corballis, 2003). By intentionally adding voice to the gestures, the repertoire of gestures could have been broadened, allowing for a more extensive communication system (Corballis, 2003). With the primitive version of Broca's area being responsible for gestures and vocal actions, it may have evolved further to support more refined use of vocalization (Corballis, 2003). Instead of creating sounds by using body parts like mouth, face and larynx in isolation, they would be used in varying combinations, with the addition of breath support (Fogassi & Ferrari, 2007).

Human beings had capacity for vocalization before spoken language was used, causing some scholars to suggest that the spoken language emerged from early vocal skills (Rizzolatti, Fadiga, Gallese & Fogassi, 1996). However, an opposing view is that while vocal skills may have helped, spoken language emerged only because a movement system existed before it (Rizzolatti, Fadiga, Gallese & Fogassi, 1996). Broca's area processes auditory information but its homologue in other primates, F5, functions to process visual and somatosensory information, both of which would have been involved in the early communication system which comprised gestures and facial expressions (Rizzolatti et al., 1996). Additionally, F5 and Broca's area have each been found to be involved in movements of hands, face and mouth (Rizzolatti et al., 1996). Early vocalization was made possible by simply phonating with the larynx (Rizzolatti et al., 1996). However, production of more sophisticated speech required modulation of the sound that the larynx generated (Rizzolatti et al., 1996). When co-created with other individuals of a social group and with commonly agreed upon rules of communicating, these articulated sounds transitioned from being vocal calls to a codified system of spoken language (Rizzolatti et al., 1996). Research in the field of genetics has lent more evidence to this view. Human beings, but not other primates, now possess the FOXP2 gene which enables sequencing of movements of the face and the mouth to enable production of human speech (Enard et al., 2002). With other species lacking such a gene, the type of vocalization produced does not contain the minute nuances of human speech (Enard et al., 2002).

While the emergence of spoken language is being studied as a neurological evolution, the role of social interactions cannot be discounted. The area of the brain that is most frequently cited in literature on this topic (F5/Broca's area) is where mirror neurons for motor-cognitive functions reside (Fogassi & Ferrari, 2007). Throughout the process of evolution, from gesture-

only communication to primarily spoken communication, this region may have allowed people to imitate the actions or utterances of another individual. It would have been critical for everyone to have a similar response to the observed action or utterance in order to create a "shared" system of communication. Without the ability to replicate the action or utterances of another individual, no one would be able to participate in a conversation and use symbols whose meaning was agreed upon, and hence comprehended, by all. Arbib (2006) has called this the mirror system hypothesis. He points out that without a mirror neuron system a formalized communication system could not have been created. The mirror neuron system originally served a role in acquisition of praxic actions (use of hands to manipulate objects or creature) but its properties allowed it to support acquisition of communication actions (gestural and vocal; Arbib, 2006).

Another way in which movements may have provided a base for evolution of spoken language is by practicing the use of syntax. When gestures were used to communicate, they would over time have acquired specific meaning and have been used in a certain sequence (Corballis, 2003). The sequence would have become more important when vocalization was added to the gestures (Corballis, 2003). A similar use of sequencing and of assigning specific use for words and other verbal components is found in spoken language (Corballis, 2003). This pattern is also visible on an ontological level in the way that typically developing children transition from using gestures, to gesture-word combinations and finally to two-word sentences, when first acquiring language (Iverson & Goldin-Meadow, 2005). As a result, speech sounds could possibly be regarded as being composed of gestures (vocal components in early speech were gestural in nature; Corballis, 2003).

Some researchers have taken a stronger position on this view and suggest breaking down speech into gestural components instead of continuing with the current categorization based on phonetics (Corballis, 2003). According to them, six parts of the vocal system (lips, blade of the tongue, body of the tongue, root of the tongue, velum/soft palate, and larynx) serve as articulators (Corballis, 2003), and their movements could be viewed as gestures, and hence the basic unit of speech. As was the role of Broca's area, early in evolution when gestures were used for communication, it may continue to serve as the place where individual units of meaningless actions/sounds are assembled to create a meaningful unit of conversation (Fadiga et al., 2006). Hence, Broca's area could be considered to be a motor assembly center (Fadiga et al., 2006).

2.1.1 Anatomical and Physiological Basis of Speech

Based on the evolutionary trajectory of human beings and their predecessors, the system that allows for expressive, spoken language now comprises various components which are uniquely human. While there is a significant neurological and cognitive component, there are other biological factors that currently provide support in producing spoken language. With the larynx being positioned at a lower point in the throat, the cavity of the pharynx forms an L-shape, allowing the tongue to move with more dexterity (Anderson, 2004). The shape of the vocal tract is especially useful in producing vowel sounds (Honda, 2015). This composition of the vocal tract might be uniquely human (Anderson, 2004). Human beings additionally have the ability to use the velum to close off the nasal cavity, which enables production of non-nasal sounds and expands the repertoire of phonemes that can be used (Anderson, 2004). Since nasal cavity absorbs a lot of sound, closing it off amplifies vocalizations (Anderson, 2004). Other animals might be able to perform vocalization similarly but would need to adjust the position of

their head (Anderson, 2004). In contrast, human beings naturally have a posture that assists closing of the nasal cavity (Anderson, 2004).

The thoracic region of the spinal cord is larger in humans when compared to other primates (Corballis, 2003). This region houses extra muscles of the thorax (specifically, the intercostal muscles), and abdomen which lend breath support to speech (Corballis, 2003; Huber & Stathopoulos, 2015; MacLarnon & Hewitt, 1999). In addition, these parts have evolved to be better innervated, allowing for more control to be exercised over their movements (MacLarnon & Hewitt, 1999). The diaphragm is the main muscle that promotes inspiration (Huber & Stathopoulos, 2015). As a result of all these adaptations, it is possible to produce a long phrase while exhaling and only pausing to inhale a small amount of air before being able to continue talking (Huber & Stathopoulos, 2015; MacLarnon & Hewitt, 1999). However, this change meant that breathing and swallowing would have the share the same passage, requiring Broca's area and motor cortex to exert advanced control to avoid instances of choking (Corballis, 2003; Fogassi & Ferrari, 2007). Another structure that is larger in humans is the hypoglossal nerve which controls some of the movements of the tongue, facilitating its use for more complex verbal articulation (Corballis, 2003).

A similar focus on accuracy of speech is made possible by the control over subglottal pressure, i.e., control over the air pressure that passes through the larynx to create a sound (Huber & Stathopoulos, 2015; MacLarnon & Hewitt, 1999). When combined with the changes in the larynx, pharynx, and the mouth, subglottal pressure can contribute towards production of precise phonemes (MacLarnon & Hewitt, 1999). It is also tied with the function of the thoracic and abdominal muscles to produce loudness of speech (MacLarnon & Hewitt, 1999). These

structures may have evolved to facilitate human speech but when they present with a structural or a functional problem, they have to be given attention to enable better communication.

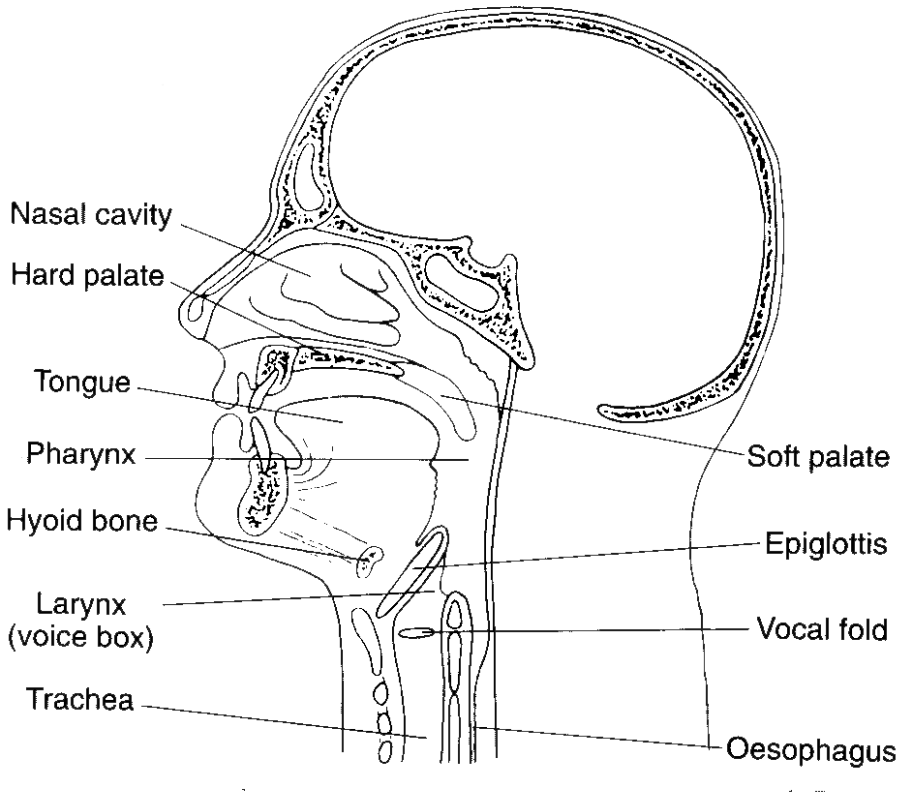

Figure 1. Diagram of the Vocal Tract (University of Pennsylvania, n.d.)

2.2 Relationship between Ontological Development of Spoken Language and Movement

2.2.1 Development

The relationship between development of movement and spoken language has been a topic of discussion in many fields. One of the scholars who focused on it is Kent (1984), who recommended taking a "process" approach to development (multiple actions occur together and interact to create an outcome) instead of adopting a "stage" model (seeing behavior as developing in discontinuing steps where the previous step has to be achieved to move to the next one; Kent, 1984). He elaborated on the role of repetitive, rhythmic patterns which appear in both movement and speech. Since repetition is an important part of the circular reactions in first few substages of the sensorimotor stage of cognitive development[1], it could underlie movement and speech development as well (Kent, 1984).

The organizing nature of rhythm serves as a transition between earlier uncoordinated movements to more controlled movements and to performance of coordinated movements, towards the end of the first year of life (Kent, 1984). The repetitive movements reach a peak at the age of six to seven months, when reduplicated babbling starts (Kent, 1984). Reduplicated babbling is rhythmic repetition of simple syllables, similar to the rhythmic repetition of movements to execute circular reactions (Kent, 1984). The next step in this process is to coordinate movements with speech since both of them are essentially motor systems (Kent, 1984). The coordination between the two systems is discussed in dance/movement therapy, too, in the form of self-synchrony. Kent (1984) viewed development of spoken language as being an auto-organization process because the ability to produce speech transforms with the gains made

[1] For additional explanation of how Piaget's theory of cognitive development conceptualizes language acquisition, refer to section 2.3.2 Psychosocial Development

in performance of movements, control of movements and the cognitive processes required for speech.

Iverson (2010) studied the relationship between motor development and language development. According to him, acquisition of motor skills provides infants with opportunities to practice skills that are related to language acquisition, even before they are required for that purpose. He presented three examples of motor behaviors through which infants can practice certain skills which may later also play a role in learning to communicate. The first was rhythmic arm movement, where a child learns to move their arms, watch that movement and hear the sound made when hitting an object (Iverson, 2010). As these actions occur in synchrony, the child learns the concept of contingency (Iverson, 2010). The same concept re-appears two to three weeks after the rhythmic arm movements are initiated, through reduplicated babbling (Iverson, 2010). Here, the child learns to monitor and adjust their vocal productions based on the contingent auditory feedback they receive when babbling (Iverson, 2010). In both cases, they are expected to be attentive to multimodal stimuli since the infant initiates a concrete action but has to focus on the visual or auditory feedback to then regulate that concrete action (Iverson, 2010).

The second trend that Iverson (2010) observed was that the type of object displacement skills used most often, coincided with the type of vocalization that was used by infants at that age. For example, in the pre-speech period, infants spend more time taking objects apart (Iverson, 2010). However, as they start formulating first words by joining sounds and start forming their vocabulary, they also start putting together objects in different ways (Iverson, 2010). To execute both these tasks, the underlying cognitive ability to understand that certain actions go together is essential (Iverson, 2010). Additionally, taking things apart also provides

them with a rudimentary understanding of the concept of actions that may be reversible (Iverson, 2010). As a result, infants learn how they can combine or break off parts of actions or words to create new ones and expand their movement and vocal repertoire (Iverson, 2010).

A third example provided by Iverson (2010), to link motor and language development is the co-emergence of naming through actions and language. Recognitory gestures tie the two together (Iverson, 2010). These gestures refer the actions which are usually done with an object, but are more stylized as they are representational rather than instrumental (i.e., they are not just done to perform the activity that the object is designed for; Iverson, 2010). Through this process, infants learn to assign meaning and start thinking symbolically (Iverson, 2010). These gestures appear at the same time as the first words do, with both tasks requiring support of similar cognitive processes (Iverson, 2010). Further, as their development progresses, both get decontextualized and applied beyond the immediate setting (Iverson, 2010).

In addition to the cognitive support underlying the simultaneous development of movement and spoken language, Iverson (2010) also discussed how movement could help with acquisition and production of correct speech sounds. This may occur as a result of mouthing objects that a child plays with (Iverson, 2010). Based on previous research, he reported that the age at which children engage in the most amount of mouthing is six to nine months, the same period at which they also start producing first consonant sounds (Iverson, 2010). Mouthing an object closes off the vocal tract, facilitating production of certain consonants that cannot be produced without this closure (Iverson, 2010). The infant gets auditory feedback on their vocalizations and can change them by changing the position of his mouth as having it enclosed around an object provides proprioceptive understanding of its movements and their role in producing different sounds (Iverson, 2010).

The connections that Iverson (2010) noticed between movement and language are not just theoretical assumptions. Several studies have been conducted to understand this relationship. Wang, Lekhal, Aarø and Schjølberg (2012), for example, found a correlation between early communication skills and early motor skills, in children that were assessed at the start and the end of toddlerhood. The correlation was stronger in the direction of motor skills predicting communication skills than vice versa (Wang et al., 2012). Based on the literature that the authors reviewed, they postulated that the results might be reflective of the two skills sharing the same neuroanatomical region. Since the correlation in the opposite direction was weak, they also acknowledged that alongside common neurodevelopmental pathways, there might be separate ones supporting only motor skills or communication skills.

Nip, Green and Marx (2010)'s study brought together movement and speech by focusing on speech motor skills. Based on a sample of infants and toddlers and through a review of existing literature, they found that "prominent" changes occur in lip and jaw movements during the period of acquisition of spoken language. Some of these changes include a shift from using only the jaw to using lips for creating consonant sounds, and using the jaw itself in more varied ways. As cognitive changes also accompany this stage of development, they contribute further to speech acquisition by facilitating faster articulation of movements (Nip et al., 2010). Additionally, the authors tried to explain potential mechanisms where language, movement and cognition intersect. A concept that they focused on was embodied cognition, where cognitive development is hypothesized to emerge from the interaction between the environment, the body, and motor skills. What the concept implies is that movement allows for development of cognitive skills which can support the simultaneously developing language skills (Nip et al., 2010).

More direct pathways between movement and speech were also discussed by Nip at al. (2010). They cited Gallagher (2005), who suggested that spontaneous facial movements of babies allow them to explore different ways of moving their facial muscles, providing information on how they could potentially use them when creating various sounds. This exploration combined with a preference of human faces provides an infant with opportunities to perceive speech movements of adults and then attempt to imitate them (Gallagher, 2005, as cited in Nip et al., 2010). These are called "catalysts" while factors which confound the development of speech motor skills would be called "function constraints" (Nip et al., 2010). The functional constraints are not impairing but are developmentally appropriate and expected. For example, before the age of two years, lower lip movements are not independent of jaw movements, limiting the speech sounds that a child can learn to produce (Green et al., 2002, as cited in Nip et al., 2010). This is limitation in phonetic repertoire may result in a smaller vocabulary of words that can be produced, even if they are present in a child's lexicon for comprehension. Presence of functional constraints is nonetheless part of typical development and is overcome as the child grows.

2.2.2 Delays/Deficits/Impairments

The overlap between speech and movement systems is apparent in not just their development, but also in cases of delays, impairments or deficits. Gaines and Missiuna (2007) conducted assessments on toddlers who were diagnosed with speech/language delays and followed-up with them at around the age of five years. At the time of the follow-up assessments, they discovered that many of the children showed signs of speech/language learning deficits. In addition, they also showed signs of developmental coordination disorder (problems with manual dexterity and static/dynamic balance), a disorder of movement skills that prevents children from

successfully engaging in activities of daily living. Since the study only establishes a possible correlation, the researchers did acknowledge that more studies were needed to understand this relationship better and to learn whether either of the two factors can be used to predict the development of the other factor, as children move from toddlerhood to school-going age.

A study by Owen and McKinley (1997), comprising of 16 children with speech and language disorders, in the age range of four to seven years, found that these children showed more motor deficits in comparison to a control group. However, the focus of the deficits here was only on speed of performance of a hand motor task, as a part of a standardized test (Owen & McKinley, 1997). While the researchers did not comment on the direction of interaction, they did suggest that the link between the two types of deficits necessitates that both, professionals and parents, pay attention to motor deficits right from the time a child is diagnosed with a speech and language disorder.

Visscher et al. (2010), similarly, studied children with developmental speech and language disorders for their gross motor skills. Using a standardized test of gross motor skills, and matching 105 diagnosed children with a control group, they discovered that children with delays performed worse on subscales measuring locomotion and object control. The older children did perform better than the younger ones, but at all ages, the performance of children with delays did not appear on the same level as that of children in the control group. Like Owen and McKinley (1997), they too highlighted the need for early intervention for children with developmental speech and language disorders. Additionally, the study discussed how similarities in neurological pathways for speech and motor functions causes a stronger relationship between motor performance and speech in comparison to motor performance and language. However, the relationship is strongest when a child has deficits in both language and

speech since each of their relationship with motor performance combines to create a larger effect (Visscher et al., 2010).

The trend of co-occurring motor and speech impairments is not one that has only been found a few individual studies. Rechetnikov and Maitra (2009) conducted a meta-analysis to provide a more comprehensive understanding of the relationship between motor and speech impairments. Based on 16 studies, with a combined sample of 621 children with impairments and 446 typically developing children, Rechetnikov and Maitra (2009) found that children with speech impairments showed motor impairments in three different ways – less motor score than typically developing children, more motor errors, and taking more time in completing the assigned motor task. They explained that cognitive abilities and motor abilities are related. With language being a cognitive ability, an impairment in speech or language could affect motor abilities and vice versa (Rechetnikov & Maitra, 2009). Rechetnikov and Maitra (2009) briefly looked at other studies which were not a part of the meta-analysis itself, as well, and discussed how this trend is visible across a whole range of speech and language disorders. Examples include specific language impairments, dyslexia, autism, and attention-deficit/hyperactivity disorder (Rechetnikov & Maitra, 2009).

2.3 Additional Factors Affecting Development of Spoken Language

2.3.1 Development of Gestures

Within the realm of movement development, use of gestures has been given attention with regards to its relationship with acquisition and production of spoken language. There are various ways in which the two can be related, including speech dependent gestures (gestures that accompany speech) and speech independent gestures (gestures that are meaningful by

themselves and can be used without speech). In addition, gestures have been found to be used to compensate for speech-related problems (Iverson & Braddock, 2011). Many scholars view gestures and language as an integrated communication system instead of treating them as isolated functions (Wray, Saunders, McGuire, Cousins & Norbury, 2017). According to Iverson and Braddock (2011), "gesture is an interface between language and action and, as such, is a product of a unique constellation of motor, symbolic, cognitive, and linguistic abilities" (p. 84).

When a child starts producing their first words, the words in their gestural vocabulary appear in their spoken words (Iverson & Goldin-Meadow, 2005). The child then learns to produce gesture-plus-word combinations, a behavior that has been found to predict the ability to use two-word combinations (Iverson & Goldin-Meadow, 2005). The budding gestural use and gesture-plus-word combinations serve as indications to caregivers that the child is ready for more complex conversation, enabling opportunities for language acquisition and production (Iverson & Goldin-Meadow, 2005). Results from research on children with intellectual disabilities (Vendereet, Maes, Lembrechts & Zink, 2011) resemble the findings from Iverson and Goldin-Meadow (2005)'s study. They may not follow the same timeline as that of typically developing children but follow the same sequence of acquiring gesture-word combination before two-word speech (Vendereet et al., 2011), and show the use of deictic gestures when requesting and commenting (Özçalışkan, Adamson & Dimitrova, 2006; Vendereet et al., 2011). However, the frequency of and diversity in spoken language, in children with intellectual disabilities, may be less in comparison to typically developing children (Vendereet et al., 2011).

Alamillo, Colletta and Guidetti (2013) focused on different types of gestures and different components of expressive language to understand how they may be used in tandem. By comparing groups of 6-year-olds with 10-year-olds, on a narrative task and an explanatory task,

they discovered that for both forms of expressive language use, complexity of gestures increases with age. The types of gestures that appeared frequently with the two tasks were representational (a gesture that symbolizes an object or an idea), discursive (a gesture directly related to speech, which highlights some of the linguistic features being used) and framing (gestures that express mental state of the speaker; Alamillo et al., 2013). Children who were confident with interactive use of speech were more likely to use gestures for pragmatic and interactive reasons instead of using discursive or framing gestures (Alamillo et al., 2013). While the former group of children seemed to use gestures to support their verbal expression, the latter group used gestures to engage other members in the conversation (Alamillo et al., 2013).

Gestures develop similarly even in children that have a condition which may create a barrier in language acquisition or production. While children with language impairments have been found to use and imitate gestures with less accuracy, the rate of gesturing may show no difference from that of other children (Wray et al., 2017). The struggle with accuracy has been explained as having been caused by deficits in motor abilities (Wray et al., 2017). In terms of rate of gesture use, a similar result was found in a study comparing the use of non-redundant speech gestures (a gesture representing something that is not explicitly stated in accompanying speech), in typically developing children and children with specific language impairments (Mainela-Arnold, Alibali, Hostetter & Evans, 2014). According to some research, the rate might be higher in children diagnosed with specific language impairments to facilitate not only verbal expression but formulation and conceptualization of a message (Mainela-Arnold et al., 2014).

A study by Özçalışkan et al. (2006) compared use of expressive language and gestures in typically developing children and children with autism spectrum disorder. The two areas of expressive language that the researchers focused on were requesting and commenting while the

gesture types studied comprised “deictic” (pointing at or holding up an object), “give” (extending hands to request something), “conventional” (gestures that have a culturally-relevant meaning) and “iconic” (for conveying the attributes related to an object). The Expressive Vocabulary Test served as the assessment tool for collecting data at the start of the study and a year later (Özçalışkan et al., 2006). In both groups of children, deictic gestures predicted range of vocabulary, since deictic gestures are used to indicate objects or point at them, providing opportunities for interactions and hence language acquisition (Özçalışkan et al., 2006). Children with autism spectrum disorder showed less deictic gestures when compared to typically developing children. The lack of self-initiated joint attention through less use of deictic gestures (a common characteristic of autism spectrum disorder) led to limited language acquisition and eventual use of expressive, spoken language (Özçalışkan et al., 2006). Iverson (2010)’s proposition that movement development might allow practice of cognitive abilities required for spoken language (see section 2.2.1 Development) is reiterated through the link that (Özçalışkan et al., 2006) found between use of deictic gestures, joint attention, interactions and use of expressive language.

2.3.1.1 Reduction of cognitive load through use of gestures. Despite the varying foci of the studies done on this topic, many of them highlight the role that cognitive processes play in both movement and speech. Gestures are thought to reduce cognitive load because one gesture can be expressive in itself and be used to express multiple things (Iverson & Braddock, 2011). In contrast, producing spoken language requires organization of units of language into a hierarchical structure to create a larger, meaningful unit which can then be used for communicative purposes (Iverson & Braddock, 2011). As a communication task gets more

cognitively demanding, use of gestures, especially in a compensatory way, may increase (Wray et al., 2017).

Gestures may reduce cognitive load because unlike words, which have a conventional form and need to be used in specific ways, gestures can be created spontaneously (Özçalışkan & Goldin-Meadow, 2005). Less cognitive demand by gestures might also explain why infants start with gesturing and then proceed to use speech when their cognition starts developing enough to support it. Even when considering only gestures, there are variations in how different types are used. Younger children use deictic gestures (referent action which can be used in multiple settings) more frequently than conventional or iconic gestures (usually language-bound and culture-bound; Özçalışkan et al., 2006) since the former require less strenuous cognitive processing.

Reduced cognitive load may also spring from the type of content being expressed and cognitive processes involved. For example, when the topic of conversation is visuospatial in nature it may be easier to express it through a gesture than through words (Iverson & Goldin-Meadow, 2005). Even when the conversation involves other content, gesturing can be helpful since it allows for a thought to be externalized and processed using a different system instead of putting all of the processing load on a single system (Iverson & Braddock, 2011).

2.3.2 Psychosocial Development

Language acquisition and production do not occur in a vacuum. It is equally important to be cognizant of the social context and psychological processes that support them. Condon and Sander (1974) suggested that infants start synchronizing with adult speech even before they start producing it. By doing a frame-by-frame microanalysis of infant-adult interactions, the

researchers found a shared rhythm between the speech used by adults and the movements of an infant. As an infant continues to move this way, they are better able to learn the linguistic rhythms of the culture that they are being raised in (Condon & Sander, 1974). While the infants have yet to use verbal language, their movements and vocalizations give them the ability to learn how different aspects of spoken language (speech rhythm, syntactic hierarchies, intonation, prosody, pitch, body movements accompanying speech, etc.) are organized in their culture (Condon & Sander, 1974).

Even some of the most revered theories in psychology have acknowledged the interaction of developing psychological processes with one's environment. Piaget and Inhelder (1969) stated that the capacity for symbolic thought is necessary for language development. But they gave equal emphasis to sensorimotor development. Initial development of language requires the ability to attend to auditory stimulation in the environment and slowly distinguish phonemic sounds that are specific to the language that the child is exposed to (Piaget & Inhelder, 1969). Additionally, the child needs to be able to imitate these sounds, thus engaging the motor system (Piaget & Inhelder, 1969). Developing memory serves as a bridge between learning a speech sound and producing it at a later point, because deferred imitation of the sounds necessitates that they be retained (Piaget & Inhelder, 1969).

In a study following children with autism spectrum disorder longitudinally, for four to five years, Bopp and Mirenda (2011) found various predictors for receptive and expressive spoken language. Joint attention and involvement in games and routines could predict both types, with expressive language additionally being linked to the use of conventional gestures (Bopp & Mirenda, 2011). With further statistical analysis, Bopp and Mirenda (2011) found games and routines as being most strongly associated factor with language production, over the

course of the research. The reason for these findings was that skills such as joint attention, initiation of an interaction, responding to an interaction initiated by another person, taking turns, imitating, using gestures, and engaging socially, were all practiced through games and routines (Bopp & Mirenda, 2011). These skills lay the foundation for language development regardless of the severity or presence of autism spectrum disorder (Bopp & Mirenda, 2011).

Charman, Baron-Cohen, Swettenham, Baird, Cox and Dew (2000) adopted a slightly different perspective. They acknowledged the factors that Bopp and Mirenda did (2011) highlighted but stated that it is important to remember the purpose of these factors. While play and imitation can involve social goals, there are times when they are primarily concerned with inanimate objects (Charman et al., 2000). On the other hand, joint attention is always intended to be social in nature as it involves another person (Charman et al., 2000). Hence, depending upon the context of interaction, these factors might help develop language associated with objects or social life, while simultaneously fostering other skills required to engage with objects/people.

Treating verbal and nonverbal communication as distinct categories fails to acknowledge the fact that they often occur simultaneously. While words can clarify nonverbal cues, nonverbal cues can provide information in addition to that provided by words. Thus, in the context of spoken language, these elements are just as important as being able to physically produce meaningful speech sounds. Mundy, Sigman and Kasari (1990) studied gestural joint attention in children with autism and mental retardation, and its effect on language development. Joint attention was one form of nonverbal communication they emphasized but their framework for understanding nonverbal communication also comprised “social behavior” and “requests”. Social behavior encompassed appealing, turn-taking inviting and teasing (Mundy et al., 1990). Behaviors that were classified as requests included reaching, appealing, giving and pointing

(Mundy et al., 1990). The chosen markers for joint attention included alternating attention between an object and a person, pointing to gain attention of a communication partner, showing the partner an object, and looking at the object/person when the communication partner initiated joint attention (Mundy et al., 1990). Such a structured study of nonverbal cues implies that they are crucial for learning effective communication.

2.3.2.1 Joint attention. Joint attention was a term first used by Jerome Bruner (Bottema-Beutel, 2016) to capture the process of "establishing common ground in general interactive activities" (Gong & Shuai, 2012, p. 4643). It is triadic in nature as it involved the child, the caregiver and an object (Bottema-Beutel, 2016). Initiating and responding to joint attention involves a range of "socio-cognitive abilities" which can be verbal (using spoken language) or nonverbal (gazing, pointing) in nature (Gong & Shuai, 2012). Like some of the other cognitive processes involved in language acquisition, joint attention is not exclusively a linguistic process. Signs of it starting emerging at the age of six months but it can be used more concretely by the age of 12-18 months, when a child produces their first words (Bottema-Beutel, 2016; Gong & Shuai, 2012).

Joint attention is a concept which is composed of various parts. It includes responding to and initiating instances of joint attention (Bottema-Beutel, 2016). Pointing and other gestures, gazing and spoken language are some of the ways in which joint attention can be maintained (Bottema-Beutel, 2016). When a child can successfully shift focus back and forth between the other two entities in the joint attention triad (the object and the mother), it is called coordinated attention (Bottema-Beutel, 2016). If the focus between the two is not balanced, the child may show other types of joint attention – supported joint engagement (child focuses on the object and does not actively refer to caregiver) or coordinated joint engagement (child gives attention

exclusively to the caregiver at key moments in the interaction; Bottema-Beutel, 2016). An equal attention to the object and the caregiver is observed when a child produces their first words (Vuksanovic & Bjekic, 2013). However, in order to develop language skills further, instances of coordinated joint engagement are more helpful as additional focus on the caregiver is required to elicit a verbal response from them (Vuksanovic & Bjekic, 2013).

There are two different approaches to understanding joint attention. The social-cognitive theory of joint attention proposes that certain social behaviors reflect a child's ability to understand others as individual entities with their own intentions (similar to theory of mind) and hence form the basis for symbolic thinking (Gillespie-Lynch et al., 2015). This aids language acquisition because language itself is composed of symbols and because viewing others as an entity independent of the self allows a child to communicate with others (Gillespie-Lynch et al., 2015). The other approach is based on the parallel and distributed processing theory in which joint attention is considered to be a result of the increasing capacity to process more information at once (being attentive to the self, the object and the caregiver while also being aware of the relationships between each part of the triad; Gillespie-Lynch et al., 2015).

In a study examining the role of joint attention in the use of pragmatic and structural language, by children with autism spectrum disorder, the two approaches were given attention (Gillespie-Lynch et al., 2015). While pragmatic language is more related to social-cognitive theory, structural language is associated with the parallel and distributed processing theory (Gillespie-Lynch et al., 2015). After administering three standardized tests, at the ages of 12 months, 18 months and six years, the researchers found that initiation of joint attention showed stronger association with structural language as it allowed children to practice more complex information processing, a skill required to produce language which is phonologically articulate,

grammatically structured, and meaningful (Gillespie-Lynch et al., 2015). These findings aligned with previous suggestions that joint attention is a form of executive function (Gillespie-Lynch et al., 2015).

Gillespie-Lynch et al. (2015) also uncovered that responding to joint attention had relatively weaker correlation with structural and pragmatic language. However, they hypothesized that it may be because responding to joint attention could be a more passive process in comparison to initiating joint attention (Gillespie-Lynch et al., 2015). To support their hypothesis, they also discussed how gestural initiation was more strongly related to language than using one's gaze for joint attention because the former may require more actively involvement (Gillespie-Lynch et al., 2015). An earlier study, based on children with autism spectrum disorder and children with mental retardation, likewise, found that gestural initiation of joint attention was associated with expressive and receptive language (Mundy et al., 1990).

Vuksanovic and Bjekic (2013)'s study, too, came to a similar conclusion with regards to active participation in moments of joint attention. They explained that when compared to gazing, gesturing (towards an object, in the case of this study) initiated by a child indicates that they are more capable to participate in an interaction and willing to learn about the object being pointed at (Vuksanovic & Bjekic, 2013). Additionally, it provides more clarity regarding what object the child is referring to and allows the parent to maintain the child's attention by facilitating better interaction with the correct object of interest (Vuksanovic & Bjekic, 2013). The same study also found that typically developing children used verbal and nonverbal cues simultaneously to communicate but late talkers used either one at a time (Vuksanovic & Bjekic, 2013). Because of that the late talkers fell into a cycle of experiencing less instances of joint

attention, less opportunity to interact and acquire language, and hence less use of spoken language in comparison to same-aged, typically developing peers (Vuksanovic & Bjekic, 2013).

Production of language also involves being able to express one's emotions. Joint attention provides opportunities for a child to share their affect with a caregiver (Mundy et al., 1990). It may involve their current mood or an emotional reaction to the object or the task which they mutually focus on (Mundy et al., 1990). Even if done nonverbally initially, the support shown by the parent and their labelling of affect can encourage a child to express themselves when they develop the ability to do so verbally. It is possible that since children with autism do not experience as much joint attention as typically developing children, emotional speech might not be completely developed or stay absent from their repertoire (Mundy et al., 1990).

2.3.2.2 Perspective taking. Being able to understand another person's perspective is essential to speak in a socially appropriate. A concept closely associated to perspective taking is of theory of mind, i.e. the ability to attribute "beliefs, desires, intentions and emotions to people" (Astington & Jenkins, 1999, p. 1311). Its relationship with receptive and expressive language is complex because various findings exist to support different directions of causation (Astington & Jenkins, 1999). However, the area where theory of mind can help develop expression is by contributing towards pragmatic skills (Astington & Jenkins, 1999). There is also some support for the view that a third factor, such as executive function and/or working memory, may play a role in development of both theory of mind and language (Astington & Jenkins, 1999).

Theory of mind is a complex concept and its relationship with language varies based on degree of theory-of-mind that makes up the context of conversation (Happé, 1993). First-order intentions help a person understand what a person's thoughts and beliefs are (e.g.: "Person A thinks that…"; Happé, 1993). Second-order intentions move a step further by focusing on what

that person may think of a third person's thoughts and beliefs (i.e. "Person A thinks that Person B believes in…"; Happé, 1993). According to some research on people with autism spectrum disorder, the degree of theory-of-mind is associated with the type of literary devices that people can understand and use in conversations (Happé, 1993). Metaphors were accessible only if a person had an understanding of second-order intentions, irony was related to being able to understand first-order intentions, and similes could be understood and used even by participants without a theory-of-mind (Happé, 1993).

Understanding intentions of other people has been linked to narrative speech as well. Demir, Levine and Goldin-Meadow (2015) used a story telling task to learn about narrative speech in early childhood. The children in the study were asked to watch a wordless cartoon and then describe what they saw. The two factors that were found to facilitate structured narratives were gestures and being able to take the perspective of a character (Demir et al., 2015). They were visible in the form of "character-viewpoint gestures" (Demir et al., 2015, p. 665) where gestures were used to support narration from a character's perspective (Demir et al., 2015). It is reflected on a larger movement level through alignment of one's own movements with those of a character (Demir et al., 2015). In contrast, describing a narrative based on own observations is called "observer-viewpoint gestures" (Demir et al., 2015, p. 665).

2.3.2.3 Memory. In terms of the psychological processes which may support spoken language, memory was suggested as being involved from as early as the 19th century (Buckingham, 2003). Some of the medical professionals who believed in this concept explained articulation of speech as a type of memory (Buckingham, 2003). According to them, speech limbs (tongue and lips) provided movement and sensory information which was stored in memory with more practice of speech production (Buckingham, 2003). Since Broca's area is

involved in execution of other movements as well, it was hypothesized that speech memories were stored there and evoked when needed for articulation (Buckingham, 2003). However, this only explains the phonological aspects of speech.

Formulation of spoken language also involves a process of "unification" of other types of memory, since there are other components of speech (Hagoort & Levelt, 2009). Semantic, syntactic and phonological memories have to be accessed and then combined into larger structures to create coherent speech (Hagoort & Levelt, 2009). According to some research, Broca's area may play a role in creating syntactic movements and may work in tandem with brain areas in temporal regions to activate other types of memories (Hagoort & Levelt, 2009). The resulting unification of these memories with facilitation of phonating could be a result of Broca's area being involved in production of both words and sentences (Hagoort & Levelt, 2009). Broca's area has also been found to be involved in production of actions and music, both of which involve movements which may be involved in speaking (Hagoort & Levelt, 2009).

2.3.2.4 Executive function. The cognitive process of consciously controlling "thought and behavior directed toward a goal" is called executive function (Miller & Marcovitch, 2015, p. 101). Problem-solving, delayed gratification and imitation are some of the other processes which constitute executive function (Miller & Marcovitch, 2015). While some form of these processes may be evident from a younger age, a more conscious attempt to execute goal-directed behavior may start developing in the second year of life (Miller & Marcovitch, 2015). According to Miller and Marcovitch (2015), executive function can contribute towards language production in different ways due to the number of processes involved in it. It is rooted in the ability to create mental representations and then modify them or merge them with other representations to reach a goal (Miller & Marcovitch, 2015). With language being inherently

symbolic in nature, mental representations are crucial in using language (Vuksanovic & Bjekic, 2013).

It is equally essential to be able to retain communication-related information for the duration for which it has to be processed and used in an interaction (Miller & Marcovitch, 2015). Hence, memory is also tied to executive function. Joint attention is an additional process associated with executive function because engaging in joint attention requires coordination of self-regulation with balancing of attention between an object and another person (Miller & Marcovitch, 2015). Just as it is important to engage with someone, it is important to know when to hold oneself back. When researching the quality of executive function in children with specific language impairments, Henry, Messer and Nash (2012) found that these children scored lower than typically developing children on a task of nonverbal inhibition. Verbal inhibition was also tested but was not significantly associated with executive function (Henry et al., 2012). Nonetheless, being able to inhibit an inappropriate response (verbal or nonverbal) is necessary for communicating (Henry et al., 2012). Expressing oneself through spoken language requires equal cognizance of when a person should avoid speaking.

Socialization is another process intricately connected to executive function. Coordination of various cognitive processes through executive function makes it possible to process the information that a child receives (through various senses) and reflect on it before internalizing parts of it (Miller & Marcovitch, 2015). As it starts shaping a child's understanding of their world, further socialization is welcomed based on existing views (Miller & Marcovitch, 2015). This process seems to resemble the concept of assimilation and accommodation, proposed by Jean Piaget. When learning a language, this process is evident in the form of starting with acquisition of more basic components of language before picking up on more complex parts. To

produce language, it is also important to understand the social context in which it is being used and the context of the conversation itself. In addition, different types of memories may need to be activated. Hence, many cognitive processes are beckoned alongside social awareness.

2.3.2.5 Information processing. Information processing has been found to be linked to the speed at which speech can be produced (Nip & Green, 2013). With information processing in its budding stages in childhood, children tend to pause frequently in their speech (Nip & Green, 2013). This pattern is especially evident in the case of spontaneous speech where greater demand is placed on different cognitive processes to generate new sentences (Nip & Green, 2013). However, when children produce simple, repetitive speech, speed of speech articulation is much faster (Nip & Green, 2013). The trend of faster rate of speech production for less demanding speech continues into young adulthood as well but by that point, information processing is mature enough to allow for quicker production than in childhood (Nip & Green, 2013). Thus, information processing affects speech in two ways – based on age (maturation of information processing) and based on type of speech being produced (simple/rehearsed or spontaneous). The effect of cognitive load in production of language appears in the case of spoken language just as is does in the case of gestural communication (see section 2.3.1.1 Reduction of cognitive load through use of gestures). This view is lent more credibility if the hypothesis of speech being an evolved form of gestures (Corballis, 2003) is accepted.

2.4 Clinical Implications of Relationship between Movement and Spoken Language

2.4.1 Speech-based Interventions Incorporating Movement

The Lee Silverman Voice Treatment (LSVT) program is a well-established program in the field of speech and language pathology, which has combined speech interventions with

movement interventions (Fox, Ebersbach, Ramig & Sapir, 2012). It has been developed for individuals with Parkinson's Disease but might be applicable to other populations (Fox et al., 2012). LSVT Loud is an intervention which targets speech motor system by working on the amplitude (loudness) of the voice (Fox et al., 2012). LSVT Big, on the other hand, focuses on exaggeration of movements to target the limb motor system (Fox et al., 2012). In both the interventions patients are encouraged to be as loud or as big as they can be in order to help them understand that what they may be perceiving as being exaggeration might be the normal way to speak/move, but feels bigger due to changes in their sensorimotor perception (Fox et al., 2012). By playing back an audio recording of their voice (LSVT Loud) or a video recording of their movements (LSVT Big) the patients can be helped in adjusting the amplitude of their voice and the size of their movements (Fox et al., 2012). Out of the two interventions, LSVT Big is the one that gives equal attention to movements. However, its aim of facilitating improved movements as a part of a speech-oriented intervention runs in the opposite direction to the question posed by this thesis.

Many of the muscle groups involved in speech production are also involved in maintaining a balanced, upright posture (Huber & Stathopoulos, 2015). Both walking and talking are, in essence, functions of these same parts (Huber & Stathopoulos, 2015). This connection is evident when one considers the fact that performing the two tasks together requires deeper breaths since these muscles are engaged in double the work, causing fatigue sooner than if each were being done in isolation (Huber & Stathopoulos, 2015). Based on this relationship, it could be inferred that interventions targeting balance and walking could indirectly target speech production by strengthening the same set of muscles. Similarly, muscles involved in breathing could be strengthened to provide breath support to speech. A study combining the LSVT

program with speech-breathing training and physical therapy, for a patient with traumatic brain injury, found that it was effective in improving breathing in general and speech-related breathing, which led to improved intelligibility of speech (Solomon, Makashay, Kessler & Sullivan, 2004).

Prompts for Restructuring Oral Muscular Phonetic Target (PROMPTS) is an approach informed by neurological and muscular underpinnings of speech production (Rogers et al., 2006). Rogers et al. (2006) adapted it for children with autism spectrum disorder. The first of its nine core elements is using tactile-kinesthetic information in order to integrate linguistic skills with cognitive and motor skills (Rogers et al., 2006). But it also focuses on psychosocial factors like providing opportunities for reciprocal interaction and making choices (Rogers et al., 2006). The initial focus is on using sounds to make requests, during playtime with a therapist. The therapist tries to model speech sounds and may physically manipulate some of the body parts involved in speech production (Rogers et al., 2006). Over time, the therapist tries to help a child in creating speech sounds based on visual cues such as a therapist's hand movements (Rogers et al., 2006). Eventually, these sounds are produced without external cues and woven together in later phases of the treatment to create words and sentences (Rogers et al., 2006). PROMPT has also been tested for adult aphasia and seemed to improve precision with which speech movements were created and their sequencing for producing imperatives and declaratives (Bose, Square, Schlosser & van Leishout, 2001).

Brüll (2003) introduced an intervention called speech-movement therapy which was based on two concepts – sense of word and eurhythmy. Rudolf Steiner proposed the idea that sense of word is one of the twelve senses (Brüll, 2003). It helps a child in understanding speech sounds created by other individuals through synchronous vibration of their own larynx (Brüll,

2003). The nervous system can then help the child reproduce that sound consciously when producing speech. This proposition was supported by William Condon's work on the role of interactional synchrony in communication (Brüll, 2003). He suggested that interactional synchrony is achieved when the speech of a speaker directly influences the body movements of a listener (Brüll, 2003). Eurythmy was another concept proposed by Steiner and refers to a form of communication where each speech sound had a corresponding gesture (Brüll, 2003). He hypothesized that "flowing" through the gestural movements would translate into a flowing speech (Brüll, 2003). Brüll (2003) tried to design an intervention incorporating these two concepts and presented two cases of specific language impairment to support it. She followed one of them over eight years and found speech-movement therapy to be useful in learning how to create speech sounds, being intelligible, and communicating with questions and information.

An interesting intervention focused on speech and movements is a technique called mental practice. It involves cognitively rehearsing the movements instead of doing them physically (Page & Harnish, 2012). It has been called a "mind-body" intervention due to its emphasis on the connection between cognitive and physiological basis of movement (Page & Harnish, 2012). The aim is to prevent areas of the brain where speech and language reside from contracting due to disuse (Page & Harnish, 2012). Page and Harnish (2012) hypothesized that when patients require additional effort to practice motor skills, are unsuccessful, or discouraged from using compensatory strategies, they end up not using these skills as much, resulting in the neurological pathways devoted to speech, language and movement becoming smaller and less efficient through disuse. Past literature has found mental practice to be effective for other movement-related impairments with a neurological basis (Page & Harnish, 2012). Hence, the authors propose that speech movements could also benefit from the intervention. While it seems

effective for patients with acquired aphasia its application with children acquiring speech for the first time needs to be questioned. Adults with aphasia, having already developed the necessary skills, can understand how to practice them cognitively. But for children who are yet to master those skills, a cognitive representation of the speech movements might not even exist. Children who lose the ability to speak after having learned at least a bit of it might find it more useful than children who have developmental delays or who have never developed these skills.

2.4.2 Movement-based Interventions for Production of Spoken Language

Movements have been used as a part of speech-based interventions in various ways. Based on a study of children with specific language impairments, Mainela-Arnold et al. (2014) recommended creation of more interventions where gestures are promoted as means of communication. Gestures have been found to provide access to one's lexicon, especially since the vocabulary acquired early in the process of spoken language development may have first been acquired in the form of gestures (Iverson & Goldin-Meadow, 2005; Mainela-Arnold et al., 2014). They may especially be helpful when planning the utterance of content which has visual and spatial components in it (Iverson & Goldin-Meadow, 2005; Mainela-Arnold et al., 2014). In cases where gestures (and/or arms movements) and words are used simultaneously for treatment of a speech disorder, gestures could serve as cues for producing its corresponding word (Rose, 2006). By practicing the two together, the use of gestures might elicit associated speech sound as the two may have been processed and stored as a single unit of information. Instead of treating speech sound as a separate entity, it might get coded as a movement activity (a form of gesture). While Rose (2006) does not discuss this possibility, it does seem to align with the evolutionary view of emergence of speech from a gestural system where speech movements are

considered to be a type of gesture (Corballis, 2003; Fadiga et al., 2006). It also appears to follow the same basic concept as eurhythmy (Brüll, 2003).

Using gestures as stepping stones was also recommended by Demir et al. (2015). Their focus was specifically on improving narrative skills. Based on their research with a group of school-aged children, they proposed that exercises of narrative reproduction should be designed with space for practicing "bodily perspective" of the characters (Demir et al., 2015). The "character-viewpoint gestures" (p. 677) facilitated a deeper understanding of the intentions behind the characters' action and the consequences that followed. Working on this skill not only allows more accurate narration of what the characters experienced but may help in narrating with a more coherent structure (Demir et al., 2015).

Another intervention where movement has been incorporated is reciprocal imitation training, where children with autism spectrum disorder are taught to imitate various communicative actions (Ingersoll & Lalonde, 2010). Ingersoll and Lalonde (2010)'s research comprised learning object imitation (using the same toy as the child to model an action with it) and gesture imitation (modelling gestures related to the play that the child is engaged in; Ingersoll & Lalonde, 2010). Verbal input from therapists comprised labelling actions and/or elaborating on them (Ingersoll & Lalonde, 2010). At the end of the intervention, all of the participants showed an increase in their use of language that was appropriate for the conversational context (Ingersoll & Lalonde, 2010). Gesture imitation was considered to be more effective than object imitation because children were more likely to repeat verbal markers that accompanied the gestures of a therapist (Ingersoll & Lalonde, 2010). A possible explanation for it is that gesture are inherently communicative, causing the children to focus on therapists' verbalization more when using gestures than when moving with an object (Ingersoll & Lalonde,

2010). Nonetheless, the two forms of training provided opportunities for interactions and joint attention, both of which promote practice of communication skills (Ingersoll & Lalonde, 2010).

An earlier study with a multiple baseline design used two similar techniques (Ingersoll & Schreibman, 2006). "Contingent imitation", the first technique, referred to imitating the actions that the child made with the toys, their gestures and their vocalizations (Ingersoll & Schreibman, 2006). Its intention was to gain their attention and elicit a response (Ingersoll & Schreibman, 2006). The second technique was "linguistic mapping", where the therapist and the child performed the same movements with the addition of the therapist providing a continuous commentary of what they were doing (Ingersoll & Schreibman, 2006). A part of the study also involved imitation by the therapist but in a nonverbal fashion (Ingersoll & Schreibman, 2006). Based on the findings, Ingersoll and Schreibman (2006) concluded that nonverbal imitation helped with imitative speech but the gains in spontaneous speech were attributable to the two main techniques (Ingersoll & Schreibman, 2006). One of the identified mechanisms was that contingent imitation promoted maintenance of eye contact which lead to increased joint attention and hence focus on what the therapist was doing or saying (Ingersoll & Schreibman, 2006). The authors recommended further research to uncover the catalysts for the relationship between these techniques and production of spoken language.

2.4.3 Interventions to Tackle Psychosocial Factors Related to Problems with Spoken Communication

Iverson and Braddock (2011) are researchers who have recognized that need to address additional needs of children who may struggle with spoken communication, by intervening on a movement-level. Their research and various other studies have found movement to be useful in facilitating development of expressive, spoken language. However, Iverson and Braddock

(2011) point out the fact that many children with language impairments may have impairments in movement skills, which are also important to tackle. In the process of working on movements, a therapist could target some communication skills while also allowing for practice of movement skills which might help a child engage in more interactions and in getting involved in activities that stimulate a sense of inclusion with peers or family (Iverson & Braddock, 2011). Their suggestion implies that the child needs to be considered to be a whole individual, and not as being their condition/diagnosis.

Charman et al. (2000) took a similar approach while discussing the results of their longitudinal study. They focused on numerous psychosocial skills by considering them to be a part of a "shared social-communicative representational system" (p. 481). These skills were hypothesized to provide a cognitive and social basis to develop spoken language (Charman et al., 2000). Their suggestion to focus on joint attention and imitation as two of the relevant skills was supported by previous literature on early intervention for autism (Charman et al., 2000). However, their own study also found play and theory of mind as important factors in expressive language. Hence, these factors, too, could be addressed in an intervention for improving speech.

In contrast, Henry et al. (2012) recommended focusing on smaller interventions which can be embedded in daily interactions. They also suggested designing interventions for children with specific language impairments where the primary focus is not on language. For example, providing hints when a child struggles with planning tasks and offering reminders when impulse control is difficult can draw their attention to being more intentional with these executive functions (Henry et al., 2012). With improved social interactions that would follow, opportunities to practice social language may increase. Additionally, executive function can allow a child to use novelty in problem-solving or interactions (Henry et al., 2012). When

applied to the context of language production, it can be inferred that improved executive function may help the child phrase their sentences differently or find alternate words when struggling to produce a word or a sentence. Through such small interventions, an improvement in speech production may be an outcome without the pressure of mastering a skill, which may accompany a more concentrated intervention.

Social communication is an area that may especially benefit from interventions for psychosocial development. The psychosocial processes discussed in some of the previous sections can contribute towards social communication. Additionally, theory-of-mind may serve as a helpful process. Baimel, Severson, Baron and Birch (2015) wrote an article connecting behavioral synchrony with theory-of-mind. They posited several hypotheses, all in the direction of behavioral synchrony leading to theory-of-mind. Being involved in a synchronous action can help in assigning personhood to other individuals, a prerequisite for being able to then assign intentions and beliefs to them (Baimel et al., 2015). It also helps in decreasing the "psychological distance" between oneself and others and in improving social cognitive processes (Baimel et al., 2015). Further, behavioral synchrony can act as a stepping stone in development of more complex theory-of-mind (Baimel et al., 2015). When everyone is engaged in the same behavior, it is easier to understand some parts of their experience as processing similarities is less cognitively demanding (Baimel et al., 2015). For children than may be struggling with even first-order theory-of-mind (Happé, 1993), it may prove useful to first use synchrony as a way to develop theory-of-mind and then progress to higher degrees of it.

Before any of these factors can be practiced it is crucial to create an environment where the child feels safe to acquire language and speak. Koegel, O'Dell and Koegel (1987) proposed the natural language teaching paradigm, for children with autism who are nonverbal. Based on

past literature, they compiled a set of techniques which could be used by parents and teachers to promote verbal language. The overall framework seemed similar to the model of incidental teaching where the environment is designed based on a child's preferences and teaching happens following initiation of an interaction by the child (Koegel et al., 1987). From a behavioral standpoint, motivating the child by reinforcing attempts of verbal communication was incorporated (Koegel et al., 1987). Other techniques which influenced the conceptualization of this method included using multiple examples, exploring variations, learning to take turns and sharing materials (Koegel et al., 1987).

A similar philosophy underlies the use of non-directive play where the child's behavior and focus of attention lead the course of therapy. Cogher (1999) states that this is a "systems" level intervention, unlike many of the other interventions where an individual is the unit of change. Non-directive play involves providing an environment where a child has freedom to engage in self-directed play (Cogher, 1999). The adult playing with the child (therapist, parent, or teacher) can provide a commentary of the child's action, adding a direct verbal component to the interaction (Cogher, 1999). However, it also allows them to practice joint attention and social timing (turn-taking, social routines; Cogher, 1999). When playing in proximity, attachment between a child and their parents/the rapport between the child and therapist can be improved, leading to a greater sense of safety for a child practicing newly acquired language skills (Cogher, 1999). The adult can imitate the child's behavior or label it to bring it to the child's attention (Cogher, 1999). Their actions can also be exaggerated to help the child challenge themselves to master a more sophisticated version of it (Cogher, 1999). Exaggeration may be useful with actions and with words. It seems analogous to the idea of mirroring and amplification of movements used in dance/movement therapy.

2.4.4 Interventions in Creative Arts Therapies

2.4.4.1 Music therapy as an intervention for spoken language. Like movements, music therapy has the capacity to address many areas that are related to speech, making it a relevant form of intervention for spoken language. A music therapy session follows a structure that provides opportunities to practice communication skills such as collaborating for achievement of a common goal, initiating and maintaining social connections, and giving all the individuals the chance to contribute to music-making (Srinivasan & Bhat, 2013). Being able to engage in such an interaction requires socioemotional factors like joint attention, imitation, reciprocity, understanding affective states of others, and behavioral factors like self-regulation, cooperation, prosocial skills, and interpersonal synchrony (Srinivasan & Bhat, 2013). Inherent in this entire process is the capacity for music therapy to promote practice of the perceptual and motor skills which provide physiological support for speech production (Srinivasan & Bhat, 2013).

A lot of research on targeting speech comes from neurologic music therapy. While it may be useful for children acquiring language for the first time, it has also been used for people who need to re-acquire spoken language following a neurological injury or a neurological disease. Some of the targeted areas include "an improvement in motor control and muscular coordination (both of which are essential for articulation), respiratory capacity, speech fluency, vocalization, and sequencing of speech sounds, as well as speech rate and intelligibility" (Mertel, 2014, p. 164). One method used for this is oral motor respiratory exercises (also known as ORMEX; Mertel, 2014). The intrinsically motivating nature of music can encourage a person to practice necessary speech-related skills and strengthen the neural connections involved in speech

production (Mertel, 2014). As a result, it may prove to be more useful than regular speech interventions which focus only on strengthening oral muscles (Mertel, 2014).

Another neurologic music therapy method is symbolic communication training through music (SYCOM; Thaut, 2014). Developed for people with a severe loss of expressive language, it aims to help people re-learn the "rules of communication" (p. 217) by working on pragmatics, speech-related gestures, and expression of emotions. Techniques involved in SYCOM are structured improvisation with instruments and vocalizations, and communicating verbally throughout the session to practice initiating conversations, taking turns, listening and responding appropriately (Thaut, 2014).

If a child shows delays in development of language and speech, developmental speech and language training through music (DSLM) might be employed (LaGasse, 2014). It involves using musical materials that are developmentally appropriate alongside singing, chanting, playing instruments and doing movements. Using melody that mimics the intonation of a spoken language and providing chances to respond within a rhythmic structure are other techniques that can be a part of a DSLM intervention (LaGasse, 2014). An additional factor which makes the intervention developmentally appropriate is that it allows for both repetition and variation (LaGasse, 2014). While repetition can help the child develop a sense of mastery, variation after a few repetitions keeps the child engaged in the task (LaGasse, 2014). The need for repetition has been acknowledged by other researchers too (Geist, McCarthy, Rodgers-Smith & Porter, 2008). Unlike other activities where repetition might seem unnatural, music activities encourage repetition (Geist et al., 2008) and allow for a more organic use of repetition, possibly making children less conscious or hyperaware that they are practicing a skill that they may be struggling with.

Howland (2015) has described the various ways in which music therapy can be useful for children who have speech and language disorders. She highlights four areas that are given attention by speech therapists – respiration, phonation, articulation, and resonance – in the context of speech motor disorders. These areas form the basis for diagnostic categories for speech disorders (Howland, 2015). Dysarthria results from poor quality and poor precision of speech articulation, causing reduced intelligibility (Howland, 2015). Neurologic music therapy methods like oral motor exercises (OMEs), OMREX and vocal intonation therapy might be helpful for individuals with dysarthria (Howland, 2015). Articulation and phonological disorders present in the form of errors in produced language due to the motor system taking longer processing time than the cognitive-linguistic system (Howland, 2015). Recommended music therapies interventions include creating songs where sounds that a child struggles with are repeated frequently, and using instruments which can produce similar sounds (Howland, 2015). When the brain cannot plan and send commands to execute speech-related movements, the diagnosis falls under the category of apraxia (Howland, 2015). Melodic intonation therapy is a method from neurologic music therapy which could target apraxia (Howland, 2015). If fluency and flow of speech is disrupted or shows repetition, it is known as stuttering (Howland, 2015). Here, the music therapist might shift focus towards psychosocial factors such as reduction of anxiety and/or facilitating relaxation to create a less stressful environment for communication (Howland, 2015).

Music therapy can also be used when problems with psychosocial functioning are a secondary effect of having a speech and language disorder. Social interaction, self-esteem and emotional regulation have been found to be facilitated by techniques such as playing a game of improvising with drums, kazoo-vocalization, and narration of the child's play by the music

therapist (Wetherick, 2014). In a study with children with autism, music was found to reduce boredom, distractibility and self-stimulating behaviors, all of which allowed children to focus on imitation of signs and words (Buday, 1995). The need for imitation and synchronization when making music can help children with autism on a biological level by engaging parts of the brain where mirror neurons are present (Wan, Demaine, Zipse, Norton & Schlaug, 2010). Further, the collaborative and pleasurable nature of these interactions keeps a child engaged for longer, providing more opportunities to acquire and practice language skills (Wan et al., 2010).

Newham (1996), the developer of Voice Movement Therapy, has suggested combining music with movements for retention of language when it is learned and then for activation of that memory to produce language. The mediating factor here is the pleasure or any other emotion that is evoked by engaging in an activity with music and movements (Newham, 1996). The attachment of an emotion makes the experience more valuable and hence, more likely to be retained (Newham, 1996). When producing this back at a later point, engaging in the music and movements that were used for retention can activate the required memories to enable fluent speech production (Newham, 1996). As an example, Newham (1996) cites work done with patients with dementia, whose long-term memory is affected but can be accessed if music from that phase of their life is introduced. The structure provided by rhythm is another possible mediating factor (Newham, 1996) as it may organize a memory at the time of retention, making it easier to retrieve when compared to a disorganized memory with multiple individual parts.

2.4.4.2 Dance/movement therapy as an intervention for spoken language. The first and only article addressing speech explicitly, in the field of dance/movement therapy, was published by Schmerling and Kerins (1987). Schmerling (a dance/movement therapist) and Kerins (a speech-language pathologist) presented the case of a child with elective mutism ("H")

who participated in the two therapies, in both individual and group formats. The role of psychosocial development was acknowledged as being a key contribution of dance/movement therapy with the authors stating that its primary goal was "to develop pre-speech and relating skills" (p. 36). Despite the group being composed of his classmates, H initially stayed out of the movement circle (Schmerling & Kerins, 1987). Over time though, he joined in at various point before reaching a point where he could be fully engaged (Schmerling & Kerins, 1987). He started using more postural movements, and took on both leading and following roles during movement activities (Schmerling & Kerins, 1987). Through individual dance/movement therapy, he experienced movement activities analogous to mother/infant games, and developed the ability to initiate and tolerate interactions (Schmerling & Kerins, 1987). Sessions were also focused on his ability to recognize his emotions (Schmerling & Kerins, 1987). These sessions resulted in verbal gains too because H started using breath support to grow and shrink (practicing breath support for speech), and would mouth the names of his classmates when trying to initiate an interaction with them (Schmerling & Kerins, 1987).

While more articles have not been published on using dance/movement therapy in conjunction with speech and language therapy, some of the literature in the field touches upon language acquisition and production or focuses on other goals which may contribute towards development of expressive, spoken language. Goodill (2005), for example, cites the work done by Pat Mowry Rutter, who incorporates yoga into dance/movement therapy for patients with vocal cord disorders (whose symptom resemble asthma). Rutter focuses on yoga-based breathing exercises in her sessions with children with vocal cord disorders who were receiving speech therapy as the primary intervention (Goodill, 2005). A by-product of the use of breathwork was an improvement in their ability to produce speech (Goodill, 2005). Goodill

(2005) also talks about working with the respiratory system in the context of pulmonary disorders. The same interventions could possibly be useful for a child who struggles with verbalizing due to inadequate breath support.

Tortora (2014) took a more psychosocial view towards the role that dance/movement therapy may play in acquiring verbal language. She made suggestions specifically for children with autism and chose emotional regulation as the point of focus. According to her, by learning to self-soothe and by blocking off overwhelming sensory stimuli, children could eventually practice self-regulation during social interactions. A more stable affect would allow caregivers to respond in a manner that would promote more secure attachment (Tortora, 2014). Hence, it would provide them with at least one safe environment in which to learn and practice their verbal language skills (Tortora, 2014).

Other psychosocial aspects related to expressive, spoken language have been addressed in the dance/movement therapy literature. However, the context in which they were addressed or the population for which they were chosen varied. Duggan (1978) wrote about facilitating improvements in social skills as well as motor skills of children with multiple areas of deficits. Suggested techniques comprised playing interactive movement games, moving different body parts while labelling them, rituals for greeting, doing sessions in a circle, keeping the group size small, etc. (Duggan, 1978). Greater body awareness, attention, independent ambulation and opportunities for socialization can help in practicing both nonverbal and verbal expression (Duggan, 1978). Koshland, Wilson and Wittaker (2004) aimed to alleviate impulse control (a part of executive function) as a part of a violence prevention program for children in elementary school. Thom (2010) also emphasized socioemotional development and argued that movement and spoken language be given equal recognition. While movements may help a child better

understand their own affect, spoken language would enable sharing it with others by using a common representational system (Thom, 2010).

2.5 Gap Analysis

Based on the literature reviewed in the previous sections, a trend appears in how movement and spoken language are connected. Ontologically and phylogenetically, development of movements precedes the development of spoken language. Movements serve as pre-verbal form of communication and continue to play a role in spoken language even after the latter becomes the primary means of communicating. Speaking itself is an act that would not be possible without movement of body parts that form of the anatomical and physiological basis of speech. While interventions have been designed to support development of spoken language and they do target both movements and the biological basis of speech, the interventions view these movements in isolation. Creative arts therapies, on the other hand, have the potential to promote development of the same factors by situating the movement-based interventions in a social-communicational context. Dance/movement therapy can more specifically also provide an insight into the movement context by considering other elements of movements. Instead of treating movements related to spoken language as being independent, dance/movement therapists can view them in the holistic context of the movement repertoire of a child.

Literature from creative arts therapies, in particular, provides insight into the first steps which may be crucial for interventions targeting spoken language to be successful. For example, breath support and posture may be worked upon to facilitate better articulation of speech. Alongside working towards these goals, dance/movement therapy could first facilitate increased body awareness, which would be required for a child that is expected to exercise movements related to spoken language. Similarly, dance/movement therapy can create a safe and motivating

environment for communication, so that a child feels prepared to communicate and feels accepted by their communication partners. Elements of play and creativity provide flexibility to meet a child at their starting point and to acknowledge their current strengths, before transitioning onto developing further skills. Additionally, these factors make dance/movement therapy intrinsically motivating, facilitating adherence to the course of intervention.

Existing literature and clinical work in dance/movement therapy has given attention to various factors that serve as components of other interventions for spoken language. Imitation and modeling, for example, are inherent in the technique of mirroring. The cognitive-linguistic factors and social skills needed for spoken communication have also been explored in dance/movement therapy. However, the shortcomings in supporting a dance/movement therapy intervention for spoken language arise from the lack of concentrated literature on this topic. Thematically analyzing the literature can, thus, enable uncovering of the salient factors which allow dance/movement therapy to serve as an appropriate entry point for development of expressive, spoken language.

CHAPTER 3: METHODS

3.1 Design

The thesis was literature-based and followed the framework of an integrative review. Integrative reviews are "broadest type" of reviews because they permit the use of both qualitative and quantitative research studies as well as non-experimental, theoretical sources (Whittemore & Knafl, 2005). The expanded range of sources enables deduction of inferences based on different types of data (Garrad, 2014). Since the lack of literature within dance/movement therapy necessitated exploration of sources from other health professions, integrative review served as an appropriate overarching design for this thesis.

The codification of integrative review, as a research method comprising five stages, was done by Cooper (1982). He stated that reviewing research was a form of "scientific enquiry", and suggested that each of the five stages parallel the stages used for primary research. By outlining how the five stages could be executed, Cooper (1982) argued that a literature-based study could have the same rigor as that of a study that is empirical in nature. Additionally, it can allow scholars to draw trends from numerous empirical research studies, which would result in coherent set of knowledge about a topic (Cooper, 1982). Unless an attempt is made to view all the research together, there would only be scattered studies, standing on their own.

Cooper (1982)'s stages have been continued to be used in studies employing integrative review as the research design, especially in the field of nursing (de Souza, da Silva & de Carvalho, 2010). However, Whittemore and Knafl (2005) updated the stages to fine-tune the design further. A more recent update on the methodology has also been proposed where authors suggested turning integrative reviews into a 6-stage process (de Souza, da Silva & de Carvalho,

2010). The increase in number of stages is not due to addition of a stage but due to splitting of the "literature search" stage into two parts – "searching or sampling the literature", followed by "data collection" (de Souza, da Silva & de Carvalho, 2010). This thesis followed the stages as proposed by Whittemore and Knafl (2005) because the literature search and data collection seemed to be overlapping processes rather than two independent stages, occurring linearly, in isolation.

The matrix method that is traditionally associated with a literature review was used for the thesis as well. A foremost authority on this design, specifically within the arena of health sciences is Judith Garrard (2014). In the matrix method proposed by her, sources are not simply restricted to primary sources like peer-reviewed research studies but expanded to include other publications such as books, as well as secondary and tertiary sources (Garrard, 2014). With the current limitations in the number of research studies published on the research topic, the need to seek out information from alternate sources arose. Hence, it aligned with the core feature of an integrative review. Further, it allowed for exploration of data from sources that themselves used different methods, counteracting the potential limitations in exploration that could be encountered if only reviewing sources with one specific type of design.

3.2 Participants

The study does not involve any human subjects.

3.3 Investigational Methods and Procedures

A five-stage process for integrative reviews has been proposed by Whittemore and Knafl (2005). A brief summary of the method is presented below, based on a journal article they published on this methodology. The first stage is that of problem identification because it

provides a clear sense of direction for the rest of the research and justifies the purpose of doing it. The literature search stage follows, where various sources that address the identified problem are gathered. De Souza, da Silva and de Carvalho (2010) have proposed that the literature review stage can be divided into two parts – searching for literature and data collection. (For the purpose of this thesis, the two stages will be seen as occurring in simultaneously.) These sources are then put through the stage of evaluation to understand how reliable they may be.

Data analysis, a stage with four sub-stages, is then initiated. The first sub-stage is data reduction where the sources are tentatively grouped together and abstracted according to topics. One of the methods that Whittemore and Knafl (2005) suggest for this is Garrard (2014)'s matrix method. The second sub-stage is data display where data from individual sources is assembled together so that initial patterns and relationships between the sources can be presented in a graphical format. The different data displays created are then viewed in tandem during the sub-stage of data comparison. Here, smaller themes may be combined to create bigger clusters. The last sub-stage of data analysis is conclusion drawing and verification where the discussion moves beyond the selected sources (which focus on an identified problem) to the larger body of work done on the topic. The four sub-stages are succeeded by the final stage of presentation. The analysis can be put forth visually at this stage but must contain details of how the conclusions are logically connected to the sources. It also involves an acknowledgement of the limitations imposed by the sources and the method. A visual summary of the process has been presented in Figure 2 (Summary of Methodology).

Garrard (2014)'s matrix method follows a four-step process and helped with the execution of an integrative review by providing practical guidance on moving from collection of sources to their final presentation. The following description of the method is based on the latest

edition of her book on the same. It starts with creating a paper trail that allows the researcher to organize their process of searching for relevant research. It involves not just noting key words and sources used but also listing what databases were used and with what search words. It may additionally include practical notes with information on where certain sources can be physically found and a list of additional sources that could be later added to the reference list, if required during the course of research. Once a tentative set of sources has been created, the next step is creation of a documents section. It comprises reviewing the abstracts and skimming through documents to determine which sources will be used during the next stage of construction of a review matrix.

Garrard (2014) suggests the topics that could be utilized for the columns of the matrix, to eventually form a spreadsheet that organizes information from all the sources that are being reviewed. The aim of this step is to abstract the literature. An advantage of this method is that it provides the flexibility to add more columns if needed, as more sources get organized into the matrix. The final step and the goal of the matrix method is to allow for a synthesis of information. Synthesis is not restricted to creating a summary but rather refers to a critical analysis of the literature in terms of its content, methodologies, and data reporting. Only after thoroughly analyzing the literature, can the review be thematically written.

Based on the above descriptions, similarities between the process of undertaking an integrative review and using the matrix method emerge. The focus on a systemic search for literature and an evaluation of the sources, before thematically synthesizing them, serve as backbones of the two methods. With common underlying principles guiding the two methods, they can be combined in a way that allows the matrix method to overlap with stages two and three of the integrative review, and become the primary means of executing stage four.

The literature matrix created for this thesis comprised six columns – “citation”, “field of study”, “topic/header”, “main point”, “quotes”, and “codes”. Thirty four sources were added to the matrix.

Table 1

Categorization of Sources According to Field of Study

Number of Sources	Field of Study
10	Speech and language therapy
7	Music therapy
6	Dance/movement therapy
4	Human development
2	Special education needs
1	Dance/movement therapy and Speech and language therapy
1	Music therapy and Speech and language therapy
1	Voice movement therapy
1	Neuroscience
1	Education

3.4 Data Analysis

Even though Garrard (2014) presents a robust method for bringing together different sources, an additional step was be required to transition from abstraction of literature into a matrix to written synthesis. It was essential because the thesis is not simply a literature review but a research-based study. As a result, a more organized analysis of literature was mandated. The bridge between the third and the fourth step was provided by thematic analysis, which refers to drawing out themes from a set of sources (Bearman & Dawson, 2013). It can involve

derivation of themes by only reading texts or by coding the data from the texts and then arranging the codes thematically (Bearman & Dawson, 2013). Nonetheless, the aim is to capture things that are important in relation to the data, especially if there is a pattern in their appearance (Braun & Clarke, 2006).

Thematic analysis can be classified as being inductive or theoretical in nature (Braun & Clarke, 2006). Inductive analysis is data-driven, i.e. no prior framework is proposed before data has been collected and analyzed (Braun & Clarke, 2006). On the other hand, theoretical thematic analysis is analyst-driven, where the research is shaped by theoretical and analytic interests of the researcher (Braun & Clarke, 2006). The data in a theoretical thematic analysis may be less rich but it allows for presentation of details based on an initial theory (Javadi & Zarea, 2016). This thesis falls under the category of theoretical thematic analysis because the framework of dividing the relationship between dance/movement therapy and production of expressive, spoken language into direct and indirect pathways was established during the first stage of the integrative review (problem identification). Additionally, the focus of the thesis was proposal of a potential model that can be further developed through more theoretical and clinical research.

All forms of thematic analysis follow a 6-phase process. Braun and Clarke (2006) have conceptualized that process and described it in a detailed way. A brief summary of the 6 phases, based on their journal article, is as follows:

1. Familiarizing yourself with your data: An immersion into data is expected from the researcher. It can be achieved by repeatedly reading the data and ensuring that the coding process is not initiated until the entire data set has been read through at least once. Taking notes and marking idea for potential codes is an acceptable practice at this stage.

2. Generating initial codes: Based on a thorough reading of the data, initial codes are assigned with regards to interesting features. For a theoretical thematic analysis, the coding is based on capturing aspects of the research topic/question that the researcher wants to address. Additional codes may also be created for data with some relevance to areas of focus, as it may enrich the creation of themes in the later stages.
3. Searching for themes: While codes are quite specific, themes are broader in their focus. They are generated based on whether the codes can combine with each other and on the relationship between different codes. A single code may fall under the purview of more than one theme if it is linked to other codes that are associated with different themes. Establishing themes is not an end-goal. It is equally important to start reflecting on how the themes themselves are related if there are some which could serve as over-arching themes or subthemes.
4. Reviewing themes: When finalizing themes, two criteria are used – internal homogeneity (coherence amongst the data within one theme) and external heterogeneity (clear distinctions between the themes). Themes are then reviewed in at two levels. The first level involves checking with the relevant codes to ensure that a theme is reasonably derived from the data. At the second level attention is drawn towards the entire data set to evaluate the relevance of a theme to the rest of the data and the topic of research. A clear understanding of the relationship between themes is established during this phase.
5. Defining and naming themes: Once the themes are identified and the relationship between them is understood, it is important to name them. Doing so not only provides an indication of the essence of a theme but also suggests where the theme is

located in the context of the entire data set. When a theme is complex, subthemes may be used to organize it but are similarly labelled.

6. Producing the report: In the final phase, the themes are presented in a "concise, coherent, logical, non-repetitive and interesting" (p. 39) manner. Description of the data is a part of the process and supports the eventual goal of explaining their relationship to the research topic.

The phases of thematic analysis are not always followed linearly since the process of creating codes, generating themes, and reviewing them can occur in many cycles (Javadi & Zarea, 2016). As a result, writing is encouraged throughout the process (Javadi & Zarea, 2016). The process also makes use of mind maps, in the form of initial thematic map and final thematic map. Thus, it aligns with the practice of visually processing and representing the research in integrative reviews (Whittemore & Knafl, 2005).

It is essential to understand that since thematic analysis was used in the larger framework of an integrative review, the earlier phases of thematic analysis overlapped with the initial stages of integrative review. Scholars have recognized that similarities may appear between thematic analysis and various other qualitative research methods due to their emergence from the same epistemological position (Braun & Clarke, 2006; Javadi & Zarea, 2016). However, the commonalities reiterate the presence of compatibility between thematic analysis and integrative reviews, ensuring a coherence in the methods employed for the thesis. The following figure (Figure 2. Summary of Methodology) provides a visual summary of how literature matrix and thematic analysis were incorporoated into the integrative reivew.

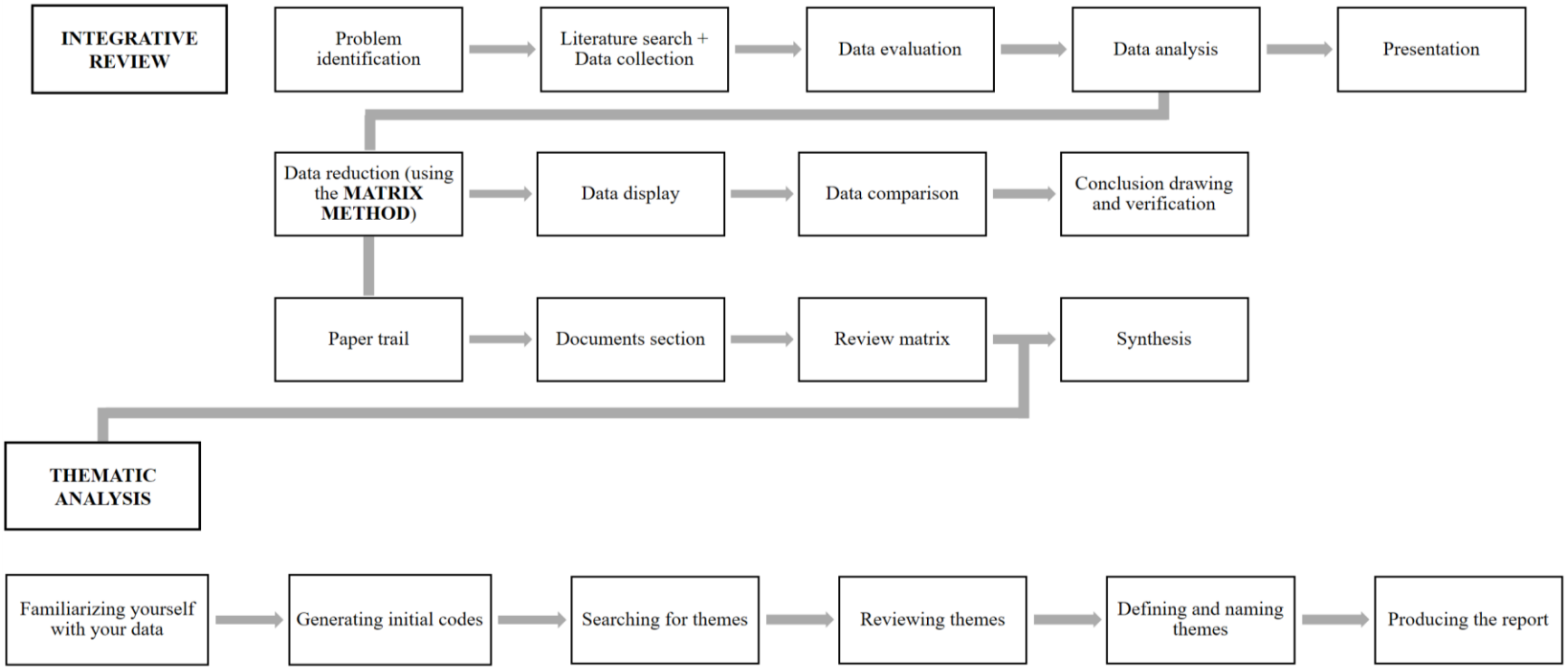

Figure 2. Summary of Methodology

For this thesis, codes were added to each of the sources in the literature matrix. These codes were then inserted into the software Wordle, to generate an image which showed the prominence of each code based on its frequency. The image served as the starting point for refining the initial codes. The quotes from the literature matrix were assigned the refined codes. Dedoose, an internet-based application for data analysis was used for this process. Up to four levels of hierarchy were present in the codes. Each of the parent codes and child codes (the two highest levels) were functionally defined, and condensed further when the definitions for two or more codes had significant overlaps. At this stage, they were also re-parented if the functional definition indicated the need for doing so. Referring back to the initial framework of direct and indirect pathways, and using the final set of codes, themes were generated. The entire thematic analysis process involved a second coder that verified the codes, the themes, and functional definitions. The second coder was Dr Janelle Junkin, a member of the thesis advisory committee.

Figure 3. Wordle Representation of Initial Codes

Table 2

Functional Definitions of Parent and Child Codes

Parent Codes	Description	Child Codes	Description
Body Awareness	Awareness of sensations in body and having an understanding of where the body parts are located, how to use them, and how they interact with one another	Posture	Alignment of different anatomical parts of vocal system - correct alignment generates sound
		Sensory Stimulation and Awarenesss	Auditory feedback to understand if the sound production is loud enough and accurate
Breath Support	Using right amount of breath and force, and sending it to the correct parts of the vocal tract	Muscle Coordination	Knowing which parts of the respiratory system are involved in inhaling and exhaling, and using those body parts together
		Muscle Strength	Being able to inhale adequate amount of air and exhale with the force required to create sound
Cognitive Processing	Provides developmental basis for language production	Memory and Sequencing	Short-term memory for content of the current conversation, alongside long-term memory for incorporating relevant information; The order of speech sounds to formulate correct words
		Pre-Verbal Communication Skills	Cognitive skills that serve as building blocks to produce verbal language (gestures, symbolic thinking, etc.)
Social Communication Skills	Understanding the context of conversation and responding appropriately	Joint Attention	Focusing on topic of conversation, communication partner, and self
		Self-expression	Ability to express needs or feelings

		Attention	Ablility to stay focused on current conversation and not get distracted
		Regulation of Emotions	Controlling aggressive and impulsive urges or disrupted mood during conversation without disrupting conversation
Reading Social Cues (Interaction)	Being involved in the actual process of communication while someone else is present; Understanding the verbal and non-verbal cues of communication partner (family and peers)	Modeling	Look at parents, therapists, or peers and replicate what was heard
		Turn-taking	Knowing when others have finished speaking, so you know when to respond
		Imitation	Produce sounds in language that communication partner is using
Techniques	Skills, materials, and theoretical orientations from various fields of studies	Child-directed	Following cues of child as opposed to imposing a concrete structure
		Dance/Movement Therapy	Psychotherapeutic use of movement and non-verbal expression for spoken language development
		Music Therapy	Using vocalization and music-making in order to provide practice of communication skills
		Rhythm	Developing the timing of spoken word
		Supporting Materials	Use of instruments, props, books and other artistic materials to facilitate sessions focused on spoken language development
		Synchrony	Child and therapist being involved in the same activity and performing it similarly

		Motivation and Engagement	Incorporating activities that are appealing to children and encoruage them to get invovled in interventions
		Repetition	Practicing a specific skill over and over with variations
		Scaffolding	Providing some amount of support to help a child perform better than their currently level
		Creativity	Being able to approach problem of language production using a range of structures and media (play, movement, drama, songs, etc.)

Note. The table provides a list of child and parent codes, alongside a brief description of what they entail.

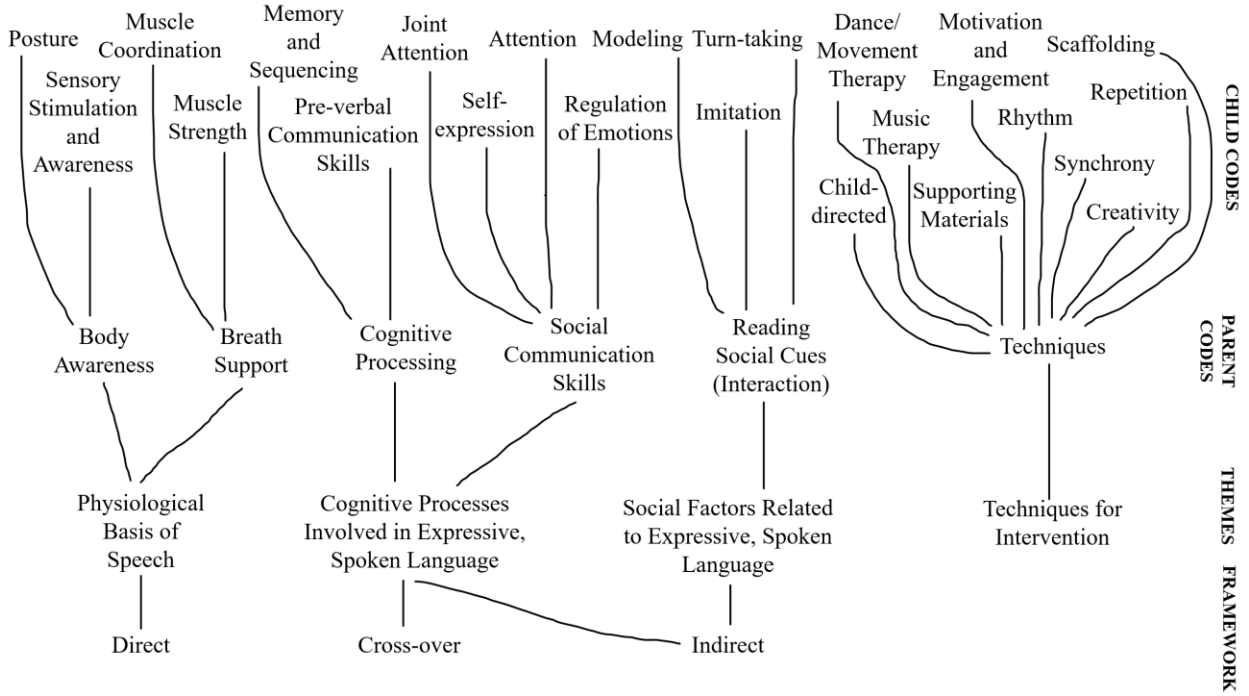

Figure 4. Process of Theme Development

3.4.1 Operational Definitions of Terms

Dance/movement therapy – The psychotherapeutic use of movement to promote emotional, social, cognitive and physical integration of the individual (American Dance Therapy Association, n.d.).

Expressive language – Sharing thoughts ideas, and feelings (American Speech-Language-Hearing Association, 2016)

Language – System for communicating ideas and feelings using sounds, gestures, signs, or marks (National Institute on Deafness and Other Communication Disorders, 2016); At its most specific level, it may refer to the concrete act of speaking, writing or signing in a given situation – the notion of parole, or performance (Crystal, 2008, p. 265).

Music therapy – Music therapy is the clinical and evidence-based use of music interventions to accomplish individualized goals within a therapeutic relationship by a credentialed professional who has completed an approved music therapy program (American Music Therapy Association, n.d.).

Receptive language – Trouble understanding others (American Speech-Language-Hearing Association, 2016)

Speech – One interpretation is from the viewpoint of phonetics: here, speech is seen as a medium of transmission for language – the spoken medium or phonic substance of language (as opposed to writing; Crystal, 2008, p. 445); The other interpretation is from the viewpoint of linguistics, where spoken language (performance, or parole) can be analyzed in phonological, grammatical and semantic, as well as phonetic terms (Crystal, 2008, p. 445).

Speech and language therapy – Speech and language therapy provides treatment, support and care for children and adults who have difficulties with communication, or with eating, drinking and swallowing (Royal College of Speech and Language Therapists, 2017).

For additional definitions see Table 2 (Functional Definitions of Parent and Child Codes).

CHAPTER 4: FINDINGS

4.1 Overview of Themes

Based on the final set of codes, themes relating to the parent codes were generated. The first three themes seemed to address the needs/goals of interventions for spoken language. These themes were "physiological basis of speech", "cognitive processes involved in expressive, spoken language" and "social factors related to expressive, spoken language". An additional theme of "techniques for intervention" was generated as majority of the child codes referred to ways in which interventions for expressive, spoken language could be executed. These four themes will be described in the remaining chapter.

4.2 Physiological Basis of Speech

Based on the parent codes "body awareness" and "breath", this theme was created to reflect the act of producing speech sounds. Body awareness is a prominent aspect of speech production because some interventions might require a child to voluntarily focus on specific body parts to create accurate and reasonably audible sounds. Body awareness may present itself in the form of an understanding of the appropriate posture required for creating speech sounds or focus on auditory feedback while talking. It overlaps with the parent code "breath" because an appropriate posture can lead to alignment of parts of the vocal tract and the respiratory system, creating an effective pathway for exhalation when producing speech sounds. "Respiratory musculature includes and is interconnected with muscles of the neck, trunk, shoulder girdle, and pelvis that control postural alignment. Therefore, difficulties with body positioning can compound respiratory weakness and incoordination" (Solomon & Charron, 1998, p. 71-72).

> Positioning should address straightening the back, securing the buttocks properly on the seat, and attaining a 90° hip, knee, and foot angle. Additionally, support should be provided for the arms and perhaps the head. Arm support is useful not only for posturing the shoulders and upper torso, but also for providing a surface against which the child can push. Pushing with the arms can result in the generation of greater air pressure for speech by assisting the chest wall muscles and can also assist laryngeal adduction. (Solomon & Charron, 1998, p. 74)

To use the required amount of breath and force of exhalation, chest and abdominal muscles need to be strong and coordinate their movements. Oral muscles can then be shaped during exhalation to articulate precise speech sounds. The need for body awareness re-emerges at this stage because when a child produces a speech sound, they receive an auditory feedback of the way it sounds as well as a kinesthetic feedback on how different parts of their body moved to create the sound. Paying attention to these elements can help with correction of posture, breath support, and articulation. As a result, the speech that is produced can become intelligible and loud, and can include longer utterances. Emphasizing the intricate relationship between the different components of speech sound production, "A systems approach that targets the components of the vocal tract controlling breathing, phonation, nasal resonance, articulation and intonation is commonly advocated" (Pennington, Miller, Robson & Steen, 2010, p. 337). Even though production of speech sounds might be the last step in the process of using expressive, spoken language, starting the intervention with a physiological focus might be helpful in some cases. "Establishing a respiratory–phonatory foundation before addressing other speech subsystems is consistent with approaches recommended for treating motor speech disorders" (Fox & Boliek, 2012, p. 931).

4.3 Cognitive Processes Involved in Expressive, Spoken Language

The parent codes "cognitive processes" and "social communication skills" precipitated into the theme of cognitive processes involved in expressive, spoken language. The former code refers to cognitive processes which facilitate the process of language formulation. One of its key factors is different forms of memory. Short-term memory might be helpful in retaining the last few statements made by one's communication partner, while long-term, declarative memory might be evoked to retain information from one's past which is relevant to the conversation. Working memory can allow a person to use these two types of memories and manipulate them to respond appropriately. Implicit memory for speech sound production can support a child in sequencing morphemes to create a word, and in following the correct syntax to create a sentence.

Pre-verbal communication skills such symbolic thinking and arranging information hierarchically may intersect with memory and sequencing, as each word is a symbol that needs to be connected to other relevant symbols to create a comprehendible sentence. Many of these processes may occur without the conscious need to attend to them. But when a child may struggle with using spoken language due to impairments in any of these cognitive processes, they may have to be consciously rehearsed and elaborated upon over time. "Presentation of the same or similar activities over time to provide a structure in which increased motor-language complexity and cognitive learning of events and sequences may be practiced" (Rogers et al. , 2006, p. 1010).

"Social communication skills" as a parent code was placed under this theme because many of these skills are manifested as a result of core cognitive processes. For example, "attention" is crucial for effective communication as it ensures that a child is not distracted by irrelevant stimuli. Kuhl (2007) postulated, "Heightened attention and arousal could produce an

overall increase in the quantity or quality of the speech information that infants code and remember" (p. 114). Attention is also important for a successful intervention as the child needs to be focused on the therapist and on the tasks during a session. To explain how music therapy might help with sustaining attention in interventions targeting expressive, spoken language, Buday (1995) stated "music enables a child to focus more intently to on-task behaviors by reducing boredom" (p. 199).

Expanding upon attention is the concept of "joint attention" which helps a child in maintaining shared focus on the topic of conversation with their conversation partner. The child may first be "taught to respond appropriately to joint attention bids of the experimenter, including placing the child's hand on an object, tapping an object, showing an object, following a point, and following gaze" (Whalen, Schreibman & Ingersoll, 2006, p. 657). The next step would be encouraging the child in initiating joint attention "including coordinated gaze shifting and protodeclarative pointing" (Whalen, Schreibman & Ingersoll, 2006, p. 657). Some of the sources chosen for thematic analysis highlighted the role of joint attention by suggesting that its impairment in children with autism spectrum disorder affects their ability to attend to their communication partner, to be aware of the topic of conversation, and to maintain focus on tasks suggested by therapists. All of these affect their capacity for using expressive, spoken language.

"Regulation of emotions" and "self-expression" were identified as other two child codes under "social communication skills". While the former focuses on restraint over emotional expression, the latter refers to the being able to talk about one's emotional state. Self-expression can serve as a key motivator in speaking, since people speak to express their needs and feelings. Further, recognition of emotions is a cognitive task in itself. "Categorization, for 3-year-olds, is an evolving cognitive ability accompanied by language development. Emerging language skills

allow children to make cognitive distinctions and organize their social and emotional experiences" (Thom, 2010, p. 105). In contrast of self-expression, regulation of emotions, requires a child to hold back the verbal and nonverbal expression of their emotion. It is related to impulse control, an executive cognitive function. It ensures that the conversation is not disrupted by a child that has the need to immediately act upon their urges.

4.4 Social Factors Related to Expressive, Spoken Language

The parent code "reading social cues" led to the theme of social factors related to expressive, spoken language. All interactions are inherently social in nature as they involve at least one more individual. In order to understand the context of a conversation and respond appropriately, a child needs to be able to read social cues – verbal and nonverbal – of people with whom they are conversing. Numerous excerpts carried the parent code "reading social cues" and its child codes "turn-taking", "modeling" and "imitation". These sources recommended targeting social behaviors which facilitate successful interactions. LaGasse (2014) argued, "Early intervention can be utilized to establish pre-linguistic behaviors, including engagement, imitative skills, and reciprocation. These skills are important because they are used in later communications efforts and provide building blocks for social communication exchanges" (p. 206).

The need for designing interventions which target the ability to read social cues was also recognized by sources which found it to be linked with some of the developmental disorders with communication deficits. Autism spectrum disorder was frequently cited as an example because children with this disorder might have a limited understanding of social cues (and some of the social communication skills described in the previous section) – "children with [autism spectrum disorder] are described as looking through people, rather than at people; therefore lacking the

interpersonal contact, joint attention, and understanding associated with the development of language pragmatics" (Scharoun, Reinders, Bryden & Fletcher, 2014, p. 211).

"Turn-taking" emerged as an important concept associated to reading social cues. It refers to the child's ability to understand when their communication partner has finished talking before responding to them. It includes the cognizance that in an interaction, the child and their communication partner are both expected to contribute to the conversation. Acquisition of spoken language is also inherently social in nature. It requires the ability for "imitation" of speech sounds from the speaker's language. "Modeling" and "imitation", two of the child codes under "reading social cues", are related because many interventions for expressive, spoken language, advocate for an environment where a child has models who they can imitate. Recognizing the social, co-constructive nature of spoken language, Trevarthen and Fresquez (2005) stated that dance/movement therapy interventions should include "phases of imitation, protoconversation and play, leading to shared knowledge and skills" (p. 200).

4.5 Techniques for Intervention

The parent code "techniques" had the highest amount of child codes. As a result, it warranted an individual theme. It comprised theoretical orientations, skills, and materials used in interventions from different fields of study. An overall child-centered approach was found to be endorsed regardless of the mode of intervention. The aim of such an approach is to address the "child's interests and communication goals" (Boliek & Fox, 2014, p. 374) with interventions which are "tailored to his or her communication environment" (Boliek & Fox, 2014, p. 374). In cases where a child can physiologically produce speech sounds, but does not use them expressively, the child-centered approach advocates for first establishing "just how the absence of speech serves the child" (Schmerling & Kerins, 1987, p. 30).

The child-centered approach also points towards joining the child at their starting point. Techniques such as mirroring, and reflecting back the phrases of a child with a more mature structure were found to be useful in joining the child verbally and nonverbally. These techniques reiterate the need for social interactions for emergence of expressive, spoken language. While not a code in itself, a similar technique which was identified in a movement-based intervention was "coactive movement". "Coactive movement stresses a meaningful entrance into the lives of these children by parents, teacher assistants, and other significant individuals" (Wheeler & Griffin, 1997, p. 387-388). It involves using body contact through touch to establish trust in the adult working with the child, before engaging in motor activities together.

"[T]he child's need to feel secure within a hostile, rejecting, or chaotic environment is a primary motivating factor" (Schmerling & Kerlins, 1987, p. 30) for an effective intervention. The safety provided in a therapeutic space can reduce the anxiety felt when speaking. It can help a child feel relaxed psychologically as well as physically. In a study on co-treatment (dance/movement therapy and speech therapy) by Schmerling and Kerlins (1987) "activities aimed at reducing tension and opening the flow of energy in the body were used at the start of each speech therapy session. These included whole body rocking, stretching, and exaggerated tensing and relaxing of various limbs" (p. 34). Physical relaxation can reduce tension in the muscles of the respiratory system, leading to improved posture and breath support. The psychological sense of safety can be equally useful, especially when the intention of a child is to express their emotions. The process of co-creation inherent in creative arts therapies allows the therapist to model skills for expressive, spoken language. Watching a trustworthy person perform an intervention might encourage a child to try the intervention themselves. Hence,

social interaction intended to create a safe environment needs to constantly be a part of interventions for expressive, spoken language.

Music therapy literature provided examples which emphasized the need for social interactions for development of others skills as well. "Interactive music making (using instruments) is useful in facilitating communication and social skills, while singing engages the [mirror neuron system] network" (Wan, Demaine, Zipse, Norton, Schlaug, 2010, p. 165). By mirroring and joining, the mirror neuron system can be stimulated and be used as a basis for supporting social interactions. Through this process, a child can learn some of pragmatic aspects of language production and practice how to physiologically generate speech sounds after having observed their production by another person.

"Practice" was found to be a parent code because a single exposure is not adequate for acquisition of skills needed for expressing oneself verbally. Repetition can be useful to "enhance skill learning, generalization, and maintenance" (Srinivasan & Bhat, 2013, p. 10). Due to the nature of creative arts therapies, they can provide "creative, meaningful, engaging activities that allow for repetition, variation, and growth" (Howland, 2015, p. 312). Geist, McCarthy, Rodgers-Smith and Porter (2008) stated that "music allowed opportunities for repeated practice than would seem natural in non-music activities" (p. 315). The exaggeration and repetition made possible through vocalization exercises and chanting can promote development of louder, longer, and more precise utterances.

Through practice, music therapy can also provide opportunities for developing more advanced skills over time. "The child progresses from passive listening, to unison singing, to partially supported singing, to immediate repetition, and finally to producing the target word or phrase on their own" (Wan et al., 2010, p. 164). Repetition in this manner can serve as a form of

"scaffolding", another child code which fell under "techniques". Other ways of scaffolding are creating "songs and activities that include the sounds in words that are both true words and protowords" (Howland, 2015, p. 306), and using activities with "response anticipation" (LaGasse, 2014, p. 192), i.e. starting a statement and then providing time for the child to complete it by responding on their own.

To prevent the practice from becoming stagnant, "creativity" might be introduced into how interventions are presented to children. "Play" can be a key source of creativity as multiple scenarios can be generated and expanded upon. It combines the child-centered approach with the ability for the therapist to verbally label what is happening in order to create awareness of a child's actions and to model how to talk about those actions. When used for self-expression, it might imply not just learning to label one's emotions but to develop a deeper understanding of them by transforming them into "a metaphor, a story or a play" (Blasi, Baglio, Baglio, Canevini & Zanette, 2017, "Experimental treatment: The movement cognition and narration of the emotions treatment (MCNT)", para. 6). Blasi et al. (2017) stated that there are:

> different approaches to promote the narration of the emotions: symbolic play, reading, inventing and/or dramatizing a story, drawing and talking. These activities are considered creative processes with a transitional function…that enable the children and the therapist to deal with the emotions in an indirect way, preventing the fear of being judged and persecutory feelings. ("Experimental treatment: The movement cognition and narration of the emotions treatment (MCNT)", para. 6)

Thus, play provides opportunities to practice social skills, problem-solving, self-regulation, and self-expression, but within safe confines of a therapeutic space.

Creativity can be fostered with the help of "supporting materials". Children's books are one example of supporting materials. They provide structure, response anticipation, creativity, and opportunities for developing some of the social communication skills identified in other codes. For music therapy, instruments were the primary supporting materials. Instruments were beneficial for assisting with physiological aspects of speech sound production. When targeting specific speech sounds, instruments which "make sounds similar to a speech sound" (Howland, 2015, p. 307) might be used. Wind instruments might help with loudness and length of utterance, as well as awareness of auditory feedback. Mertel (2014) explains,

> Patients receive auditory and kinesthetic feedback when they sing or play wind instruments. Therapeutic singing and breathing exercises on wind instruments may reduce excess muscle tension, increase respiratory capacity, and improve articulatory accuracy through their ability to train and strengthen the involved muscle groups. (p. 167)

Just as creativity pervades dance/movement therapy and music therapy, so does the presence of "rhythm". Drawing parallels between the structure of spoken language and of music, Newham (1996) stated that "the backdrop, blue-print and initiating expressive faculties upon which linguistic or verbal activity are predicated consist of the phylogenetic spontaneous rhythmical arrangement of sound and silence which constitute the composition of music" (p. 72). Rhythm is given attention in dance/movement therapy, too, because the child engages in "a good deal of sensory-motor activities that are frequently accompanied by rhythm or music. These activities are assumed, among other things, to increase the child's awareness of his body, and to improve his motor skills and use of language" (Morris & Pothier, 1978, p. 312). On an individual level "rhythm can be extremely useful for promoting speech production and

anticipation of response" (LaGasse, 2014, p. 199). "Joint rhythmic activities may intrinsically motivate adults and children to move in synchrony and engage in a cooperative effort" (Srinivasan & Bhat, 2013, p. 5). Hence, rhythm can foster social communication skills and help with reading social cues, by facilitating a sense of connection with the therapist when creating some music or dance together.

Techniques such as creativity, play, rhythm, child-centered approach, and others identified under this theme are not alien to the practice of dance/movement therapy. Similarly, the physiological, cognitive, and social factors identified by earlier themes have been identified as achievable goals. Hence, it is possible to design dance/movement therapy interventions which address expressive, spoken language as an outcome. The next chapter provides support for this argument based on literature from the field.

CHAPTER 5: DISCUSSION

The themes identified in the previous chapter provide an indication of areas that need to be addressed in interventions for expressive, spoken language. One of the themes ("techniques for intervention") highlighted some components of interventions which might be beneficial. Literature from the field of dance/movement therapy supports these techniques as well as other themes. By connecting the theoretical frameworks from dance/movement therapy with the needs and techniques identified by the themes, a theoretical foundation for supporting development of expressive, spoken language can be postulated. Before doing so, it is important to recognize that the factors under themes interact to ensure effective use of spoken language.

5.1 Overlaps in Physiological, Cognitive, and Social Factors

Assuming that the factors identified by the first three themes work in isolation would be fallacious. Some of the sources reviewed for thematic analysis had more than one code assigned to them, hinting towards the presence of interaction in multiple processes, to create the expected result, i.e. for developing expressive, spoken language and using it. The cognitive domain is where the pathways can cross-over as it can relay information to and from the physiological and social systems as well as between them. The input from social interactions need to be processed before physiologically producing an appropriate response. Cognition is also the area where physiological information such as auditory feedback from a child's own speech and auditory cues from a communication partner are processed to generate a response. Autonomic cues for emotional appraisal inform instances of self-expression as they provide clarity on one's understanding of their emotional state.

Cogher (1999) captured the complexity of the relationship between these factors when discussing how child-directed play can serve as an appropriate intervention for development of expressive, spoken language:

> Children learn to use and understand language in a social context through experience. To do so they must be able to understand the principles of cause and effect and to predict or anticipate events to some extent. They must be able to imitate and learn through trial and error. They must be able, through sharing joint reference with others, to make strong associations between a linguistic symbol and an item or event so as to respond to its use, and also build up a strong enough auditory representation of the word to be able to reproduce it in an interaction. Children must also develop their awareness of social rules so that they can give and receive social cues and take turns. (p. 8)

Existing interventions have used the understanding of the interconnectedness of these factors to ensure that an intervention is effective. LSVT LOUD, for example, emphasizes the interaction of attention (a cognitive factor) with loudness (a physiological factor). "The single focus on vocal loudness limits cognitive demands associated with treatment, which may be important for children with low-average to below-average cognitive functioning" (Fox and Boliek, 2012, p. 931). Taking the neurological basis of social behavior into consideration, Srinivasan and Bhat (2013) stated, "Socially synchronous movements and unison singing during group music activities evoke the [mirror neuron system] activity in the brain. [Mirror neuron system] has been postulated as the neural basis for social abilities of shared attention, affect, and empathy" (p. 8).

Another example of how the various themes can cross-over is in cases where emotional content is being expressed. According to Thom (2010), "connecting these body cues to language

becomes one more step in the process of emotional appraisal through representation" (p. 108). With emotions having a physiological basis, attending to these cues becomes important in deciphering them. Once an understanding of one's emotional state is gained, the child can proceed to use words or vocalization to express themselves. Hence, body awareness might not only help with the actual process of speech sound production, but also lead to recognition of the emotional state that a child may wish to express. Awareness of sensory stimuli may also help a child understand the pace at which the conversation is progressing, how loud their conversation partner is (and hence, how loudly they should respond), use the facial expressions and posture of the other person to uncover nonverbal cues related to the conversation, etc.

5.2 Connecting the Findings with Dance/Movement Therapy Theory and Literature

5.2.1 Framework of Pathways through the Dance/Movement Therapy Lens

Laban Movement Analysis, a movement observation system adopted by dance/movement therapy, might provide some insight into the connection of themes with the larger framework. The overall framework of direct and indirect pathways appears to be parallel to the Laban Movement Analysis theme of function-expression. Functional movements refer to actions with are performed for objective tasks, i.e. they are practical in nature (Schelly Hill, 2008). Expressive movements, on the other hand, play a role in communicating the inner state of a person (Schelly Hill, 2008). While described as polarities "function and expression are intertwined in relationship" (Hackney, 2002, p. 48).

Production of speech sounds can be considered to be functional in nature because it is the final step when using spoken language expressively. It aligns with the theme "physiological basis of sound", which has been classified as being a direct pathway. However, these speech

sounds convey a message to inform a communication partner, implying that there is an expressive intention in why they are being used. Hence, the intertwined relationship described by Hackney (2002) appears in the case of expressive, spoken language. Expressing oneself requires an understanding of self, other individuals in the conversation, and the context of communication. As a result, themes related to cognitive and social aspects, classified as indirect pathways, might be considered to be more expressive. Some of the cognitive processes also mediate the relationship between other factors, causing cognition to become the site of cross-over of direct and indirect pathways – the place where function and expression can be "intertwined". The table below provides the classification of the themes based on the framework of pathways and the Laban Movement Analysis Themes.

Table 3

Framework of Pathways through the Dance/Movement Therapy Lens

<table>
<tr><td>Framework</td><td>Direct</td><td>Cross-over</td><td>Indirect</td></tr>
<tr><td rowspan="2">Themes (from the thematic analysis process)</td><td rowspan="2">Physiological basis of speech</td><td></td><td>Social factors related to expressive, spoken language</td></tr>
<tr><td colspan="2">Cognitive processes involved in expressive, spoken language</td></tr>
<tr><td>Laban Movement Analysis Themes</td><td>Function</td><td>Function and expression intertwined</td><td>Expression</td></tr>
</table>

5.2.2 Connections between Identified Themes and Core Concepts of Dance/Movement Therapy

The first theme, physiological basis of speech, was constituted of parent codes "body awareness" and "breath support". With body being the entity that produces movements and that contains an individual, body action is viewed as the starting point for dance/movement therapy interventions (Chaiklin & Schmais, 1993). It parallels the suggestion made by Fox and Boliek (2012) of first intervening with respiratory and phonetic aspects of speech before progressing to other factors. Hackney (2002) states, "Breath brings life and movement" (p. 43). Without adequate breath support, a person cannot move or speak in a way that expresses their full intention. It affects loudness, intelligibility, and length of utterance. Breath serves as the basis for Flow Effort and for Phrasing, both of which are required for expressing oneself (Hackney, 2002). Hence, it is involved in both functional and expressive aspects of spoken language.

Bartenieff Fundamentals, a set of exercises designed to improve efficiency of movements, can be used by dance/movement therapists to improve breath support and body awareness. They often start with creating an awareness of breathing pattern followed by activating body weight and then initiating an action (Bartenieff & Lewis, 2002). The focus on breathing patterns can help in enhancing breath support, while the use of Weight Effort might help develop and clearer sense of confidence in one's actions. Breath support might be biologically confounded due to a pre-existing condition, or may be a result of feeling anxious/tensed in instances where some form of anxiety in expressing oneself or inability to self-regulate are visible. Anxiety might lead to increased muscle tension (Bound Flow), affecting the extent to which a person may feel comfortable to express themselves. Hence, working on breath support, relaxation, and developing a sense of confidence might be useful for some children who

struggle with expressing themselves through spoken language. According to Bartenieff and Lewis (2002), "the dance/movement therapist's vocabulary includes references to specific anatomical functional aspects of movement – center of weight, connectedness, muscle tension and relaxation. It offers a wide range of options for dealing with body awareness and feelings" (p. 145).

Body awareness involves body schema, which refers to the ability to understand where different parts of the body are located and how they interact. An understanding of the different body parts involved, their location in the body, and the way they work together might be necessary when trying to voluntarily initiate movement. With most of these parts being internal (not directly visible), it becomes even more critical to have a mental image of them to learn how to use them. Focusing on body schema might be more psychoeducational in nature when compared to other components that interventions focus on. Body awareness also involves an awareness of sensory information. When speaking, auditory feedback on loudness and accuracy of pronunciation might be a focused upon. Proprioceptive sense might provide information of how a person is presenting oneself and is using spatial proximity with their communication partner.

The need for developing body schema and an increased awareness of sensory information have been acknowledged in dance/movement therapy as they are integral to one's body image (Pylvänäinen, 2003). Alongside breath support, body awareness can serve as one of the initial goals. The exercises of Bartenieff Fundamentals can help with postural alignment by enhancing an awareness of how different parts of the body work together to create effective movements (Bartenieff & Lewis, 2002). They follow the structure of starting with a simpler movement and

practicing it before making the movements more complex, which was identified through parent codes “repetition” and “scaffolding”.

The body of a dance/movement therapist should be given attention as well because mirroring is the primary technique for expressing empathy and developing a therapeutic alliance. For children who might be struggling with their posture for breath support, therapists could initially mirror their posture and breath patterns. An external image of the way in which their body moves can provide a concrete understanding of what is expected of a child and help in development of a clearer body image. Over time, the therapist can start “modelling” a more effective posture and breath support. “Imitation” is inherent in this process as there is opportunity for the child to mirror the movements back. Modeling and imitation can be extended to vocalization and labelling of movements or emotions as they emerge during a session.

Mirroring can also convey a sense of acceptance by the therapist as the therapist matches the movement qualities of the child instead of criticizing them or immediately making demands for change. It embraces the concept of “flow readiness”, i.e. starting with the currently level of energy, use of space, and rhythmicity of the child (Leventhal, 1980). Feeling accepted might create a safe environment of the child and reduce the negatively intervening effect of muscle tension caused by anxiety of engaging in sessions designed to improve expressive, spoken language. Safety in environment can be further created by expanding mirroring from the body of the therapist to the physical space in which therapy occurs. A child’s movement preferences can be used to construct an environment which provides containment (Leventhal, 1980).

Safe environment and mirroring of movements are interwoven concepts. The therapeutic movement relationship is considered to be the basis of any dance/movement therapy session (Chaiklin & Schmais, 1993). As the two individuals in this relationship (therapist and child)

interact, potential space is created between them. This space, which permits indulgence in fantasy while still being rooted in reality, exists in the perception of each person involved in the interaction (Ogden, 1992). It provides children with opportunities to explore their environment, their thoughts, and their relationships, whilst the therapist holds it safely (Ogden, 1992). "Creativity" (child code) and "play" (grandchild code) identified under the parent code "techniques" flourish in the potential space due to its acceptance of symbolism and paradoxes. Some of the other techniques identified as a part of dance/movement therapy and music therapy ("child-directed", "motivation and engagement") also appear in the potential space because of their inherently creative nature. "Supporting materials" can be used to scaffold the interventions or to expand upon them.

Development of psychosocial skills such as "joint attention", "turn-taking", "attention", "self-expression", and "imitation" can be pursued through play and creativity as the involvement of a therapist ensures that it is social and interactive. "Synchrony" and "rhythm" (child codes under "techniques") are integral in interactions, in both individual and group sessions. Synchrony has been acknowledged as being a healing factor in group dance/movement therapy (Schmais, 1985). It can be achieved on three different levels – body, space, and rhythm (Schmais, 1985). Synchrony could involve mirroring to activate the mirror neuron system to promote social interactions. Within the safe confines of a therapy session, the child can start practicing social skills related to expressive, spoken language. Exercises such as follow-the-leader, can facilitate practice of the different psychosocial skills. Since social interactions are a part of relationships right from the time a child is born, dance/movement therapy can provide opportunities to practice "pre-verbal communication skills". As noted in the reviewed literature,

neurodevelopmental disorders like autism spectrum disorder, too, might require interventions focused on pre-verbal communication skills before progressing to verbal communication.

Structured/choreographed dancing might be a useful intervention for areas identified under the theme of cognitive processes ("memory and sequencing", "preverbal communication skills", "joint attention", "self-expression", "attention", "regulating aggression"; Tortora, 2006). Rhythm can provide temporal structure while spatial synchrony can provide structure in how space is used. Rhythm, additionally, structures the body and cognitive processes. As per the Chaceian principle of body action, muscular activity is viewed as having the ability to express emotions (Chaiklin & Schmais, 1993). By structuring the muscular activity, emotions that are intended to be expressed can be similarly organized, ensuring a more effective communication of them (Chaiklin & Schmais, 1993). Co-creation of a dance provides opportunity to verbally negotiate and assert oneself while also engaging in self-regulation and flexible thinking when other people's suggestions have to be accepted. As the choreography progresses, different types of memory (short-term, long-term, habitual, and working memory) are used to retain the movements in a given sequence.

Repeated practice might be required to master the movement sequences for structured dancing. However, practice and repetition can become counterproductive if a child starts feeling bored/gets disinterested in continuing with the intervention. Fortunately, the creativity inherent in co-creation of movements can provide opportunities to create variations which can keep a child engaged and motivated. Hence, the idea of repetition and practice can be embedded into the structure of the session itself. Structurally, repetition can also be used in the form of opening and closing rituals. These rituals might additionally facilitate a sense of safety (Serlin, 1993) before the child starts using the potential space to practice skills related to expressive, spoken

language. Rituals could include vocalization or chanting alongside movements. Such rituals may reduce anxiety or fear associated with spoken language by associating the act of speaking with creation of a safe environment.

The intervention of 4 Bs illustrates how structure and repetition could be used for a child whose communication is disrupted by the inability to regulate themselves. For the intervention, the child would be expected to hold their hands together (brake), raise them above the head while taking a deep breath ("breathe"), tell themselves that they can be calm ("brain"), and bring the hands back down while feeling different parts of their body for calmness ("body"; Kornblum, 2002). With repetition they can learn to appraise the physiological cues of their distress ("body awareness"), use a technique they are familiar with to calm themselves ("self-regulation") through movements ("breath support") and verbalization ("self-expression"), and draw their focus back to the conversation ("attention", "joint attention", "turn-taking"). The child could be given an opportunity to customize it to their needs ("creativity", "child-directed") and preferred ways of coping. The therapist could do the intervention with them initially ("modeling", "imitation", "scaffolding") before the child can use it as a resource on their own. By ritualistically practicing it each time a child feels dysregulated ("repetition"), it can become an acceptable way of taking a break and returning to a conversation.

As theorized by scholars like Iverson and Piaget (see Chapter 2), children start developing various cognitive processes involved in spoken language first on the level of movements. Starting with movements, hence, provides the foundation which is essential for social interactions and cognitive processes (the indirect pathways). It resonates with one of the major assumptions in dance/movement therapy – "significant changes occur on the movement level that can affect total functioning" (Schmais, 1974, p. 10). Other assumptions state that

"movement reflects personality" (p. 10) and that "the relationship established between the therapist and patient through movement supports and enables behavioral change" (p. 10). Dance/movement therapists can combine their training in movement analysis with verbal counselling skills to enhance their understanding of how a child is feeling in the moment and make changes to maintain the safe space needed for engaging in interventions. The presence of a therapist transforms the interventions into being social and interactive. By integrating the physiological, cognitive, and social aspects of a child, a holistic approach can be adopted into interventions for developing expressive, spoken language. The table below provides a summary of some of the applications discussed in this section.

Table 4

Application of Dance/Movement Therapy Concepts to Interventions

Dance/Movement Therapy Concepts	**Some Application in Interventions**
Starting with breath ("Breath brings life and movement", Hackney, 2002, p. 43) → Flow and Phrasing	Breath support → Intention of expression + Creating louder and longer sentences
Bartenieff Fundamentals	Breath support
	Body awareness (especially postural alignment)
	Repetition and scaffolding for more complexity over time
Reducing Bound Flow + Using Weight	Alleviating anxiety related to using spoken language + Facilitating greater sense of confidence
Facilitating a clearer body image	Creating a mental image of internal parts that help with speech sound production

Awareness of sensory stimulation	Auditory feedback on loudness and accuracy of pronunciation
	Proprioceptive information about how one present's oneself and using appropriate spatial proximity with communication partner
The therapist using their own body as a tool	Serving as a model for imitation of movements and vocalizations
	Providing an external image of the child's posture to develop clearer body image
Mirroring, flow readiness, and creating an environment based on child's movement repertoire	Creating a sense of safety and acceptance → Reducing muscle tension (caused by anxiety) which might affect breath support
	Following the child's lead to keep them engaged
Therapeutic movement relationship → Potential space	Presence of paradoxes and symbolism
	Creativity
	Play
	Being child-directed → Keeping the child engaged and motivated
	Facilitating trust in the therapist who serves as a model for practicing relevant skills
Synchrony and rhythm (e.g.: follow-the-leader)	Attention
	Joint attention
	Turn-taking
	Self-expression
	Imitation
Early developmental movement patterns and rhythm	Refining preverbal skills which are useful for spoken language
Co-creation of structured/choreographed dancing	Memory and sequencing
	Preverbal communication skills
	Joint attention
	Negotiating the sequence → Maintenance attention + Self-expression + Regulation of emotions
	Using rhythm → Understanding the concept of temporal structure in speaking
	Normalizing repetition and practice
Opening and closing rituals	Sense of safety in environment → Reducing anxiety or fear related to interventions

	Incorporating verbalization and vocalization in rituals
	Creating an association between repeated practice and safety
4 Bs of self-regulation	Understand physiological cues of arousal → Body awareness + Self-regulation
	Breath support and relaxation
	Verbalization for self-expression and fostering sense of control
	Refocusing on the conversation (attention, joint attention, turn-taking)
	Customizing the intervention → Creativity and child-directed approach

5.3 Case Vignettes Illustrating Clinical Application of Findings

5.3.1 Brin

Brin was a six-month old infant born with fibrous syngnathia, a condition which causes the soft tissue in the mouth to be fused. The tissue had a very small opening around her throat. She was admitted to a children's hospital as her condition caused an inability to be fed orally and restricted her airways. As a result, she was not receiving adequate amounts of nutrition and oxygen. A tracheostomy tube (for respiration) and nasogastric tube (for feeding) were inserted while she was being stabilized for multiple surgical procedures to make the opening in her mouth larger.

In my role as a dance/movement therapy intern, the goals that I chose for Brin included self-regulation, body awareness, supporting developmental movement patterns and cognition,

and acquisition of pre-verbal communication skills. Theoretical foundations were provided by Kestenberg Movement Profile (developmental movement patterns), Mahler's theory of child development (attachment, attunement, and self-regulation), and Piaget's theory of cognitive development (sensorimotor exploration, particularly the substages of secondary and tertiary circular reactions). While multiple interventions were used during the course of two months of dance/movement therapy, the following description discusses those which were most relevant for supporting skills related to expressive, spoken language.

As an infant that had spent most of her life in the neonatal intensive care unit, Brin was not used to a lot of social interaction or touch-based attunement. When not in therapies, she would spend her day lying in a crib, often by herself, but surrounded by age-appropriate toys. The initial sessions required starting with self-regulation interventions to help her feel safe with me. The opening ritual always included playing a chime in the Sucking rhythm (a consistent, repetitive rhythm of a soothing nature) as she showed a preference for auditory stimuli. The rhythm was also used when providing tactile pressure to different parts of her body while I vocalized a sucking sound. As Brin grew more comfortable with touch and became more familiar with me, she could start regulating herself and would make attempts to imitate the same sound. She also moved her arms or legs in the same rhythm, indicating a rhythmic organization in her body.

After three weeks of sessions, she started to respond to my initiation of joint attention, smiled appropriately, and took turns in creating sucking sounds. Her attention span improved, she could maintain eye contact throughout this sound-based conversation, and required less tactile support for emotional regulation. With scaffolding, she could move through the zone of proximal development for her age (progressing from oral indulging rhythm to oral condensing

rhythm as she entered the seventh month of life) and follow along when the rhythm of the conversation was changed from Sucking rhythm to Snapping and Biting rhythms. While it met psychosocial goals (expressive/indirect pathways), it also facilitated acquisition of movements required to be orally fed after her surgeries and to eventually articulate speech sounds (functional/direct pathway).

Self-regulation was also modelled by me through an intervention involving taking audible deep breaths. I would slow down the pace of exhalation and make the breaths progressively more elongated. A hand was placed on Brin's torso to provide tactile feedback on her own breathing pattern as well. Through this process, Brin could improve her breath capacity without feeling distressed and regulate herself to continue with the interaction. In the last few sessions, Brin was provided with hands-on support to engage in the movement of opening and closing her fist. This gesture was used as a ritual at the end of the session to say bye to each other.

Body awareness was created by helping Brin understand the physical boundaries of her own body. While she showed awareness of the upper half of her body when engaging with different objects, the lower half of her body initially was in Shape Flow (moving with an inner impulse without consciously being aware of the movement). She was given opportunities to kick a ball, move a mobile, and push her legs against my hands or a scarf to create lower body awareness. In times of distress, a hand was placed on her feet while another was placed on her head to provide a physical sense of containment. With increasing body awareness, Brin reached a stage where she showed early signs of self-other differentiation. It enabled her to create actions which had an impact on her environment (secondary and tertiary circular reactions substages of sensorimotor development) and learn that the person who was interacting with her

was a separate entity than herself. It allowed the sessions to transform from their receptive nature into socially engaging ones, leading to development of various skills identified for development of expressive, spoken language.

Areas from thematic analysis targeted during the course of intervention: Body awareness (sensory stimulation and awareness), Breath, Cognitive processing (pre-verbal communication skills), Social communication skills (joint attention, attention, self-expression, regulation of emotions), Reading social cues (modeling, turn-taking, imitation, scaffolding), Techniques (repetition, synchrony, rhythm, supporting materials, motivation and engagement).

5.3.2 Beyoncé

Beyoncé (a pseudonym chosen to reflect the patient's preference in music) was a nine-year-old girl who was brought into a children's hospital for a sudden change in mental status. She was a typically developing girl but suddenly lost her gross and fine motor skills, her mobility, and her ability to produce spoken language. It was hypothesized that there was an underlying neurological etiology for her presenting symptoms. She was referred for dance/movement therapy by a speech-language pathologist. The first few weeks comprised using her movements to understand what she was trying to communicate due to her very limited movement range and lack of facial affect. A small twitch in the right side of her lips or a small movement of her fingers and toes were used to understand what she was trying to communicate during the sessions. However, she did maintain eye contact or blink to respond, expressing an intent to communicate. The one movement that she could do comfortably was take deep breaths. It was used as a ritual at the start and end of each session. Sometimes, I held up a scarf in front of her face to enable her to see how her breath moved it and assure her that her breathing was indeed an impactful movement.

As she progressed neurologically, her range of motion and her ability to vocalize started improving. The opening and closing ritual was built upon by adding stretches and creating Growing movements (expanding the torso in different directions to increase the volume of air which could be inhaled). Her experience as a ballet dancer was incorporated by using the arm positions to facilitate expansion. A chime was used to provide rhythmic cues on when to inhale and exhale. She engaged in individual and group sessions, where she could use her peers and me as model for social referencing, and imitate their movement and verbalizations. When she struggled with the length of utterance, she was given reminders to pause, change her posture to sit more upright, and take a deep breath to support the completion of her sentence. With repetition over a few sessions, she could spontaneously use this intervention. The simultaneous focus of other therapies on strengthening muscles positively impacted the breath support in her speech. After some weeks, she started singing along to the music which accompanied the sessions. It motivated her to move during the interventions while meeting the goal of increasing the duration for which she could vocalize.

The increases in her overall functioning allowed her to express herself more and more with each session. At this point, while she needed to be supported physiologically to improve her use of spoken language, on a psychosocial level, she needed assistance in regulating it. Her extraverted personality meant that there was a clear intention to communicate and express herself. It occasionally led to instances where she spoke before a peer had completed their statement, started speaking on different tangents, and became too loud in expressing her excitement. Interventions which required turn-taking and cooperative tasks of structured nature were used to help her communicate according to social rules. These interventions allowed her to remain attentive to a given task and sustain joint attention with her peers, while regulating

herself. Creativity and rhythm (through accompanying music) were a part of these interventions and supporting materials were provided. One example of an intervention used in group sessions was stretching legs and using them to pass a ball from one person to another. It helped with strengthening abdominal muscles, required her to verbally negotiate spatial positioning with her peers, to regulate herself to engage in smaller and more precise movements, remain attentive to the ball that was being passed to her/that she was passing to a peer, and continuously communicate with other members of the group.

Areas from thematic analysis targeted during the course of intervention: Body awareness (posture), Breath (muscle coordination, muscle strength), Cognitive processing (pre-verbal communication skills), Social communication skills (joint attention, self-expression, attention, regulation of emotions), Reading social cues (modeling, turn-taking, imitation), Techniques (rhythm, creativity, repetition, supporting materials, motivation and engagement).

5.4 Limitations

Being a thesis focused on uncovering theoretical foundations for how dance/movement therapy can support expressive, spoken language, a major limitation is that the thesis does not provide direct clinical evidence or describe a protocol for what interventions could be implemented. Case vignettes have been provided to serve as examples of how the findings could possibly be implemented in combination with a therapist's understanding of theory and literature from dance/movement therapy. It covers a range of conditions which can confound the ability to use expressive, spoken language. Depending upon the etiology, the course of intervention would have to vary. Additionally, the individual differences in the form of ability to regulate oneself, past experience of communication, motivation to talk, etc. suggest that there is no set way of approaching this concern. What the themes do identify though are factors which may need to be

given attention along with a possible set of techniques which could be incorporated into interventions.

As specified by the delimitations, the thesis is focused on children who are still in the process of acquiring language. Different processes might be involved in cases where adults lose language due to a traumatic brain injury, a neurological condition, or age-related decline. The thesis might also be restricted in its applications to individuals who have some physical capacity to produce speech sounds and cognitive processes to support it. As the site of cross-over of direct and indirect pathways, the need for supportive cognitive processes is crucial for successful relay of information between the social cues one receives, social skills they need to use, and physiological factors involved in producing speech sound (based on the sensory feedback they receive throughout their conversation). The literature used for thematic analysis focused on the English language. But the structural differences in other languages might affect what types of interventions might be required to support the ability to communicate in them.

Attempts were made to connect the themes generated through thematic analysis to existing work in dance/movement therapy. But there is no single theory which describes how dance/movement therapy can support language acquisition or production. As a result, there was no framework which could be used to justify the propositions made. The product of the thesis was a patchwork based on theories and concepts which are frequently used in dance/movement therapy. Even the initial framework of direct and indirect pathways was chosen by me to provide some structure for the thesis. As would be expected of a qualitative research method which is analyst-driven, the chosen framework might have affected the overall organization of findings.

5.5 Future Implications

5.5.1 Further Research

Having been developed on the basis of literature from different fields, the thesis hints towards the need for collaboration between them to create interventions which would be most beneficial. The only study published on this topic, too, was a co-treatment of dance/movement therapy and speech therapy. While each of the fields have their own ways of contributing to the process, they cannot address the entire issue in isolation. Even if therapy sessions do not involve presence of different therapists, a constant communication between the team members might be essential to ensure that the child is progressing towards interdisciplinary goals. Further, practicing similar skills across different therapies can provide different ways of approaching it, based on what may be most suitable for a child, while still ensuring a sense of consistency as overarching goals might be shared amongst the different fields.

Based on the numerous factors identified through thematic analysis, a tentative theoretical framework was conceptualized. However, it is equally important to study these factors clinically now. Some research exists on the extent to which each of these factors can be addressed by dance/movement therapy. However, future research needs to focus on how these factors appear in cases where they are intentionally used as interventions to produce expressive, spoken language instead of being goals in themselves. While these factors seem to be helpful from a theoretical standpoint, clinical studies can determine how they may interact and/or confound each other's effect. Standardized tests might be useful in understanding these effects with more clarity.

The study on this topic could be expanded to other populations. A similar approach might be beneficial for individuals with a traumatic brain injury or neurogenerative disorders where spoken language may have been acquired at some point in the lifespan but gets lost or starts deteriorating. It might be helpful to learn whether the process of learning spoken language for the first time and its re-acquisition share common factors.

5.5.2 Expanding the Scope of Dance/Movement Therapy Practice

From the perspective of place of these findings within the field of dance/movement therapy, the aim is to expand the scope of practice from nonverbal communication to spoken communication. As a field whose strength lies in working on the level of movements and understanding people from that perspective, the use of spoken language is sometimes overlooked. While there may be therapists who focus on it in their practice, the need to address this area has not been made explicit in theory or literature.

Vocalizations and verbalizations have been used as forms of interventions, but not been targeted as outcomes. A movement-based understanding is one of the defining features of the field. However, in working with the spoken word, dance/movement therapy or a dance/movement therapist will not lose their identity. Working with the outcome of expressive, spoken language still requires the dance/movement therapy lens of using movements to understand how factors recognized by thematic analysis can be supported. Additionally, this lens can even allow the therapist to consider the secondary effects of struggles with expressive, spoken language (e.g.: feeling isolated from peers, frustration from not having needs met, not being able to express one's emotions, coping with physical/cognitive deficits which might be the underlying cause for their condition, etc.) and help a child in coping with them as well.

CHAPTER 6: SUMMARY AND CONCLUSIONS

Children can face struggles with expressive, spoken language due to specific speech and language disorders or as one of the symptoms of a medical condition or a psychosocial disorder. In either of these situations, interventions need to be provided. Living in a society where spoken language is an important form of communication and socialization, it becomes crucial to help them in expressing themselves. While a dance/movement therapist might have an additional insight into how movements can be expressive, other individuals in a child's life would require spoken communication to understand them. The attention on movements, however, might be a reason why expressive, spoken language has been overlooked as an outcome in literature from dance/movement therapy. With only one published case study on the topic, the gap in existing research was glaring.

Adopting the research design of integrative review, the thesis tried to answer the research question "What are the pathways through which dance/movement therapy can contribute to interventions for expressive, spoken language?". The design enabled incorporation of literature of different types from numerous fields (especially dance/movement therapy, speech and language therapy, and music therapy) to explore answers to the research question. To provide more structure to the design, literature matrix and thematic analysis were used. The former method facilitated organization in how the literature was searched, chosen, and stored. Thematic analysis was the next step to systematically understand trends in the literature. Codes were added to each of the sources in the literature matrix and then refined and condensed until four themes emerged – "physiological basis of speech", "cognitive processes involved in expressive, spoken language", "social factors related to expressive, spoken language", and "techniques for intervention".

The physiological factors included the use of appropriate posture and breath support to support speech sound production. The recognized cognitive processes comprised memory, sequencing, and some social communication skills. There were certain overlaps between the social communication skills (attention, joint attention, regulation of emotions and self-expression) and factors such as turn-taking, imitation and modeling which were identified as being social factors. Numerous techniques which can support interventions were also found through the coding process. The ones which appeared in different forms of therapies were taking a child-directed approach, keeping the child motivated and engaged, ensuring a safe environment with adequate scaffolding, synchronizing with the child, engaging them rhythmically, using supporting materials and creativity, and providing opportunities to attain mastery through repetition and practice.

As a theoretical form of thematic analysis, the thesis was analyst-driven. The framework chosen to provide initial structure to the thesis was that of direct and indirect pathways. The theme "physiological basis of speech" was identified as a direct pathway while the cognitive and social factors were categorized as being indirect. These themes and pathways were connected to dance/movement therapy concepts. The framework of pathways was found to be parallel to the concept of function-expression, which states that movements can be used for a specific, practical purpose as well as for expressing oneself. However, these pathways were not completely independent. Their functioning intersected to create areas of cross-overs. These cross-overs were found to occur through cognitive processes. The cross-over was also supported by the idea that sometimes functional and expressive movements can interact.

Case vignettes based on real clinical work were provided as examples of how dance/movement therapy interventions could be designed with the goal of helping a child in

developing expressive, spoken language. Whereas one case focused primarily on self-regulation, body awareness, and pre-verbal skills, another case discussed the paradox of physiologically promoting an increase in spoken language while also helping that patient in learning social skills required to hold oneself back and communicate appropriately. These cases indicate possible ways in which the factors discovered through thematic analysis could serve as goals. However, research of clinical nature is required to study them further. As had been the aim of the thesis, a theoretical framework was created to support future research.

In enhancing the attention given to expressive, spoken language as an outcome in dance/movement therapy, the question of the identity of those practicing in the field needs to be given consideration. A focus on speaking would not render the use of movements moot. Rather, movements provide therapists with a unique understanding of the child from moment-to-moment, as a session progresses. With dance/movement therapy focusing on the mind-body connection and with the identified themes being bio-psycho-social, both hint towards seeing a child holistically. Instead of pathologizing the child's experience, a dance/movement therapist can start where the child is before expecting them to start making changes. Since children might not be able to expressive themselves with spoken language, observation of movements might give more clues about how responsive the child is to the interventions.

Understanding the role that dance/movement therapy can play also requires an acknowledgement that it is not meant to replace other forms of therapies or take over the work that they do. Different professionals have strengths which might enable them to address some issues better than others. Hence, a collaborative approach to treatment would be suitable. Through such an approach the child and the interventions they receive would both be holistic.

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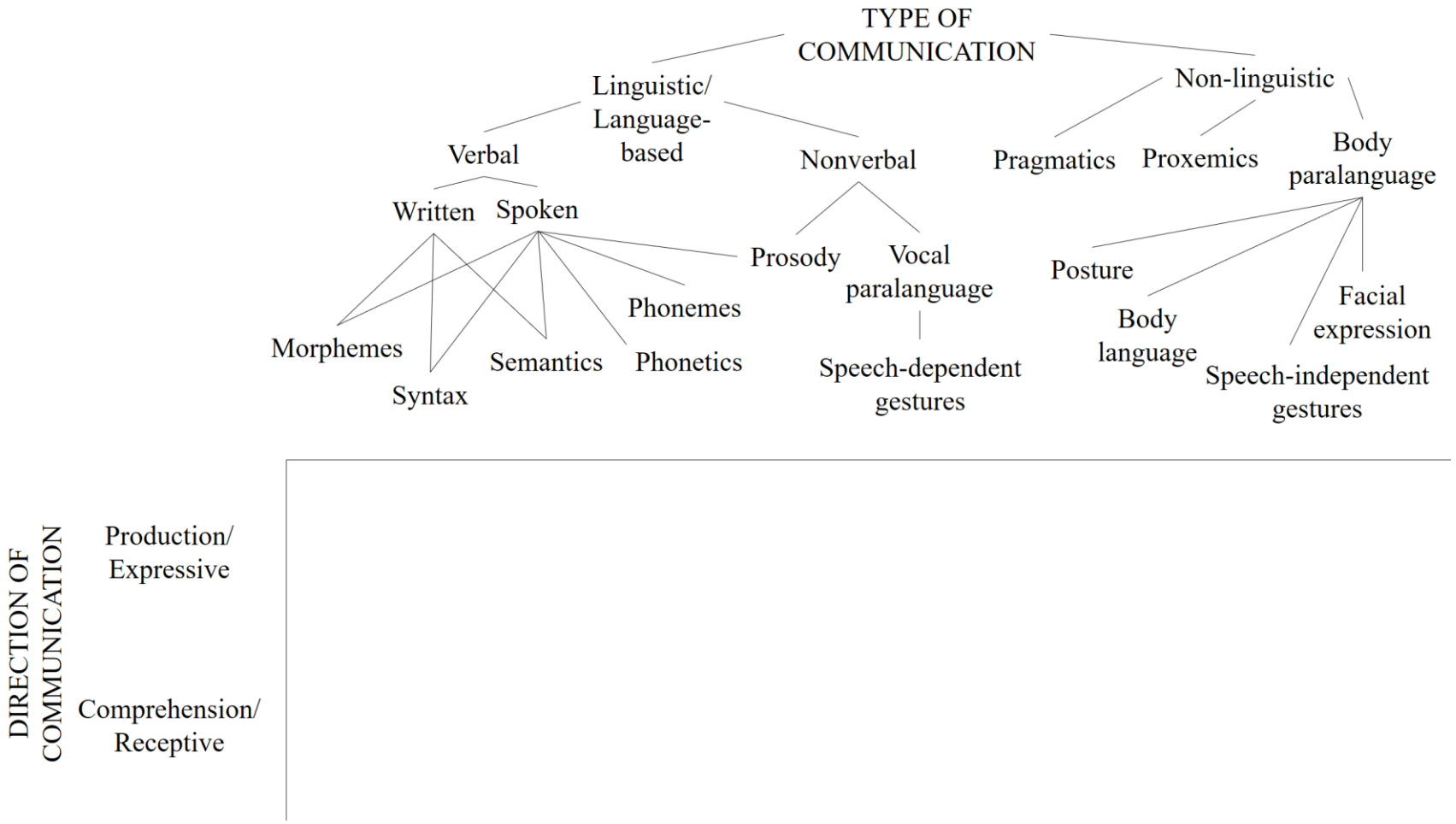
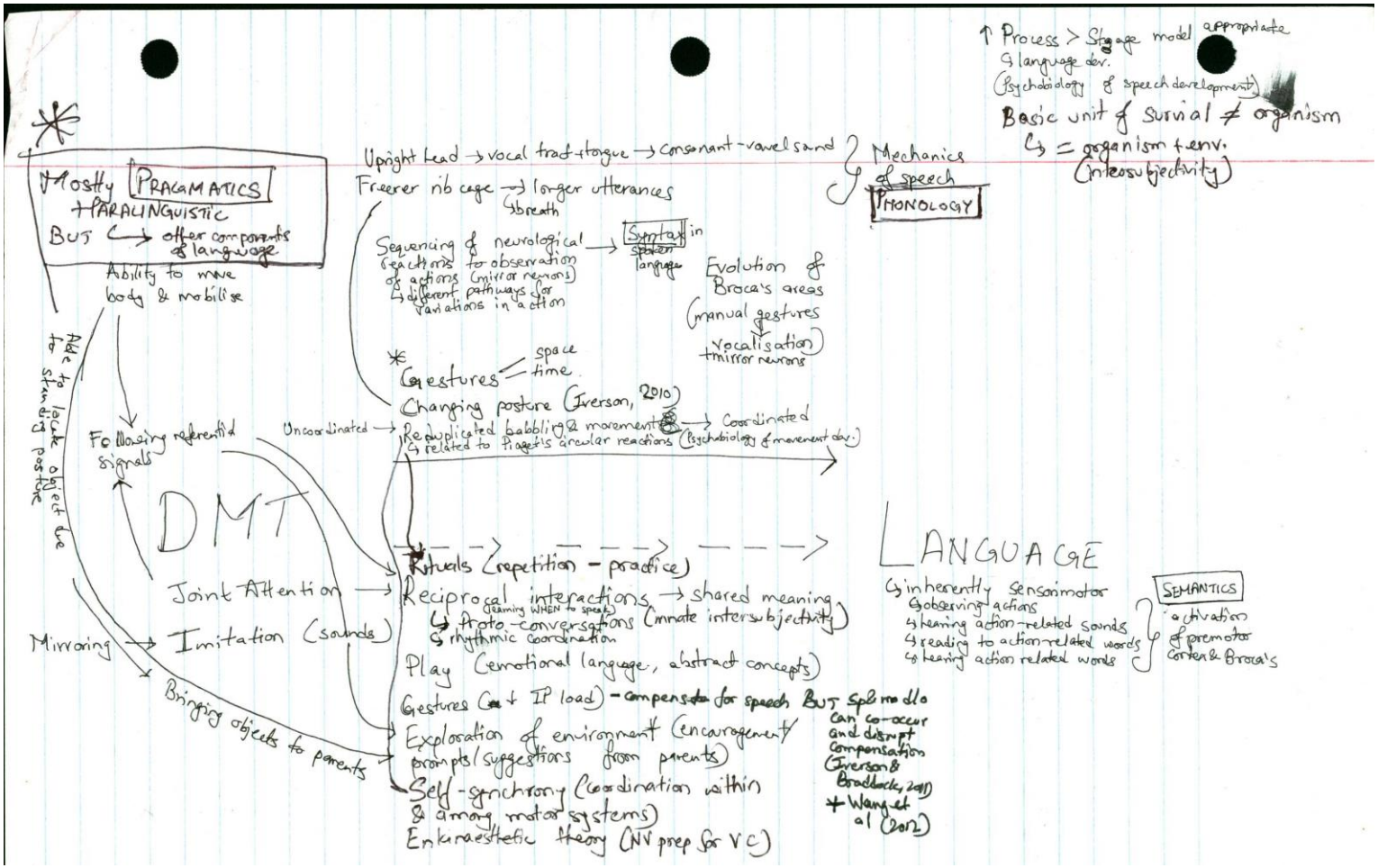
Appendix A: Different Forms of Communication



Appendix B: Cursory Reading Which Led to Development of Initial Framework



Appendix C: Literature Matrix

Citation	Field of Study	Topic/ Header	Main Point	Quotes	Codes
Schmerling, J. D., & Kerins, M. R. (1987). Stimulating communication in a child with elective mutism: Collaborative interventions. *American Journal of Dance Therapy*, *10*(1), 27-40. doi:10.1007/bf02251787	Dance/movement therapy + Speech and language therapy	Speech therapy and dance/movement therapy for elective mutism	Addressing speech issues + Psychosocial issues related to speech disorder	"In order to work effectively with an electively mute child, it is important to consider just how the absence of speech serves the child." (p. 29-30) "…the child's need to feel secure within a hostile, rejecting, or chaotic environment is a primary motivating factor." (p. 30) "…activities aimed at reducing tension and opening the flow of energy in the body were used at the start of each speech therapy session. These included whole body rocking, stretching, and exaggerated tensing and relaxing of various limbs." (p. 34)	Elective mutism; Co-treatment; Relationship with adults; Secure environment; Need for control; Mastery; Vocalization; Chanting; Breath control; Gesturing; De-escalation; Social skills; Self-esteem; Expression of affect; Self-expression; Awareness of body sensations; Infant/parent games; Props; Wind instruments; Family involvement
Martin, M. (2014). Moving on the spectrum: Dance/movement therapy as a potential early intervention tool for	Dance/movement therapy	Using dance/movement therapy as a form of early intervention for	Dance/movement therapy can address social, communicational, and motor issues (and	"Social understanding and development are difficult to separate from the development of communication. In	Early intervention; Autism spectrum disorder; Social isolation; Loneliness; Paralanguage; Proxemics; Empathy; Theory-of-mind;

children with Autism Spectrum Disorders. *The Arts in Psychotherapy*, 41, 545-553.		children with autism spectrum disorder	connections between them) in children with autism spectrum disorder	particular, the paralinguistic and pragmatic aspects of communication can be directly linked to social development." (p. 547) "…before verbal language is acquired, non-verbal skills in social/communication development are often difficult for children with ASDs and can have an impact on future development. Such skills include gesturing, joint attention, and imitation." (p. 547) "…that impairments in joint attention behaviours are core to ASDs…" (p. 547)	Joint attention; Social communication; Pragmatics; Gesturing; Imitation; Eye contact; Repetitive, rhythmic movements; Mirror neurons; Attunement; Body awareness; Coordination; Bartenieff Fundamentals; Secure environment; Self-regulation; Theory of body; Exaggeration; Games; Turn-taking; Vocalization; Children's songs
Scharoun, S. M., Reinders, J. J., Bryden, P. J., & Fletcher, P.C. (2014) Moving on the spectrum: Dance/movement therapy as an intervention for children with Autism Spectrum Disorders. *American Journal of Dance Therapy*, 36, 209-228. doi: 10.1007/s10465-014-9179-0	Dance/movement therapy	Description of various ways in which a dance/movement therapy intervention may be suitable for children with autism spectrum disorders	Dance/movement therapy can help children with autism by targeting multiple areas of development through the use of creative and developmental movements	"…children with ASD are described as looking through people, rather than at people; therefore lacking the interpersonal contact, joint attention, and understanding associated with the development of language pragmatics." (p. 211)	Autism spectrum disorder; Repetitive behaviors; Self-regulation; Social interaction; Expressive movement; Spatial awareness; Sensory-motor integration; Therapeutic relationship; Props; Music; Eye contact; Mirroring; Imitation; Social isolation; Attention span; Mirror neuron system; Social skills; Recognizing facial expressions; Rhythmic movement; Self-expression; Self-control; Body image; Synchronous movement; Gesturing; Attention span;

					Empathy; Singing; Turn-taking; Joint attention
Thom, L. (2010). From simple line to expressive movement: The use of creative movement to enhance socio-emotional development in the preschool curriculum. *American Journal of Dance Therapy*, *32*(2), 100-112. doi:10.1007/s10465-010-9090-2	Dance/movement therapy	Incorporating expressive movement into pre-school curriculum to enhance socio-emotional development	Dance/movement therapy can expand self-awareness and social awareness by facilitating recognition of emotions and labelling them verbally	"Categorization, for 3-year-olds, is an evolving cognitive ability accompanied by language development. Emerging language skills allow children to make cognitive distinctions and organize their social and emotional experiences." (p. 105) "…connecting these body cues to language becomes one more step in the process of emotional appraisal through representation." (p. 108)	Gesturing; Cognitive development; Emotional expression; Social cognition; Yoga; Regulation of emotions; Recognition of internal sensations; Free movement; Breathing; Attunement; Emotion charades; Self-awareness; Social awareness; Circle; Peer support; Scaffolding
Trevarthen, C., Fresquez, C. (2015). Sharing human movement for well-being: Research on communication in infancy and applications in dance/movement psychotherapy. *The Arts in Psychotherapy*, *10*(4), 194-210. doi: 10.1080/17432979.2015.1084948	Dance/movement therapy	Interactions start at a body-level and serve as the basis for all types of communication	There are psychobiological mechanisms that ensure creation of a trusting environment for interaction before and while acquiring language	"In an enkinaesthetic domain we share meaning and intentions via dynamic rhythmic, propositional and exploratory movement. This vibrant, physical ability to be with another is necessary before words can affect the way one feels and thinks" (p. 200) "…phases of imitation, protoconversation and play, leading to shared knowledge and skills." (p. 200) "Our social nature is animated from the start by physical	Social psychobiology; Expressive movement; Reciprocal interaction; Innate intersubjectivity; Enkinaesthetic theory; Pre-verbal development; Imitation; Play; Imaginary/Pretend Play; Shared meaning; Mirror neurons; Gestures; Timing

				movement and its perception." (p. 204)	
Tropea, E. B., Dulicai, D., & Freeman, W. C. (2009). 14. Applying dance/movement therapy in school settings. In R. W. Christner & R. B. Mennuti (Eds.), *School-based mental health: A practitioner's guide to comparative practices* (pp. 353-372). New York, NY: Routledge.	Dance/movement therapy	Summary of dance/movement therapy with children and its applications for dance/movement therapy assessments and interventions	Dance/movement therapy can promote healthy development by providing opportunities for acquiring developmental movements and using them for self-expression and regulation	"Gesture, body attitude, tone of voice, and nonverbal interaction precede language, and actually affect a child's relationship to and mastery of the spoken word. (p, 354)"	Kinesthetic awareness; Mirroring; Amplification; Modulation; Emotional expression; Socialization skills; Impulse control; Attention span; Body boundaries; Props; Music; Obstacle courses; Sequencing tasks; Vocalization; Labelling emotions
Koshland, L., Wilson, J., & Wittaker, B. (2004). PEACE through dance/movement: Evaluating a violence prevention program. *American Journal of Dance Therapy*, *26*(2), 69-90. doi:10.1007/s10465-004-0786-z	Dance/movement therapy	A dance/movement therapy program for violence prevention	Dance/movement therapy can promote positive peer interactions by support skills of self-control, emotional regulation, and problem-solving through structured movement experiences	"…One goal of the design of the dance/movement therapy treatment program was to offer children practice for building positive peer interactions. To this end, the program structured students play through movement experiences to acquire skills for less aggressive interactions which they could transfer and apply in other settings." (p. 87)	Violence prevention; Self-control; Emotional regulation; Positive peer interactions; Spatial awareness; Time modulation; Hand gestures; Poems; Social space; Personal space; Stories; Movement images; Expanding movement repertoire
Solomon, N. P., & Charron, S. (1998). Speech breathing in able-bodied children and children with cerebral palsy: A review of literature and implications for clinical intervention. *American Journal of Speech-Language Pathology*, *7*(2),	Speech and language therapy	Comparing speech breathing patterns of children with cerebral palsy and typical developing children to recognize areas that need to be targeted by speech-related interventions	Interventions addressing muscle weakness and incoordination, body positioning, and neurodevelopment aspects of cerebral palsy can be useful in strengthening the essential components	"Data from perceptual and acoustic studies also suggest that expiratory muscle control is abnormal in children with cerebral palsy." (p. 64) "Because of weak expiratory muscles, these children have trouble	Cerebral palsy; Speech breathing; Body positioning; Muscle strengthening; Muscle coordination; Muscle control; Muscle tone; Breath pressure; Loudness; Chest wall muscles; Breath volume; Length of utterance; Air flow; Air wastage; Diaphragm; Rib cage;

61. doi:10.1044/1058-0360.0702.61			of speech breathing (pressure, volume, air flow, shape of various body parts)	exhaling below the resting expiratory level…" (p. 64) "Children with cerebral palsy tend to have reduced vital capacities due to weak, hypertonic, and/or uncoordinated muscles for breathing. To produce speech, these children probably have to use a substantial proportion of their already reduced vital capacities." (p. 66) "Children with dysarthria associated with cerebral palsy may valve the airstream inefficiently, thus using abnormally high air flows during speech." (p. 67) "Respiratory musculature includes and is interconnected with muscles of the neck, trunk, shoulder girdle, and pelvis that control postural alignment. Therefore, difficulties with body positioning can compound respiratory weakness and incoordination." (p. 71-72) "…muscle training strategies that target muscle strengthening and endurance, muscle relaxation and passive	Abdominal muscles; Posture; Body positioning; Muscle relaxation; Breathing against resistance; Passive relaxation; Active relaxation; Imagery for breathing; Collaboration with patient; Neurodevelopmental treatment; Hands-on support; Tactile feedback; Scaffolding; Decreasing support

				stretch, balanced activity of muscle groups, and motor coordination are reasonable approaches to attempt." (p. 72) "Positioning should address straightening the back, securing the buttocks properly on the seat, and attaining a 90° hip, knee, and foot angle. Additionally, support should be provided for the arms and perhaps the head. Arm support is useful not only for posturing the shoulders and upper torso, but also for providing a surface against which the child can push. Pushing with the arms can result in the generation of greater air pressure for speech by assisting the chest wall muscles and can also assist laryngeal adduction" (p. 74) "[Neurodevelopmental treatment] principles include the simultaneous use of therapeutic handling by the clinician and active participation of the speaker during functional activities" (p. 74)	
Pennington, L., Miller, N., Robson, S., & Steen, N. (2010). Intensive speech	Speech and language therapy	Providing intensive speech therapy for improving speech	Speech intelligibility can be supported through increase in	"A systems approach that targets the components of the vocal tract	Cerebral palsy; Breath support; Exhalation; Phonation; Speech rate;

and language therapy for older children with cerebral palsy: A systems approach. *Developmental Medicine & Child Neurology*, *52*(4), 337-344. doi:10.1111/j.1469-8749.2009.03366.x		intelligibility in children with cerebral palsy	breath support, respiratory effort, and reduction in pace of speech production	controlling breathing, phonation, nasal resonance, articulation and intonation is commonly advocated…" (p. 337) "…coordinating exhalation and phonation for the production of spoken language. In the spoken language tasks, children also practised speaking slowly and maintaining breath supply across a phrase…" (p. 339)	Hierarchical exercises; Speech intelligibility; Articulation; Spontaneous speech; Modelled speech; Conversational speech
Blasi, V., Baglio, G., Baglio, F., Canevini, M., & Zanette, M. (2017). Movement cognition and narration of the emotions treatment versus standard speech therapy in the treatment of children with borderline intellectual functioning: A randomized controlled trial. *BMC Psychiatry*, *17*(1), [146]. doi:10.1186/s12888-017-1309-z	Speech and language therapy	Describing a study protocol comparing standard speech therapy with movement cognition and narration of emotions treatment	(Results yet to be reported)	"Giving a simple name to the emotion is not sufficient, it is necessary to transform it into a metaphor, a story or a play" ("Experimental treatment: The movement cognition and narration of the emotions treatment (MCNT)", para. 6) "…different approaches to promote the narration of the emotions: symbolic play, reading, inventing and/or dramatizing a story, drawing and talking. These activities are considered creative processes with a transitional function…that enable the children and the therapist	Borderline intellectual functioning; Movement training; Cognitive training; Socio-emotional development; Game therapy; Balance; Coordination; Planning; Working memory; Inhibitory control; Shared attention; Alphabetization; Verbalizing bodily sensations; Narrating an emotion; Metaphor; Story; Play; Drawing; Transitional space; Symbolization; Brain plasticity

				to deal with the emotions in an indirect way, preventing the fear of being judged and persecutory feelings." ("Experimental treatment: The movement cognition and narration of the emotions treatment (MCNT)", para. 6)	
Hoit, J. D. (1995). Influence of body position on breathing and its implications for the evaluation and treatment of speech and voice disorders. *Journal of Voice*, *9*(4), 341-347. doi:10.1016/s0892-1997(05)80196-1	Speech and language therapy	Giving attention to breath and body position when producing sound	Starting by increasing breath awareness in a supine position for resting breath and then using it in upright position to improve speech breathing	"The client is asked to attend to the rise and fall of the abdomen while breathing quietly, and then to practice vocalizing using the same large abdominal motion…The goal is that the client eventually will carry over the so-called natural breathing pattern from the supine body position to everyday speaking activities performed in the upright body position." (p. 345) "…supine speech breathing involves efforts of the diaphragm (-DI) for inspiration and efforts of the rib cage (+RC) for expiration. In contrast to supine speech breathing, upright speech breathing involves efforts of the diaphragm and abdomen (DI, + AB) for inspiration and efforts of the rib cage and	Physiology of speech; Body position; Breathing; Upright; Supine; Chest motion; Rib cage; Abdominal muscles; Diaphragm; Breath awareness; Natural breathing pattern; Resting tidal breathing; Speech breathing

				abdomen, with the latter predominating (+RC < +AB), for expiration." (p. 345-346)	
Cogher, L. (1999). The use of non-directive play in speech and language therapy. *Child Language Teaching and Therapy*, *15*(1), 7-15. doi:10.1177/026565909901500102	Speech and language therapy	Incorporating non-directive play into speech and language therapy		"The child engages in self-determined play or activity while the adult plays alongside, closely imitating and/or providing a language commentary which is linguistically and contextually appropriate" (p. 7) "Children learn to use and understand language in a social context through experience. To do so they must be able to understand the principles of cause and effect and to predict or anticipate events to some extent. They must be able to imitate and learn through trial and error. They must be able, through sharing joint reference with others, to make strong associations between a linguistic symbol and an item or event so as to respond to its use, and also build up a strong enough auditory representation of the word to be able to reproduce it in an interaction. Children must also develop their	Non-directive play; Cognitive development; Joint reference; Social rules; Social cues; Turn-taking; Cause and effect; Trial and error; Social context; Cognitive association; Auditory representation; Play routine; Flexibility in routine; Imitation; Scaffolding; Linguistic mapping; Challenges; Linguistic commentary; Proximity; Contingent responsivity

				awareness of social rules so that they can give and receive social cues and take turns." (p. 8) "When adults respond contingently to a child's current communication behaviours, they enhance the child's communicative efficiency and therefore shape more conventional communicative behaviours" (p. 13) "Linguistic mapping involves repeating children's utterances back to them using a slightly more mature sentence structure." (p. 13)	
Brüll, A. (2003). The acquisition of speech through speech-movement therapy: An exploratory study. *The British Journal of Development Disabilities, 49*(96), 59-65. doi:10.1179/096979503799104156	Speech and language therapy	Using speech sounds to acquire and elicit speech	Speech sounds can be treated as being individual movements which can be perceived when others use them and practiced by a child to improve their speech	"…sense of word as enabling a child to have a direct sensory perception of speech sounds, phonemes and syllables. The sense of word is quite different from the sense of hearing, as its function is to pick out speech sounds amongst other sounds, noises and tones" (p. 60) "…the listener's muscles are the perceptive organs for the speaker's muscle movements" (p. 60) "Each consonant and vowel is expressed by a specific gesture of the	Speech-movement; Learning disability; Sense of word; Perception of speech sound; Eurhythmy; Gesturing; Association; Repetition

				arms. These gestures cannot be executed in a mechanical manner but need a 'flowing awareness' or an experience of the inner quality of the gesture." (p. 61)	
Adams, C., Lockton, E., Freed, J., Gaile, J., Earl, G., McBean, K., … Law, J. (2012). The Social Communication Intervention Project: A randomized controlled trial of the effectiveness of speech and language therapy for school-age children who have pragmatic and social communication problems with or without autism spectrum disorder. *International Journal of Language & Communication Disorders*, *47*(3), 233-244. doi:10.1111/j.1460-6984.2011.00146.x	Speech and language therapy	A randomized controlled trial to test how effective speech therapy can be for children with pragmatic and social communication problems	The intervention focused on social and pragmatic communication seemed to be more effective than standard speech therapy based on parental reports but not on standardized measures of language	"The experimental treatment was an intensive manualized social communication intervention with content within a principled framework aimed at remediation of impairments in semantics and high-level language skills, pragmatic difficulties, and social interaction and social cue interpretation" (p. 236) "[Social Communication Intervention Project] is perceived by parents and teachers as effective at improving some functional pragmatic and social communication skills at home, and classroom learning skills, for these children." (p. 242)	Pragmatic language impairment; Social communication disorder; Autism spectrum disorder; Semantics; Pragmatics; Social interactions; Social cue interpretation; Remediation; Manualized intervention; Individualized intervention; Home environment; School environment
Fox, C. M., & Boliek, C. A. (2012). Intensive voice treatment (LSVT LOUD) for children with spastic cerebral palsy and dysarthria. *Journal of*	Speech and language therapy	Using LSVT LOUD as a form of intensive intervention, with a singular focus on loudness, for enhancing speech in children with spastic	Parents and unrelated listener's rated posttreatment speech as being better than baseline speech for loudness, pitch	"The training mode of LSVT LOUD is consistent with principles that drive activity-dependent neuroplasticity	Cerebral palsy; Dysarthria; LSVT LOUD; Motor learning; Activity-dependent neuroplasticity; Loudness; Respiratory-phonatory effort; Singular training target; Reduction of cognitive load;

Speech, Language, and Hearing Research, *55*(3), 930-945. doi:10.1044/1092-4388(2011/10-0235)		cerebral palsy and dysarthria	variability and voice quality	and motor learning" (p. 931) "Establishing a respiratory–phonatory foundation before addressing other speech subsystems is consistent with approaches recommended for treating motor speech disorders…" (p. 931) "The single focus on vocal loudness limits cognitive demands associated with treatment, which may be important for children with low-average to below-average cognitive functioning." (p. 931)	Muscle weakness; Incoordination of muscles; Fatigue
Boliek, C. A., & Fox, C. M. (2014). Individual and environmental contributions to treatment outcomes following a neuroplasticity-principled speech treatment (LSVT LOUD) in children with dysarthria secondary to cerebral palsy: A case study review. *International Journal of Speech-Language Pathology*, *16*(4), 372-385. doi:10.3109/17549507.2014.917438	Speech and language therapy	Considering the role that environment factors and individual characteristics play in how children with cerebral palsy and dysarthria respond to LSVT LOUD	Communication environment (setting and communication partners) and individual characteristics (preferences, motivation) of a child need to be given sufficient consideration when using in LSVT LOUD	"The core voice training achieved in the first half of treatment sessions is then trained into child self-selected functional phrases and speech hierarchy exercises with the goal of systematically moving improved voice function into daily communication. Functional communication goals are different for each child and tailored to his or her communication environment." (p. 374) "The child's interests and communication goals are used to structure the	Cerebral palsy; Dysarthria; LSVT LOUD; Motor learning; Activity-dependent neuroplasticity; Healthy loudness; Specificity of vocal training; Muscle weakness; Poor coordination; Respiratory-laryngeal strength; Endurance; Voice quality; Functional communication; Progressive challenges; Interests; Rewards; Motivation; Role-playing; Communication environment; Communication partners; Homework; Individualized exercises; Technological support

				speech exercises" (p. 374)	
Strand, E. A., Stoeckel, R., & Bass, B. (2006). Treatment of severe childhood apraxia of speech: A treatment efficacy study. *Journal of Medical Speech-Language Pathology, 14*(4), 297-30. Retrieved from https://www.pluralpublishing.com/journals_JMSLP.htm	Speech and language therapy	Using an intervention based on motor learning principles to promote speech articulation in children with apraxia of speech	Focus on movement rather than sound of speech provides proprioceptive feedback which can be practiced repeatedly to improve speech in children with apraxia of speech	"This is a treatment approach based on integral stimulation, which emphasizes the shaping of movement gestures for speech production and continued practice of those gestures, in the context of speech." (p. 298) "The utterances are practiced slowly and simultaneously at first to facilitate movement accuracy." (p. 298) "This technique allows high level of success, emphasizes extensive practice (many repetitions), and maximizes proprioceptive input." (p. 299) "In talking with the child, we were careful to use language that emphasized movement rather than 'sounds'. We also spent the first few minutes of the initial sessions having the child move the jaw, lips, and tongue while the clinician encouraged the child to feel the movement." (p. 305)	Apraxia of speech; Motor learning principles; Dynamic temporal and tactile cueing; Articulation; Movement gestures; Repetition and practice; Movement awareness; Practice at home; Proprioceptive feedback
Howland, K. M. (2015). Chapter 24. Music therapy	Music therapy	An overview of areas of speech and	Music therapy can be a helpful intervention	"Singing is a positive context in which to	Dysarthria; Apraxia; Stuttering; Phonation;

for children with speech and language disorders. In B. L. Wheeler (Ed.), *Music therapy handbook* (pp. 302-314). New York, NY: The Guildford Press.		language that music therapy interventions for children can target	for four areas of motor speech disorders – respiration, phonation, articulation, resonance – when used in isolation and in the form of a co-treatment	practice sustained phonations and loudness." (p. 305) "…the music therapist can create songs and activities that include the sounds in words that are both true words and protowords…" (p. 306) "Instruments that make sounds similar to a speech sound can be used to work on the sound in isolation." (p. 307) "Reducing anxiety and inducing relaxation may be very helpful with children who stutter." (p. 310) "[Music] allows one to quickly build a strong working relationship, which is important in overcoming resistance, anxiety and dread." (p. 312) "The music therapist is uniquely trained to facilitate this process with creative, meaningful, engaging activities that allow for repetition, variation, and growth." (p. 312)	Singing; Recording songs; Muscle strengthening; Oral motor exercises; Respiratory exercises; Call-and-response; Contextualization of speech production; Elongation of syllables; Intelligibility; Kinesthetic prompts; Songs with targeted sounds; Instruments with targeted sounds; Multisensory; Repetition; Carrier phrases; Movement sequences; Melodic intonation therapy; Rhythm; Anticipatory cues; Mirror neuron system; Increasingly challenges; Strengths; Fluency; Self-esteem; Relaxation techniques; Reducing anxiety; Systematic desensitization; Eye contact; Turn-taking; Initiation; Proximity; Attention; Interest; Therapeutic relationship; Co-treatment; Incorporating family
Srinivasan, S. M., & Bhat, A. N. (2013). A review of "music and movement" therapies for children with autism:	Music therapy	A review of articles addressing the role of music-based therapies for development of	Music therapy can target multiple areas of development, especially language, by promoting social	"Music and language are closely related to each other in that both music and language are	Autism spectrum disorder; Musical strengths; Singing; Chanting; Instrument playing; Music-making; Increasing complexity;

Embodied interventions for multisystem development. *Frontiers in Integrative Neuroscience*, *7*(22), 1-15. doi:10.3389/fnint.2013.00022		language and motor skills in children with autism spectrum disorder	skills in naturalistic environment, through interactive music-making processes	hierarchically arranged…" (p. 3-4) "Synchronous movements during rhythmic actions or music-making as well as unison singing creates a state of social cooperation, shared purpose, and a sense of togetherness which sparks a social connection between individuals…" (p. 4) "Joint rhythmic activities may intrinsically motivate adults and children to move in synchrony and engage in a cooperative effort…" (p. 5) "Socially synchronous movements and unison singing during group music activities evoke the MNS activity in the brain. MNS has been postulated as the neural basis for social abilities of shared attention, affect, and empathy…" (p. 8) "By grounding music in physical movements, eurhythmics provides an embodied musical experience…" (p. 8) "Repetition is of utmost importance to ensure learning in this	Attention; Memory; Pitch perception; Native language sounds; Verbal fluency; Rhythmic movements; Synchronous movements; Group; Dyad; Musical games; Social interaction; Cooperation; Imitation; Joint attention; Social reciprocity; Shared affect; Eye contact; Expression of emotions; Reduced stereotypical behaviour; Sensory-motor integration; Common neural substrates; Repetition and practice; Mirror neuron activation; Compensatory mechanism; Temporal concepts; Eurhythmy; Auditory Motor Mapping Training; Melodic Intonation Therapy; Familiar environment; Feedback; Prompts; Reinforcement

				population. Hence, we recommend involving parents and caregivers in the training activities to enhance skill learning, generalization, and maintenance." (p 10)	
LaGasse, A. B. (2014). Chapter 17. Developmental speech and language training through music. In M. H. Thaut & V. Hoemberg (Eds.), *Handbo ok of neurologic music therapy* (pp. 198-216). Oxford, United Kingdom: Oxford University Press.	Music therapy	Description of the role of developmentally appropriate music therapy interventions in meeting spoken language goas for children with developmental disorders	Music therapy can target pre-linguistic behaviors, as well as cognitive and social development, to promote language acquisition and production	"Rhythm can be extremely useful for promoting speech production and anticipation of response." (p.199) "Melody can be used to mimic the natural intonation of phrases, to develop music exercises that are engaging, and to help with response anticipation." (p. 192) "Musical creativity can also be added to children's books, using music as a way to promote further engagement, create structure and anticipation, and provide a stimulus for aiding target production." (p. 205) "Early intervention can be utilized to establish pre-linguistic behaviors, including engagement, imitative skills, and reciprocation. These skills are important because they are used in later communications	Developmental speech and language training through music; Developmental apraxia of speech; Down syndrome; Fragile X syndrome; Autism spectrum disorder; Angelman syndrome; Intellectual disability; Developmentally appropriate; Singing; Chanting; Instrument playing; Functional; Appealing; Aesthetically pleasing; Goal-oriented; Rhythm; Melody; Multiple repetitions; Novelty; Mastery; Phoneme sequencing; Cueing; Supporting movements; Intelligibility; Children's books; Pre-linguistic skills; Motor imitation; Vocal imitation; Imitative games; reciprocation; Social communication; Asking for response; Receptive language; Verbal instructions

				efforts and provide building blocks for social communication exchanges." (p. 206)	
Mertel, K. (2014). Chapter 14. Oral motor and respiratory exercises (OMREX). In M. H. Thaut & V. Hoemberg (Eds.), *Handbook of neurologic music therapy* (pp. 161-178). Oxford, United Kingdom: Oxford University Press.	Music therapy	Description of oral motor and respiratory exercises that can be used in music therapy interventions addressing articulation of speech	Vocalization and playing wind instruments can support coordination and strengthening of muscles involved in respiration and phonation to improve length and intelligibility of speech	"… [Neurologic Music Therapy] can facilitate an improvement in motor control and muscular coordination (both of which are essential for articulation), respiratory capacity, speech fluency, vocalization, and sequencing of speech sounds, as well as speech rate and intelligibility." (p. 164) "Patients receive auditory and kinesthetic feedback when they sing or play wind instruments. Therapeutic singing and breathing exercises on wind instruments may reduce excess muscle tension, increase respiratory capacity, and improve articulatory accuracy through their ability to train and strengthen the involved muscle groups." (p. 167)	Oral motor and respiratory exercises; Articulation; Vocalization; Wind instruments; Length of phonation; Singing; Diaphragm contraction; Abdominal muscles; Orofacial movements; Enjoyable; Concentration; Memory; Rhythmic cues; Motor learning principles; Reducing muscle tension; Kinesthetic feedback; Auditory feedback; Muscle coordination; Range of motion; Sound distinction; Echoing breathing patterns
Thaut, C. P. (2014). Chapter 18. Symbolic communication training through music (SYCOM). In M. H. Thaut & V. Hoemberg (Eds.), *Handbook of neurologic music therapy* (pp. 217-220).	Music therapy	Description of exercises that can be used in music therapy to promote an understanding of pragmatic use of language	Music therapy can provide simulation of communicative environment through elements of turn-taking, social awareness, listening, and responding	"In addition to practicing the verbal components of communication, non-verbal language patterns and gestures such as turn taking and listening can be addressed through	Symbolic communication training through music; Pragmatic language; Rules of communication; Structured improvisation; Questioning; Responding; Dialoguing; Turn-taking; Gesturing; Eye

Oxford, United Kingdom: Oxford University Press.				SYCOM exercises." (p. 218) "Once the patient is able to musically implement appropriate gestures of communication, and has established the ability to listen before responding through previous exercises, the next step in SYCOM would involve implementing some level of dialoguing between the therapist and the patient." (p. 219) "Because music is sensorily structured, requires social awareness, has strong affective saliency, and evolves in real time, it can be an effective tool for simulating communication structures and social interaction patterns…" (p. 220)	contact; Repetition; Social awareness
Buday, E. M. (1995). The effects of signed and spoken words taught with music on sign and speech imitation by children with autism. *Journal of Music Therapy*, *32*(3), 189-202. doi:10.1093/jmt/32.3.169	Music therapy	Comparing the use of music and rhythmic speech in teaching sign language to children with autism	Children in learning signs with music were able to imitate more signs and words because children were more engaged, focused, and motivated when music was involved	"…music enables a child to focus more intently to on-task behaviors by reducing boredom." (p. 199) "…a number of children would sing or speak to many, (and in some cases all), of the words in the music verse in addition to the tested target words." (p. 200)	Autism; Reinforcement; Reducing stress; Focused attention; Motivating; Memory; Signing; Imitation; Controlling repetitive behaviors

Wetherick, D. (2014). Music therapy and children with a language impairment: Some examples of musical communication in action. *Psychology of Music*, *42*(6), 864-868. doi:10.1177/0305735614547716	Music therapy	Using music therapy to target problems secondary to having language impairment	Music therapy interventions can target language impairment as well as its secondary effects on children by providing opportunities to practice social communication skills	"The therapist's musical structures and phrasing also provided models for speech phrasing and conversational turn-taking." (p. 867) "Language skills were addressed only indirectly during the sessions, e.g. by encouraging single words for greetings/goodbyes or choices, or verbalizing the implied meaning of actions e.g. "You want a hug!" In later sessions, an increase in occurrences of cooperative play occurred alongside an increase in spontaneous attempts at social speech." (p. 867)	Language impairment; Social communication; Social interaction; Emotional regulation; Self-esteem; Improvised music-making; Drum games; Kazoo-vocalization; Greeting and goodbye songs; Establishing rules; Time-out; Musical conversations; Sharing; Turn-taking; Rituals; Cooperative play; Group work
Geist, K., McCarthy, J., Rodgers-Smith, A., & Porter, J. (2008). Integrating music therapy services and speech-language therapy services for children with severe communication impairments: A co-treatment model. *Journal of Instructional Psychology*, *35*(4), 311-316.	Music therapy + Speech and language therapy	A model combining speech therapy and music therapy intervention, and its application in school setting	Collaboration of speech therapist and music therapist with school teacher promoted development of spoken language in a 4-year-old child with global developmental delays	"…relaxation exercises, breathing and vocalization exercises, song articulation experiences, word and phrase rhythm chanting experiences, and vocabulary and concept development singing." (p. 312) "…treatment intervention that presented musical stimuli in various imitation exercises, singing experiences, and fill in	Co-treatment; Communication impairments; Prosody; Motivating; Enjoyable; Breath control; Muscle control; Singing; Relaxation exercises; Chanting; Social interaction; Engagement; Group time; Expressing choice; Greeting; Prolonged attention; Turn-taking; School setting; Repetition and practice

				the blank rhythmic exercises." (p. 312) "First, music allowed opportunities for repeated practice than would seem natural in non-music activities" (p. 315)	
Newham, P. (1996). Making a song and dance: The musical voice of language. *The Journal of the Imagination in Language Learning*, *3*, 66-74.	Voice Movement Therapy	Using songs and movements in early schooling to promote language development	Music- and movement-based activities promote development of social skills and cognitive processes which are required for acquisition and production of language	"…the backdrop, blue-print and initiating expressive faculties upon which linguistic or verbal activity are predicated consist of the phylogenetic spontaneous rhythmical arrangement of sound and silence which constitute the composition of music." (p. 72) "The simultaneity of motor action and vocalisation in the preverbal infants is revived through song and dance, where attaching of particular tones and gestures to specific words that sets them in a firm and easily retrievable form." (p. 72)	Rhythmic arrangement of sound; Singing; Memory; Singing games; Accompanying movement; Song-making; Playfulness; Rhyme-making; Voice Movement Therapy; Behaviorist model of language acquisition
Wan, C. Y., Demaine, K., Zipse, L., Norton, A., & Schlaug, G. (2010). From music making to speaking: Engaging the mirror neuron system in autism. *Brain Research Bulletin*, *82*(3-4), 161-168.	Neuroscience	Understanding common neural pathways shared by music and speech in order to use them as a resource in speech interventions for children with autism	Music making can facilitate speech perception and production in children with autism by stimulating common neural pathways and by	"Given the overlap between the language and music systems in the brain, we propose that music making (through singing and/or playing an instrument) may provide an alternative medium	Autism spectrum disorder; Mirror neuron system; Sensory-motor integration; Articulatory gestures; Imitation; Motor representation; Music-making; Synchronization; Joint attention; Familiarity

doi:10.1016/j.brainresbull.2010.04.010			providing social activities that keep children engaged in a comfortable environment	for accessing and engaging this system." (p. 164) "The child progresses from passive listening, to unison singing, to partially supported singing, to immediate repetition, and finally to producing the target word or phrase on their own" (p. 164) "Interactive music making (using instruments) is useful in facilitating communication and social skills, while singing engages the MNS network that is believed to be deficient in individuals with autism." (p. 165) "…specialized treatments for autism that maximize the individual's potential for developing or re-learning expressive language function (e.g., through interactive AMMT), and thus, improve the quality of life for people with autism and their families" (p. 165-166)	with communication partner; Activation of Broca's area; Singing; Overlapping neural systems; Melodic intonation therapy; Auditory motor mapping training; Fluency; Loudness; Comfortable environment; Interaction; Interest; Turn-taking; Choice making; Appropriate body contact
Morrison, D., & Pothier, P. (1978). Effects of sensory-motor training on the language development of retarded	Special education needs	Comparing effectiveness of perceptual-motor training, movement training, and not	Environment of a program may affect outcome regardless of type of remedial training	"…dance and movement therapy involves the child in a good deal of sensory-motor activities that are frequently	Mental retardation; Physical retardation; Sensory-motor; Perceptual-motor; Verbal instructions; Reinforcement; Movement training;

preschoolers. *American Journal of Orthopsychiatry*, *48*(2), 310-319. doi:10.1111/j.1939-0025.1978.tb01319.x		systemic training for development of children with mental and physical retardation		accompanied by rhythm or music. These activities are assumed, among other things, to increase the child's awareness of his body, and to improve his motor skills and use of language." (p. 312)	Movement group; Instruments; Free movement; Cognitive skills; Remedial training; Sensory integration; Expressive vocabulary; Locomotor movements; Games; Fine motor movements; Gross motor movements; Circle
Wheeler, L., & Griffin, H.C. (1997). A movement-based approach to language development in children who are deaf-blind. *American Annals of the Deaf*, *142*(5), 387-390. doi: 10.1353/aad.2012.0300	Special education needs	Using coactive movement as a model for language development	A movement-based approach may be appropriate for teaching language skills to deaf-blind children	"Coactive movement stresses a meaningful entrance into the lives of these children by parents, teacher assistants, and other significant individuals." (p. 387-388) "Coactive strategies include among others, frequent touch, joint motor activities between children and their instructors, and consistent use of verbal and nonverbal cues." (p. 388) "Body contact recommended…assists children in developing trust concerning their teachers or caregivers, as well as a sense of security about the environment." (p. 389)	Deaf-blind children; Coactive movement; Sensory intervention; Touch; Body contact; Structured environment; Repetition; Imitation; Deferred imitation; Gestures; Independence; Communication environment
Rieg, S. A., & Paquette, K. R. (2009). Using drama and movement to enhance English language learners' literacy	Education	Incorporating activities involving drama and movement in teaching children who are English language learners	Drama and movement activities can be help in acquisition and production of English language, and in	"In addition to the development of gross and fine motor coordination skills, creative expression and thinking, social	Drama; Movement; Kinesthetic Learning; Group activities; Circle; Increased motivation; Reduction of anxiety; Total physical response approach; Follow

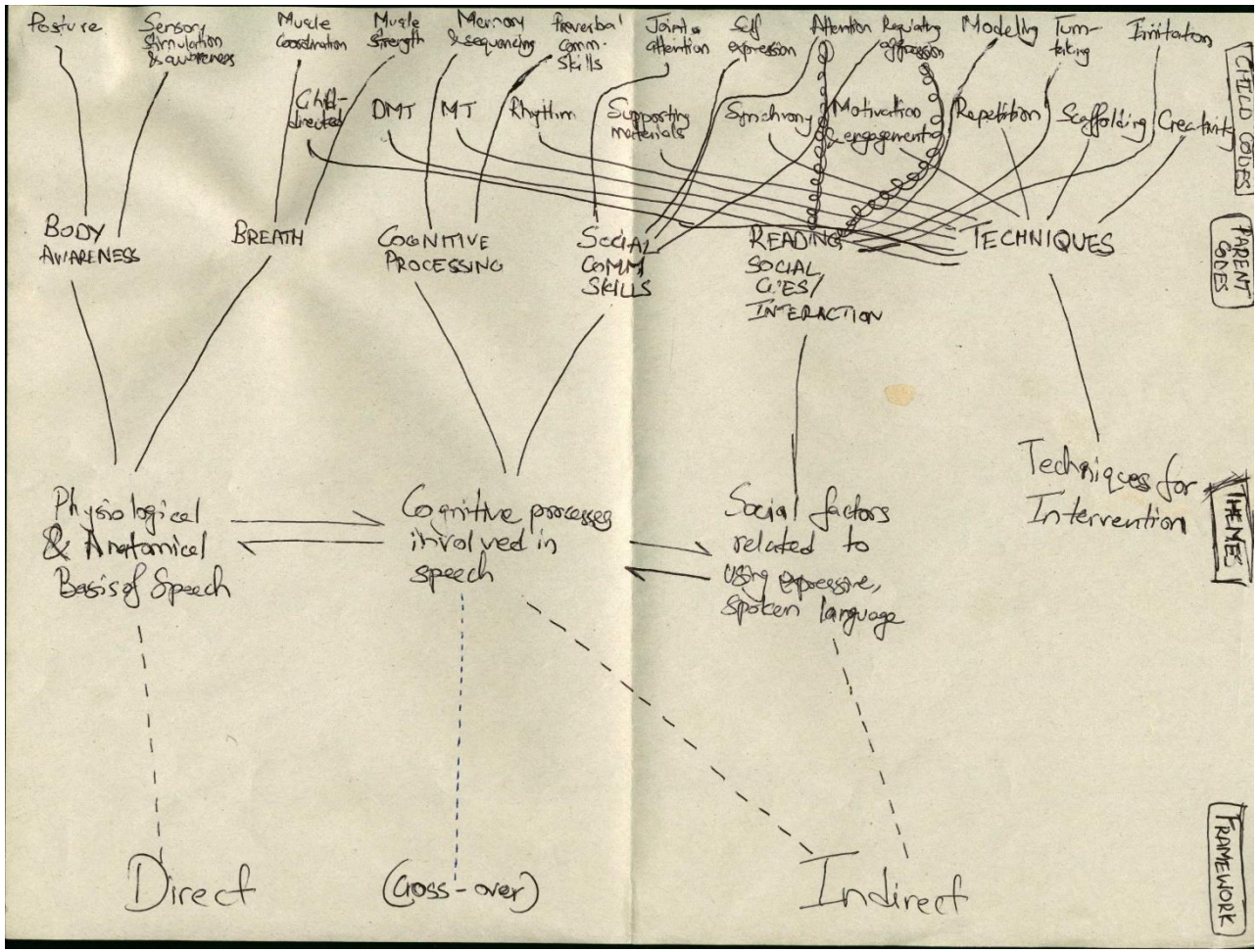
development. *Journal of Instructional Psychology*, *36*(2), 148-154. Retrieved from http://www.projectinnovation.biz/journal_of_instructional_psychology			comprehension of other academic subjects	interaction, problem solving, cooperative play, rhythm and rhyming skills can be enhanced." (p. 148) "[Total Physical Response] is an approach to teaching language that pairs actions with words to convey meaning…" (p. 152) "Formal and informal drama experiences help children build important literacy skills such as reading, writing, listening, and language production." (p. 153)	the leader; Social interaction; Cooperative play; Problem solving; Games; Play
Rogers, S. J., Hayden, D., Hepburn, S., Charlifue-Smith, R., Hall, T., & Hayes, A. (2006). Teaching young nonverbal children with autism useful speech: A pilot study of the Denver Model and PROMPT interventions. *Journal of Autism and Developmental Disorders*, *36*(8), 1007-1024. doi:10.1007/s10803-006-0142-x	Human development	An exploration of employing Denver Model and PROMPT Interventions for children with autism spectrum disorder	Children with better imitation and joint attention skills at baseline showed more gains in use of language at the end of the treatment period	"Teaching imitation of actions on objects, body movements, oral-facial movements, and speech sounds…" (p. 1009) "Increasing verbal approximations of target words in object play and social routines using naturalistic behavioral teaching approaches including modeling, and shaping increasingly more accurate approximations with intrinsic reinforcement strategies." (p. 1009) "Presentation of the same or similar activities over time to provide a structure in which	Autism spectrum disorder; Denver model; PROMPT intervention; Social interaction; Social games; Object play; Motivation; Reinforcement; Turn-taking; Joint attention; Adult-directed interaction; Child-initiated interaction; Natural gestures; Greetings; Requests for help; Self-advocacy; Modeling; Imitation; Simple instructions; Verbal approximation; Oral facial movements; Repetition; Increasing complexity

				increased motor-language complexity and cognitive learning of events and sequences may be practiced." (p. 1010)	
Whalen, C., Schreibman, L., & Ingersoll, B. (2006). The collateral effects of joint attention training on social initiations, positive affect imitation, and spontaneous speech for young children with autism. *Journal of Autism and Developmental Disorders*, *36*(5), 655-664. doi:10.1007/s10803-006-0108-z	Human development	Understanding the effect of joint attention training on numerous behaviors associated with autism spectrum disorder	Children receiving joint attention training showed an improvement in the use of joint attention, in imitation when playing, empathic responses, and use of spontaneous speech	"In the first phase, Response Training, the child was taught to respond appropriately to joint attention bids of the experimenter, including placing the child's hand on an object, tapping an object, showing an object, following a point, and following gaze." (p. 657) "In the second phase, Initiation Training, the child was taught to initiate joint attention bids to the experimenter, including coordinated gaze shifting and protodeclarative pointing." (p. 657) "In this study, substantial gains in spontaneous speech were observed for all four participants following the training of joint attention initiations and frequency of spontaneous speech resembled that of typical children. These data support the hypothesis that joint attention may be developmentally	Autism spectrum disorder; Joint attention; Social communication; Response Training; Initiation Training; Empathic response; Imitation; Structured play; Spontaneous speech

				linked to language" (p. 662)	
Charlop, M. H., & Milstein, J. P. (1989). Teaching autistic children conversational speech using video modeling. *Journal of Applied Behavior Analysis*, *22*(3), 275-285. doi:10.1901/jaba.1989.22-275	Human development	Investigating whether video modelling can be a useful tool in promoting conversational speech in children with autism	Watching models on a video tape enabled children with autism to use conversational speech in various settings	"The robust generalization of conversational speech may have been facilitated by provisions for generalization inherent in the video modelling procedure, including multiple exemplars (of conversations and models), programming common stimuli (toys), and natural contingencies (e.g., answers to questions, access to toys)." (p. 284)	Autism; Modeling; Appropriate responses; Asking questions; Turn-taking; Conversational speech; Echolalic speech; Contingencies; Varied examples
Kuhl, P. K. (2007). Is speech learning 'gated' by the social brain? *Developmental Science*, *10*(1), 110-120. doi:10.1111/j.1467-7687.2007.00572.x	Human development	Investigating the role of social interactions in acquisition of language	Neurobiological and communicational factors affect the process of language acquisition and eventually language production, during infancy	"Heightened attention and arousal could produce an overall increase in the quantity or quality of the speech information that infants code and remember." (p. 114) "Exposure to a new language in a live social interaction situation induces remarkable learning in 9-month-old infants, but *no* learning when the exact same language material is presented to infants by a disembodied source." (p. 116) "…first, infants must be attracted to and	Language acquisition; Social interaction; Attention; Arousal; Social settings; Contingency; Reciprocity; Motherese; Mirror neurons; Social agent; Infant-directed speech; Exaggeration of phonemes; Interest; Motivation; Cateogrization; Social cognition; Natural settings

				interested in infant-directed (ID) speech to learn" (p. 116) "…infants whose mothers show greater exaggeration in speech show correspondingly better speech discrimination performance." (p. 116-117)	

Appendix D: Visual Development of Themes



Glossary

Cognitive-communication disorder – Cognitive-communication disorders include problems organizing thoughts, paying attention, remembering, planning, and/or problem-solving (American Speech-Language-Hearing Association, 2016).

Language disorders – Language disorders occur when a person has trouble understanding others (receptive language), or sharing thoughts, ideas, and feelings (expressive language). Language disorders may be spoken or written and may involve the form (phonology, morphology, syntax), content (semantics), and/or use (pragmatics) of language in functional and socially appropriate ways (American Speech-Language-Hearing Association, 2016).

Morpheme – The minimal distinctive unit of grammar, and the central concern of morphology (Crystal, 2008, p. 313).

Paralanguage – A term used in suprasegmental phonology to refer to variations in tone of voice which seem to be less systematic than prosodic features (especially intonation and stress; Crystal, 2008, p. 349)

Phoneme – The minimal unit in the sound system of a language, according to traditional phonological theories (Crystal, 2008, p. 361).

Pragmatics – A term traditionally used to label one of the three major divisions of semiotics (along with semantics and syntactics). In modern linguistics, it has come to be applied to the study of language from the point of view of the users, especially of the choices they make, the constraints they encounter in using language in social interaction, and the effects their use of language has on the other participants in an act of communication (Crystal, 2008, p. 379).

Prosody – A term used in suprasegmental phonetics and phonology to refer collectively to variations in pitch, loudness, tempo and rhythm (Crystal, 2008, p. 393).

Semantics – A major branch of linguistics devoted to the study of meaning in language (Crystal, 2008, p. 428).

Social communication disorder – Social communication disorders occur when a person has trouble with the social use of verbal and nonverbal communication. These disorders may include problems (a) communicating for social purposes (e.g., greeting, commenting, asking questions), (b) talking in different ways to suit the listener and setting, and (c) following rules for conversation and story-telling (American Speech-Language-Hearing Association, 2016).

Speech disorder – Speech disorders occur when a person has difficulty producing speech sounds correctly or fluently (e.g., stuttering is a form of disfluency) or has problems with his or her voice or resonance (American Speech-Language-Hearing Association, 2016).

Syntax – A traditional term for the study of the rules governing the way words are combined to form sentences in a language (Crystal, 2008, p. 471).