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ABSTRACT

This research project aims to test the hypothesis that: *singing is valuable to the Verbal Language Development (VLD) of Greek children who are diagnosed with Autism Spectrum Disorder (ASD) and aged between 5 and 11 years.* The research is quantitative since it measures and compares progress and draws from the literature, experiential knowledge, positivism and primary research and seeks deep-insights that are indicative. The scope of this project is to evaluate whether singing appears to be valuable for VLD amongst these participants, in this context, and according to the methodological limitations of this study, having its intellectual foundation and its implications in education and with a potential to affect curricula strongly. The method for my research project involves pre-test and post-test, comparative analysis with a Speaking Group, plus probing analysis within the overall research findings. The study is of an insufficient size for generalisation and takes place within the field instead of a clinical environment. However, participant observation and detailed scrutiny used the primary data gathering tool, which is “Test of Receptive and Expressive Language Abilities” (TRELA). The TRELA was specifically designed to measure VLD in Greek children with ASD.

The components of the study, namely singing, VLD, and Greek children with ASD aged 5 to 11 years old, frame the research project's contribution to original knowledge and have the potential to influence curricula for children with ASD. This is an interdisciplinary research project that transformatively draws from the fields of music-singing, speech therapy, and ASD (teaching and learning of children with ASD). This research in the field of special education calls, if possible, for the involvement of speech therapists trained on this particular test of measurement, musicians or educators with basic music knowledge and singing experience, and special educators in ASD. In health-related research, interdisciplinary approaches are becoming more and more necessary and should be taught as a standard research methodology instead of being the exception that leads to random, unsystematic events. Despite not using inferential statistics, this educational study is regarded as quantitative in nature because it counts, measures, and compares progress. Furthermore, it is regarded as positivist since it clearly seeks to determine whether this advancement is objectively true, hopes to generalise this to intervention for more children, and incorporates psychological processes like motivation and engagement. The gathered qualitative data improve our comprehension of the objective measurements and offer context for the quantitative data.

Overall, this study demonstrates much better progress in the SiG participants who used singing to develop their verbal language and that is important in order to continue further research into this approach. The progress with VLD of the children in the SiG agrees with the finding of previous research in the field. The researcher concluded that there is value in the empirical study's experimentation but a larger sample size is required to be able to respond to this with certainty and further research needs to take place because the positive findings make a contribution to the field and could affect curricula.

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CHAPTER ONE: INTRODUCTION

1.1 Overview

The purpose of this chapter is to introduce the research project, the primary aim, basic research design, and the main assessment tool. To achieve this purpose, Chapter One is set out in five sections, including this first section that provides a brief overview of this first chapter. The second section states the hypothesis that this research aims to test. Testing the hypothesis is the primary aim of this study and is concerned with developing the verbal language abilities of Greek children diagnosed with Autism Spectrum Disorder (ASD). As well as stating the hypothesis, the second section provides concise descriptive insights about the professional and personal experiences that influenced my formulation of the hypothesis. The third section focuses on the prospects for making an original contribution to knowledge and specifically the practical implications and contribution of this research project to the field of education. In this section, the basic research design is expounded in the broadest terms of typology and scope. In this same section, the basic research design is specified in terms of essential details – method, testing, and the identification of progress with Verbal Language Development (VLD) amongst the research participant cohort. The fourth section introduces ASD as a diagnosed mental health classification and underlines the need to develop receptive and expressive language abilities amongst children diagnosed with this condition. The fourth section also includes reference to specific research that influenced my thinking about how singing may be valuable for developing the verbal language abilities of children with ASD. Finally, there is a brief summary of this first chapter including how it relates to the next chapter and the entire thesis.

1.2 Formulating the Hypothesis

This research project aims to test the hypothesis that: *singing is valuable to the Verbal Language Development (VLD) of Greek children who are diagnosed with Autism Spectrum Disorder (ASD) and aged between 5 and 11 years (5–11yrs).* I have fourteen years (14yrs) of professional experience in the context of special education working in schools with children who have ASD, plus some prior experience. Additionally, I have undertaken project work to support children with ASD. I completed a professional practice placement working with children who have ASD in Elms Special School and Coppice Special School (both in the United Kingdom). I also have extensive experience (since the age of 12) as a chorister. Each of those factors was influential in formulating my hypothesis.

1.3 The Basic Research Design

There are no research findings pertaining to the use of singing amongst children with ASD and there are no research findings supporting or challenging the hypothesis that singing can enhance VLD for children with ASD. In this research project, the elements of singing, VLD, and Greek children aged 5–11yrs with ASD frame the contribution to original knowledge, with a potential to affect curricula for children with ASD. Focus upon VLD amongst Greek children allows for specificity with the research findings accounting for the particularities of spoken Greek since the test measurement used in this study was designed for Greek children with ASD. The use of a specified age range limits the study population thereby enhancing internal validity and limiting the extent to which the research findings can be generalised to other age classifications.

Interdisciplinary thinking has been encouraged and there is a wish to develop it in elementary and secondary schools. Bear A, and Skorton D, state (first para, page 173, 2018) that “Integrative educational experiences may take place in individual courses (in-course as happened in my research), within integrated curricular programs (within-curriculum), or outside of the formal curriculum (co-curricular).” Knowledge integration fosters creative thinking and can result in important scientific breakthroughs (ibid). Strong correlations between participation in the arts and individual excellence in science, engineering, and medicine provide evidence for this claim, as do historical examples of how the arts have served as an inspiration for scientific discoveries. Like Einstein, many of the greatest minds in science, engineering, and medicine have actively engaged in the arts and humanities in addition to their scientific endeavours because they believe that all knowledge is interconnected. As JR Barrett states (page 5, para 1, line 3, 2023) “Music influences and, is influenced by, other ways of knowing”.

This research project is interdisciplinary, drawing on the fields of speech therapy, music and ASD (teaching and learning of children with ASD) in a transformative way. The children were recruited from several speech therapy centres. The elements of language development, singing and ASD are necessary in the conduction of the research, thus this research calls, if possible, for the involvement of speech therapists trained on this specific test of measurement, musicians or educators with basic music knowledge and singing experience and special educators in ASD. However, in my research project there was no need for that since my research was on a small scale, I am a special educator specialised in ASD, I was trained on the use of the TRELA test, I have many years of experience as a chorister and basic knowledge of music. I co-operated with a professional musician for the writing of the scores and I also co-operated with a professional speech therapist for the writing of the lyrics of the VLD exercises. I also co-operated with the speech therapists of several centres for the recruitment of the children for my research.

Rosenfield (1992), on his definition of Interdisciplinarity, describes that teams work in cooperation but still from a field-specific basis to address a problem. The typology suggested by Rosenfield (1992), accordant with the hypothesis-driven approach used by these disciplines in which the basis for all corporations is a problem or question, was most referred from the social, health, and physical sciences. The physical and social sciences made use of a positivist or postpositivist mode of examination in which a significant reality exists and is impartially (although sometimes incompletely) observed and understood. The physical and social sciences are essentially driven in their methodologies by hypothesis and make use of experimentation and influence to attain objectivism similar to my research project where there is an aim to attain objectivism through experimentation for the hypothesis-driven question.

Aboelela, Sally W., et al., based on a systematic literature review, interviews and a field test with interdisciplinary researchers, recommend the following definition of interdisciplinary research (last para, page 341, 2007): “Interdisciplinary research is any study or group of studies undertaken by scholars from two or more distinct scientific disciplines. The research is based upon a conceptual model that links or integrates theoretical frameworks from those disciplines, uses study design and methodology that is not limited to any one field, and requires the use of perspectives and skills of the involved disciplines throughout multiple phases of the research process.” In my research the study design, the methodology and the execution are not limited to any one field, for example only children with ASD, or only singing or only speech. In any phase of the research those fields are interconnected and that can be seen even in the data analysis, discussion and conclusions. Aboelela, Sally W., et al. (2007) argue that analysis of the conceptual framework, study design and execution, data analysis, and conclusions could be used to define the true extent of interdisciplinarity in a study and that in most cases interdisciplinary research has been conducted in a default way since only eleven (26.1 percent) of the papers included an explicit definition of interdisciplinarity and only five papers (11.9 percent) described or cited any type of conceptual framework or theoretical underpinnings for their approach to interdisciplinary research (see discussion Section 6.5). Essential factors to the success of interdisciplinary work are sufficient resources, institutional commitment to interdisciplinarity, and specific characteristics of team members such as good communication, trust, commitment and flexibility (Aboelela Sally W., et al., 2007). In my research all the above criteria were met and the cooperation was the best possible.

This research follows the growing 4E approach to interdisciplinary research that hold the following: Embodied (mind in body), Embedded (mind in culture), Enacted (mind in action) and Extended (mind in environment), as the cognitive processes. The 4E approach is structured by interactions both of the body and brain and both of the physical and social environment. It also seeks deep insights that could be indicative for (postdoctoral) further research. In other words, this project is devised to evaluate and indicate whether singing appears to be of any value for VLD amongst these participants and in this context. The research does not set out to make definitive claims. Rather, future research, such as research seeking statistical significance that could allow generalisation of research findings, will be suggested by the findings of this project.

Whilst neither adverse effects nor affects can be expected as a result of the research intervention, full ethical approval was obtained for working with the vulnerable children. Ethical consideration for working with these vulnerable children involves the Greek equivalent of the UK's Disclosure and Barring Service (DBS check) and a complex ethical strategy involving access arrangements, approval in-principle, consents, and oversight. This research project has been approved by the Built Environment, Business, Arts, Humanities and Social Sciences (BAHSS) e-Ethics Committee of the University of Central Lancashire in Preston UK where it was issued the unique approval code – BAHSS130. Subsequent to ethical approval, I sourced and recruited eighteen prospective research participants from within the range of speech therapy services and specialist professional contacts that I have developed over the past decade.

The research method involves pre- and post-test analysis for each of the fifteen participants, as well as comparative analysis of five Singing Group (SiG) participants with five Speaking Group (SpG) participants. For each participant, the aim is to demonstrate progress with receptive and expressive verbal language abilities. Progress is evaluated relative to individual baselines that are calculated for each participant. Baselines are calculated using the mean average of three valid scores and progress with VLD is compared between those who participate in VLD exercises and those who participate in singing VLD exercises. Participants are assigned to either the SiG or the SpG that receives standard intervention. This enables some insight through comparison of VLD exercises alone compared to singing VLD exercises. However, the crux of the research is deep insights into each child participant's language development within either group. In this manner, the data from each participant is valuable in terms of potential insights into that child's development and in terms of comparative evaluation with the other paired group participant. In both the SiG and the SpG, the aim is always to progress the children in terms of continuing VLD.

All scoring is determined by the VLD test that is being used. This is Vogindroukas et al.'s (2009) Test of Receptive and Expressive Language Abilities (TRELA). Having ascertained the baseline (the starting point) for each participant, each participant's progress is calculated by comparing their baseline with their finishing position. Each participant's progress is compared with their paired participant; this is the participant in the other group whose baseline is most comparable with that of the participant in question. Prospective significances are rationalised and discussed, informed by observations (Chapters Four, Five and Six) and Widiger's (2013) 'hyperresponsivity' and 'hyporesponsivity' symptomatic of ASD.

This research seeks deep quantitative (supplemented by qualitative) insights by measuring and comparing progress that could be indicative for (post-doctoral) further research. In other words, this project is devised to evaluate and indicate whether singing appears to be of any value for VLD amongst these participants and in this context. The research does not set out to make definitive claims. Rather, future research, such as research seeking statistical significance that could allow generalisation of research findings, will be suggested by the findings of this project.

1.4 Autism Spectrum Disorder (ASD)

Individuals diagnosed with ASD experience difficulties with communicating and socialising with others. Children with ASD have language deficiency and expressive-receptive speech is missing or minimal; this characteristic alone excludes such children from much social interaction and often from inclusive education in Greece. Macmillan et al. (2023) looked at empirical research from 2000 to June 2019 that assessed school-based interventions for students who were formally diagnosed with ASD as having an IQ of greater than 70 and were enrolled in kindergarten, pre-school, primary, or secondary education. The six skill areas that interventions most frequently focused on were verbal skills, social cognition, play behavior, academic skills, and on-task behavior. The outcomes showed a considerable improvement in every category. Evaluations of generalization and maintenance were inconsistent and concluded that larger sample sizes and stricter statistical techniques need to be used in future studies to determine the most practical and efficient interventions to enhance educational outcomes for this population. In order to study the language deficiency of those children one should take into account the linguistic processing that takes place in the brain. Linguistic processing is primarily located within the left hemisphere of the brain; whereas Altenmuller (1986, cited in Falkai, 1986), Brust (1980, cited in Compston,1980), plus Gates and Bradshaw (1977) report that music processing involves the whole brain: both cerebral hemispheres. Thaut (1987, cited in Volkmar, 1987) reports that: children presenting with ASD appear to prefer musical stimulus to visual stimulus when compared with children without ASD. Although Thaut's (*ibid*) research has insufficient statistical significance, the study reports that children with ASD show more motor reactions during periods of music than children without ASD, and that children with ASD appear to listen to music longer than their peers without ASD. Thaut's (1988, cited in Volkmar, 1988) study compares children with ASD and their peers without ASD and discovers that children with ASD produce spontaneous tone sequences almost as well as children without ASD and significantly better than a control group of 'mentally retarded children'. Thereby, music apparently offers potential to improve learning, perhaps especially amongst children with ASD.

In ASD, language has pronounced need for development. Verbal language is typically impaired amongst children with ASD, especially in early childhood, and this project focuses exclusively upon verbal language development. Oldfield (2006) has seen numerous children with ASD who sing rather than speak; she writes that the reliable structure of amicable children's songs will, in many cases, encourage children to vocalise. In Oldfield's (*ibid*) case studies, one child acknowledges some tunes and, at times, finishes the songs by singing the last word; another child uses vocal sounds within musical dialogues and vocalises when playing with toys. Miller and Toca (1979, cited in Gelenberg, 1979) conclude in their case study of a boy with ASD aged 3yrs, who was encouraged to develop language through melodic intonation, that singing and vocalisation merit creative use. According to Aldridge et al. (1995, cited in Haselen, 1995), who conducted a pilot study in the treatment of children with developmental delay, Music Therapy is an approach that may facilitate significant advances in speech development and communication skills, particularly amongst children with ASD. Brownell's study (2002, cited in Robb, 2002) investigates musical storytelling amongst four students with ASD: each song addressing a personal behavioural goal. Brownell's results suggest that musical adjustments benefit behavioural modification. Groß et al. (2010 cited in Jobst, 2010) find that Music Therapy may have an advantageous effect upon 'primal' qualities of speech development, phonological memory, and apprehension of sentences, amongst children with developmental speech delay. Grumman (cited by Haas and Brandes, 2009, p. 109) emphasises how recent the developments in understanding the neural activities associated with vocalisation are; both speaking and singing occur within 'movements of the phonatory system […] use identical vocal pathway […] and share identical neural areas'. Therefore, it is reasonable to hypothesise that singing and speaking share commonality in perception and production. Therefore, singing may be used to enhance speaking and potentially benefit from whole brain stimulation and embodied learning.

However, singing and speaking are not the same. Developing language through speech predominantly appeals to the child's conceptual engagement. The Greek language is referential; therefore, in order to learn Greek, a child must understand cognitively the meaning of the word. The word refers to something beyond itself (for example the word cat refers to an animal, but that animal is not in the word). Comparably, singing affords the opportunity to engage each child actively in what Merleau-Ponty (1945) refers to as the 'flesh' of experience, at an embodied level. Through the sensate experience of sung VLD exercises, it is intended to transcend what Merleau-Ponty (1968) refers to as 'habituated patterns'. Habituated patterns (or tone sequences) are characteristic of limited verbal language use in ASD.

1.5 Summary

This introductory chapter has stated the hypothesis that is to be tested and provided elementary insights in to how it will be tested and why. The research project was framed as seeking both quantitative and qualitative insights to indicate prospects for continuing and further investigation. There are practical limitations within this research that limit the magnitude of the study and consequently restrict the finding of any statistically significant knowledge that could be reliably generalised to the ASD population. Although the main assessment tool is Vogindroukas et al.'s (2009) Test of Receptive and Expressive Language Abilities (TRELA) which involves scoring and calculating progress, this chapter has identified that my research involves interdisciplinary experimentation that also involves qualitative judgments that inform evaluative interpretations of significance. In the same spirit of *rigour and surety*, this chapter has declared that my research adopts the pre-test/post-test model, the singing and speaking group participants comparison, and supplements numerical analysis with observational insights that may support or challenge the evaluative interpretations presented in the later chapters of this thesis. In Chapter One, I sought to provide background narrative about my preparedness for this research and I sought to identify the prospective contribution to knowledge. This first chapter has presented a broad overview of ASD bringing into focus challenges with verbal language development. However, whilst any diagnosis of ASD does not specify a unitary condition, impaired language is characteristic of ASD. The remainder of this thesis is dedicated to discussing the hypothesis that singing could be valuable to the verbal language development of Greek children aged 5–11yrs and diagnosed with ASD thus having the potential to affect curricula in that field. The next chapter, Chapter Two, details the research method used to test that hypothesis and includes discussion of the methodological values and limitations of this research project.

CHAPTER TWO: METHODOLOGY

2.1 Overview

The purpose of this chapter is to identify the methodological limitations and consider the methodological values of the research project. To achieve this purpose, Chapter Two is set out in five sections, including this first section that provides a brief overview of this second chapter. The second section discusses a number of the key methodological limitations of this empirical research in terms of how the study is constructed. In that same section, the methodological parameters of this research are addressed, including identifying a matter such as magnitude (the size of the study/ the number of research participants) simultaneously as a limitation and as a value. There are four subsections in reference to the educational tools that were used; Participant Distribution and Evaluation, Observational Charts, Vogindroukas, et al.'s (2009) TRELA, which was the primary data-gathering and evaluation tool, and the Parent External Factor Report. The third section details the design of the intervention, specifying the stages of baseline assessment, assignment, session design, intervention sessions for the singing participants and intervention sessions for the speaking participants. The fourth section details the ethical strategy devised for this research project which involves working with minors who are vulnerable because of their age but also because of their diagnosis of ASD. Finally, in the fifth section, there is a brief summary of this second chapter including how it relates to the next chapter and to the entire thesis.

2.2 Methodological Limitations and Values

Research suggests that music has the potential to facilitate learning and development, perhaps especially amongst children with ASD (see, for example, Thaut, 1987, cited in Volkmar 1987). Language has a pronounced need for development in ASD as 'qualitative impairments in communication' (Widiger 1994) constitute one of the core diagnostic criteria. Fong and Lee's (2012) case study, Kern et al.'s (2007) research, Zhi-Min Shi et al.'s (2016) meta-analysis, Pasiali's (2004) research of three children with ASD, and Vaiouli et al.'s (2015) research are promising with regard to the developmental intentions of my research. This empirical research intervention builds upon this literature (see Chapter Three for a discussion) and the main potential benefit of this research is to improve children's language skills. While it is not known whether singing specifically will improve the development of verbal language, it is reasonable to assume that it may have a positive effect due to the potential of music to facilitate learning development and the shared elements between singing and speaking in perception and production (thus one may enhance the other). This is supported by the research of Thaut cited in Volkmar's work (1987).

There is currently no research that provides evidence for the effectiveness of implementing the 'reasonable adjustments' as outlined in the UK Government's Special Education Needs and Disability Act's (SENDA, 2001). Singing is being used in ASD for social empathy, emotional development and social communication. This research intervention is a valid extension of a standard model, and appears to be plausible. While there is no direct evidence on the topic, my professional experience in the context of special education and reflection on working with children with ASD for over a decade suggests that there may be merit in exploring the use of singing as a supplement to speaking interventions. This idea seems to be reasonable and worth investigating through a quantitative study comparing singing and speaking interventions. The results of my intervention study, as opposed to an experimental study, could potentially inform policy and practice by identifying any potential benefits of using singing in addition to speaking in specialist education curricula. This is educational research because its aim is to further grow the verbal language development of children with ASD and Dewey (1916, in Pring 2004) describes as educational activities those which lead to further growth and develop capacities such a knowing, understanding and behaving intelligently (see Chapter Three).

Unlike a clinical study conducted in a controlled environment with a representative proportion of the study population, s study is limited to fifteen participants (eighteen and were recruited but only fifteen completed the study) and takes place in the field (the naturally occurring environment and not in a laboratory). As a result, the research findings of this study cannot be directly generalised (no external validity) to a wider population due to the small magnitude of the study and the lack of a clinically controlled environment in which it was conducted. This means that the research findings apply specifically to this research intervention with these participants at the time of the intervention and in the context in which it took place. While the findings of this study are only indicative and cannot be generalised to a wider population, it is possible that similar findings may be obtained with similar participants in similar circumstances.

This research could be considered a mixed methods study, both quantitative and qualitative, yet mainly quantitative. Researchers assumed that biases inherent in any one method could balance out or neutralise the biases of other methods, which gave rise to the mixed methods study (Creswell, J. W., & Creswell, J. D., 2017). When using a mixed methods approach, the researcher typically bases knowledge claims on pragmatic considerations (e.g., problem-centred, and consequence-oriented). In order to better understand research problems, it uses inquiry strategies that entail gathering data either simultaneously or sequentially. For the final database to include both quantitative and qualitative information, data collection also entails obtaining textual information, such as views, and numerical information, such as instruments (see ibid). Conventional surveys with quantitative data (see test of TRELA in my research) were mixed with techniques related to field methods like observations (see Observation Chart for my research) and interviews (providing qualitative data). Also in mixed (integrated) research the strategy of concurrent procedures can be developed: these involve the convergence of quantitative and qualitative data by the researcher to produce a thorough analysis of the study problem (see ibid). One method's results can inform or assist in the development of another method (Greene, Caracelli, and Graham, 1989). Under this strategy, the researcher gathers both types of data concurrently with the study and then integrates the data to interpret the overall findings. This study, because it counts, measures and compares progress, is considered quantitative in nature even though this is not done with inferential statistics. In addition, because it aims evidently to establish whether this progress is objectively true, it hopes to generalise this to intervention for more children and includes psychological processes like motivation and engagement which are considered positivist. The qualitative data collected increase the understanding of the objective measures and provide explanations of the quantitative data. It is not considered a qualitative or Interpretative Phenomenological Analysis (IPA) study because it does not describe the complex social motivations behind personal/social realities, nor does it explore in detail how participants are making sense of their personal and social world (Smith, J. A., Nizza, I. E. , 2022). Specifically in this work it does not provide insight into how or why singing works, yet it justifies and supports that it works and that also answers the research question.

There is sufficient evidence (as discussed in Chapter Three) for me to justify a small-scale, exploratory study to investigate if singing has any advantages over speaking in VLD exercises for children with ASD. As there is no theoretical foundation for the idea that singing may have potential for VLD, the research question needed to be more exploratory and experimental rather than focused on testing a specific theory. This is why this education research, methodologically, is set out as an intervention using tools and language familiar to practitioners in order to facilitate educational improvements. This means that the basic research tool used in this study had to measure the progress of verbal language development in order to meet the question of any possible value of singing in the VLD of children with ASD. Although positive research findings could not in any way have been guaranteed, the research intervention (which involves either doing language exercises and a language test or singing language exercises and then doing a language test) had, from my professional experience, no potential for harming VLD.

This study is concerned with exploring the effects of singing as a form of language support for children with ASD. It considers the language development of two groups of children who are supported through regular individual learning sessions with the researcher, a qualified practitioner employed in school settings. The first group, SpG, received the standard intervention involving speaking. The second group, SiG, received a similar intervention but using singing as opposed to speaking. Apart from the differences between singing and speaking, all other aspects of the interventions were as close as practically possible. The language developmental progress of the children was assessed using a well-respected instrument designed for and regularly used in clinical practice for children with ASD in Greece, the TRELA. The TRELA offers a coding framework to identify the child's language ability (see Section 2.2.2 for a full review).

Amongst other tests such as the Reined Developmental Languages Scales (Reynell & Gruber, 1990), the Mullen Scales of Early Learning (Mullen, 1997), the Clinical Evaluation of Language Fundamentals, Fourth Edition (Semel et al. 2003), the Comprehensive Receptive and Expressive Vocabulary Test, Third Edition (Wallace and Hammill 2002), the Expressive Vocabulary Test, Third Edition (Williams, 2018), the Receptive and Expressive One-Word Picture Vocabulary Tests, Fourth Edition (Martin, PhD / Brownell, MA, 2011), the Peabody Picture Vocabulary Test, Fifth Edition (Dunn, 2018) that assess the language skills of children with ASD, the most similar to TRELA is the Eliciting Language Samples for Analysis (ELSA, 2021) because it is also used to assess verbal ability in children with ASD with varying language profiles (ranging from single words to fluent speech) and at any age. However, I could not use another test or ELSA, not only because ELSA was not invented when I was doing the research intervention, but also because all those tests were made for English and not Greek children with ASD. The TRELA test was chosen because it is a tool that can be used to measure the language progress of children with ASD and assess the potential value of singing in their verbal language development. The TRELA test is designed to allow children with ASD to complete the (maximum) score at one level and then progress to the next levels of language development after the intervention sessions. The TRELA test was specifically designed for Greek children with autism and was therefore a reasonable and likely the most appropriate option to use for this research intervention.

Alongside the TRELA, qualitative data were collected from each child's primary caregiver and an observational chart was completed by the research-practitioner during each session. The basic research method was designed around the classic pre-test, post-test with additional data collected from the Observational Charts and supplemented by the Parent External Factor Report. In this project, rather than only comparing pre- and post-test, the child participants completed a test (TRELA) after every three sessions in order to track their progress over time. If there were only two points of comparison, pre-test (in this case – the baseline) and post-test (the final achievement), it would not be possible to evaluate progress regularly. It is important to have intermediate assessments in order to gain insights into progress made between the start and end of the study because children with ASD often exhibit significant fluctuations in their levels of achievement. The internal details enable each three-session block to be compared with each subsequent three-session block as well as for overall comparison between start and finish. If the focal point of the research was an object then the classic pre-test, post-test could be sufficient. However, as the focus is verbal language development and as the subjects in question are prone to irregularities of behaviour because of the ASD, the pre-, during, and post-test comparisons are supplemented with Observational Charts (see Appendix Six).

Singing allows children to engage with verbal language on a more embodied rather than purely conceptual level, and the emotive and expressive qualities of singing may be beneficial for learning. Rather than seeking certainty, the focus of this study is on exploring developmental change and gaining insights. The need to understand what is happening for the child during the sessions is connected to the exploratory nature of the study. Boeree (1998, cited in Lichtman, 2012) describes the methode clinique of Piaget as a technique (also used by early social psychologists) in which differences among children of different ages or other classification variables are carefully noted. This approach, which is similar to the systematic exploration (rather than formal experimentation) used in this research, is argued to be "a valuable – yet non-experimental – contribution to the field." Boeree (ibid) also points out that in participant observation, we aim for validity in our descriptions, and we can observe the effects of the subject, researcher, and sampling, just as in experimental research conducted in a laboratory setting.

Specific qualitative indicators/criteria such as credibility, dependability, transferability, confirmability (Lincoln, YS. & Guba, EG. 1985) and reflexability (Korstjens & Moser, 2018) were taken into account when deciding the scales and the tools I used. Credibility is concerned with confidence in the truth of the findings and whether the research findings represent plausible information. Prolonged engagement and persistent observation are strategies of that qualitative criterion and were both used in this research intervention. This study was conducted over a significant number of weeks (15 for each participant) and used multiple data sources/ observational frameworks, alongside my professional judgement based on my extensive experience (more than a decade) working with children with ASD and my skills as a researcher. Dependability refers to the consistency of the analysis process and findings, and whether it adheres to the accepted standards for the specific research design. This study used a quantitative well-respected framework (TRELA) for assessing the children's language capabilities. To increase the dependability of the research design, progress was regularly assessed throughout the study. Confirmability in this research refers to ensuring that the interpretations of the findings are based directly on the data collected and that the findings are shaped by the responses of the participants rather than the researcher's imagination, bias, or motivation. To ensure confirmability, objective data were collected through recordings of observations and responses to the TRELA framework, alongside parents' observations, and any potential biases were taken into account during data analysis (Chapters Four and Five) and discussion (Chapter Six). Transferability refers to the extent to which the findings of this study can be applied or transferred to other contexts and settings with other participants. While the results of this study may be transferable to very similar contexts and settings with similar participants, the small cohort of participants limits the generalisability (transferability) of the findings. Reflexivity refers to the researcher's self-reflection on their assumptions, values, and how these may have influenced research decisions throughout the study (as discussed in Chapter Six).

The philosophy that underlies this research intervention is Humanitarianism, which emphasises treating individuals with respect, dignity, and compassion. This approach is reflected in the use of an arts-health praxis that focuses on interacting with the children as individual subjects rather than viewing them as objects of study and draws from positivism. The research paradigm of positivism is based on verifying a hypothesis and experimentation by using variables and measures in order to inform and advance science. The history of positivism dates back to the period of Enlightenment and is inspired by philosophers Locke and Descartes. It is based on the hypothetico-deductive model, a scientific model based on forming a testable hypothesis and developing an empirical study to confirm or reject the hypothesis (Park, Y. S., Konge, L., & Ration Jr, A. R., 2020). A primary goal of positivist inquiry is to generate explanatory associations or causal relationships that ultimately lead to prediction and control of the phenomena in question. In the purest view, positivism is rooted in specific principles (Mill, 2021); social and natural sciences should focus on the discovery of laws that facilitate explanation and prediction and should use the same methodology based on the model of theory-hypothesis- operationalisation- experimentation. The existence of a single true and identifiable reality is formed through replication and syntheses of scientific discoveries and theories since laws of nature are derived from empirical data. Larger samples are favourable over smaller samples since they reveal generalisable tendencies. For this reason, there is an important need for this research to be conducted again in the future with a much larger sample. The testable hypothesis in my research is the following : is there any value in singing for the verbal language development of children with ASD aged 5–11 years old? Through the experimentation of this empirical study (see also Section 3.2) the researcher came to the conclusion that there is value; however, there is a need for a larger sample in order to be able to answer this with surety.

In order to see if it is possible to improve their verbal language abilities, all children encounter developmental exercises, designed to their level. To supplement the evaluations, Observational Charts were used to provide detailed qualitative insights. The progress of the children in the Singing Group (SiG) was compared to the progress of those in the Speaking Group (SpG) at the same level of language ability. For participants in the SiG, the (same) VLD exercises were animated through singing (Boud and Miller, 1996), focusing on rhythm and melody. Due to the small cohort of participants, the distribution of participants in terms of number and level of language ability was not exact. Additionally, the assignment of participants to the SiG and SpG was not randomised, as it was based on the participants' baseline scores rather than through randomisation. While the pairing of SiG and SpG participants according to their pre-test language ability scores is approximate rather than exact (since there was no exact scoring for two participants), comparing the individual changes within these paired groups allows for insights into the potential value of singing the VLD exercises. The ages of the participants mostly varied within the same level, and the potential impact of chronological differences on the study results will be discussed in Chapter Six.

2.2.1 Participant Distribution and Evaluation

Working with Greek children aged between five and eleven years (5–11yrs) who are diagnosed with ASD and doing the primary research with them was a very unusual, intriguing, interesting, and affecting experience for me. Although I have professional experience in the context of special education, have dedicated more than a decade to working with children with ASD and have used singing with young Greek children diagnosed with ASD in their daily programme at special schools and inclusive classes, undertaking primary research was a new experience. There were challenges of undertaking VLD exercises with these children in this context because, apart from two children, I had not met any of them before and I was unfamiliar with their behavioural patterns, learning preferences, and needs. Preceding major formal primary data gathering, I met with the participants to assess a VLD baseline for each individual's starting point. The baseline was calculated as the mean average of three (in some cases more than three) scores for each individual's verbal language prior to participating in the research intervention. At these sessions, my main concern was to make the whole session as friendly and professional as possible so that each participant could feel comfortable. I was aware that emotional involvement on the part of the researcher could alter subjects' behaviour in the same way cool professionalism could do (Boeree, 1998, cited in Lichtman, 2012). Being too friendly or too distant throughout the intervention could also easily trigger maladaptive behaviours (such as discomfort or obsessive repetition) due to children with ASD symptomatically experiencing 'hyperresponsive' and/or 'hyporesponsive' sensory perception (Widiger 2013). Whilst sensory perception is typically thought of as seeing, hearing, touching, tasting, and smelling, Ayres (1973) adds 'Vestibular', 'Proprioception' and 'Interoception' to the already commonly known senses, and participants could be over- or under-stimulated in these ways too. Some of the child participants felt comfortable sooner than others, and I observed their comfort in presentations of nonverbal communication, such as body movements and gestures (Waiflein, 2013).

Unsurprisingly, one of the children I had worked with in the past felt comfortable straight away. Children with ASD do not always form secure attachments and when they do, they do not always maintain them, especially when the attachment does not fulfil a need for dependence. As my prior relationship with the other of these two participants was limited to a specific and quite distinct context, it is equally unsurprising that the other child I had worked with in the past did not settle so quickly.

Two of the child participants appeared to be distracted by a floor light that I had placed in the room next to the office area where we were working. Their visual attention was repeatedly drawn to the source of the light and they would not remain seated until I temporarily removed the floor light from the room. This may have affected the baseline VLD score and so I had to repeat the baseline assessment for these two participants. After two sessions I permanently relocated the floor light to another room and from that point onwards both these children were able to sit down and focus better on what we were doing. At the VLD baseline sessions, there were two other children who chose not to remain seated and headed towards the door to leave the room. I opened the door to inform the mother of their child's desire to leave and in each case the mother gave verbal encouragement to the child for the child to return to the room. One mother also physically supported her child in returning to the room. It took, on average, three sessions for the children's behaviour to settle. Overall, working with these child participants gave me a wealth of experience and their engagement and cooperation are reflected in the research findings.

Eighteen participants were recruited but three withdrew from the study, one before the baseline assessment was completed and the others shortly after completing the baseline assessment. In the distribution of participants to the SiG, there was only one participant starting at Level 2, only one participant starting at Level 3, and only one participant starting at Level 4. Also in the SiG, there were five participants starting at Level 1 and two participants starting at Level 5. In the distribution of participants to the SpG, there were two participants starting at Level 1, only one participant starting at Level 3, and two participants starting at Level 5. It was hard to find more participants at that specific time, and even if I could have found a couple more participants there was no certainty that in the baseline assessment they would be assessed as Level 2 and Level 4, where there were SpG participants needed for comparison. Possibly, it would be hard for these to start at the same time with the other participants. Not starting at the same with the other participants implies that they wouldn't manage to complete the 15 sessions of the research by the end of the school year (thus complete the research). The following table shows the quantity of participants at each starting level according to assignment to the SiG or SpG.

Participant Distribution According to Quantity and Level						
TRELA Starting Levels	Level 1	Level 2	Level 3	Level 4	Level 5	***Total***
SiG – Quantity of Participants	5	1	1	1	2	***10***
SpG – Quantity of Participants	2	0	1	0	2	***5***

Table 2.1 Table showing Participant Distribution According to Quantity and Level

During the baseline assessment sessions there were some complex cases. For these participants, I tested them at two different levels, for example – Level 1 and Level 2 – because a score at Level 1 was very close to Level 2 or the highest possible score at Level 1 so I needed to determine at which level of verbal language ability the participant should commence. The following figure shows distribution by participant number (P) according to Group (SiG/ SpG) and the level of TRELA at which each participant commenced the study. Participants concluded the study within their starting level, except for three participants (P01, P09, and P18) who graduated to the next level; graduation is indicated by the same P number appearing {in brackets}. Those starting at Level 5 could not graduate to another level since Level 5 was the final level; they could only complete the highest score at that level and thus complete it.

Participant Number Distribution According to Group and Level					
TRELA Levels	1	2	3	4	5
SiG (Singing Group – 10 Participants)	P02 P07 P09 P13 P16	P14 {P09}	P18	P03 {P18}	P04 P08
SpG (Speaking Group – 5 Participants)	P11 P17	-	P01	{P01}	P05 P12

Table 2.2 Table Showing Participant Number Distribution According to Group and Level

Participants were paired in order to compare their individual progress for detailed data analysis. I paired the participants by comparing the mean average of three baseline scores. The mean average scores that were the closest match to each other were paired – one participant allocated to the SiG and the other to the SpG. Since participants did not have equal scores, the participant with the higher score was placed in the SpG because this gave the SpG the apparent advantage of a higher overall starting point and SiG participants were biased (against). Any big advantage in the final scoring of paired SiG participants came with a bit more value in the singing intervention because the paired SiG participants started at a lower staring point in comparison to their SpG participants thus it was more difficult for them to be at an advantage. The three participants who remained unpaired at Level 1, because the mean average scores were not close to each other, were allocated to SiG in order to obtain more detailed insights about the prospective value of singing. Level 1 was the level with the minimum verbal language abilities hence any qualitative data that showed possible value of singing at that level would be more important. Levels 1, 3 and 5 were paired as well as Level 4 but only as a graduation of paired participants from Level 3. Level 2 was not paired since there was only one participant who achieved a baseline score in that level and later on another graduated from Level 1 but they could not be paired since they were not paired from the beginning.

2.2.2 Observational Charts

Each child's communication was observed throughout each one-to-one session. Communication was observed in 11 attributes through the Observation Chart "Speak through Singing" (see Appendix Six): overall engagement, verbal engagement, nonverbal engagement, emotional engagement, cognitive understanding, embodied knowledge, how receptive the participant was to paralinguistic content, how receptive the participant was to extra-linguistic content, use of paralinguistic content by the participant, use of extra-linguistic content by the participant, and general wellbeing. Data were recorded for each attribute using a rating scale: 0 = Not Applicable, 1 = Not at All, 2 = Very Little, 3 = Little, 4 = Enough, 5 = Good, 6 = Very Good and 7 = Excellent. Those categories were not definitive; rather, professional knowledge, training and experience in the context of special education were used to make informed judgements about scoring each participant at each session in a more practical and quick way (instead of being descriptive). Apart from scoring these attributes in every session for each participant, the Observational Charts included space (Attribute 12) for specific features /deviations /significances that were observed during each session. Because these shed light in each child's progress, these are analysed at length in Chapters Four and Five. There was also another attribute (13) in case there was a need to report to UCLan a problem such as an adverse event, an accident or an incidental finding that might have happened to the research participant but fortunately such a need did not take place. Observational Charts were referred to in support of interpretating the significance of test scores (see Chapters Four and Five).

2.2.3 Test of Receptive and Expressive Language Abilities

Participants were assigned to either a SiG or to a SpG. Vogindroukas et al.' s (2009) TRELA was used to record VLD in both groups. This test was used because it was specifically designed for Greek children who have ASD in order to examine their level of (receptive and expressive) language development. TRELA is a standardised test written in Greek, copyright protected, and available to participants with specialist training which I had completed. TRELA is a language test in which an individual is asked to use words to identify or describe colours, spatial relationships, emotions, stories, etc; it is suitable for the age range of my Greek child participants who were diagnosed with ASD. TRELA consists of five levels: 1) Language Level 1 (monolectic/ one word level); 2) Language Level 2 (two-word combination level); 3) Language Level 3 (three-word combination level); 4) Language Level 4 (early grammar level); and 5) Language Level 5 (advanced grammar level). The test can be used to measure progress and track language development in clinical practice.

Specifically, at Level 5 (advanced grammar level) there are two components to the level assessment. One component follows the same way of scoring that has been used at Levels 1–4 so it's a consistent approach to assessing children with ASD's receptive and expressive language. The other component is a different form of test in which the person conducting the test uses broader criteria in order to come to professional judgement about the extent to which the child is able to use the language in a more fluent contextual way and in a more extended context. As a result of that, the scores from components one and two could not be simply added together because even though they both measured language ability, they measured language ability in different kinds of ways. These two scores could not be added together but they were useful in interpreting the extent to which children's language was developing. There could potentially be a greater lack of judgement into reliability between different people. Two researchers could score for component one, that follows the same approach for levels 1–5, much more similarly than for component two.

At Level 5 (advanced grammar level) I had to exclude the two last subsections from the analysis of data on the ground of the lack of a score scale for assessment like the rest of the subsections of the TRELA test at Level 5 and the rest of the levels. Those two subsections were descriptive of the Expressive Language Development and descriptive and subjective judgement was required (see Section 2.2.2 Language Level 5; 5) Structure of Narrative and 6) Repetition of Narrative). For those subsections the assessment could only be based on my subjective professional judgement on a scale out of 10 made by me for this reason (see Chapter Four, subsection 4.8, Tables 4.14 and 4.15 progress in brackets); nevertheless, the level of inaccuracy was high in order to be included.

Language Level 1 (monolectic) consists of four subsections:
1a) Identification of objects; there are eight pairs of objects, for instance two spoons, two socks, etc, and once each one of the pairs was put in front of the examined child, she/he was given the other object to be placed with its pair. Then the objects, one of each pair, were placed in front of her/him and she/he was asked to be given the other pair, for instance "Give me the spoon."
1b) Basic Vocabulary-Level of Object; using the same objects, the child was asked to give the object that was named by the examiner (comprehension) and later the examiner asked the child to name the object, "What is this?" (expression).
2) Basic Vocabulary of Meanings-Level of Picture; using pictures, the examined child was asked to show (comprehension) 11 word meanings, for instance "show the house", "show the flower." Then she/he was asked to name 11 words of what she/he saw (expression), for instance the examiner asked "What is this?" and one reply was "apple", another "car", "telephone" etc.
3) Understanding the Use of Objects; the child showed which object, between the eight that were used in Subsection 1, is used to eat, which one to brush teeth etc (comprehension), for instance "With which one do we drink?"
4) Basic Vocabulary of Actions-Level of Picture; using pictures the examined child was asked to show the picture (one of the 8) that depicted (comprehension) an action, for instance "Who is sleeping?" "Who is walking?" Then she/he was asked to name (eight pictures) what she/he saw the person was doing (expression), for instance "What is she/he doing here?".

Language Level 2 (2 words combination level) consists of five subsections;

1) Understanding Instructions - Level of Real Object; the examiner placed four objects in front of the examined child and asked her/him to follow the instructions, for instance “Feed the doll”, “Comb the doll.”

2) Understanding Meanings-Persons; the examined child was asked to show if she/he understood (comprehension) the meanings of the words boy, girl and man/dad/Mr, woman/mum/Mrs, for instance “Show the girl.”

3) Who is Doing What?; the child was asked to show (four times) the picture that depicted what the examiner said, for instance “Show me the boy who is writing.” Then she/he was asked to tell (eight times) what the picture depicted (expression), for instance “What shall we say here?” and (for which) one reply was “The woman is sitting.”

4) Characterisation of Objects; the child was asked to show (four times) the picture that depicted what the examiner said, for instance “Show me the big horse”, “Show me the small ball.” Then she/he was asked to tell (four times) what the picture depicted (expression), for instance “What are we saying here?” and (for which) one reply was “Small horse.”

5) Negation-Affirmation; the examined child was asked to show (four times) the picture that depicted what the examiner said (comprehension), for instance “Which one doesn’t have wheels?”, “Who is not sitting?” and afterwards she/he was asked to tell what four pictures depicted (expression), for instance “What are we saying here?” and (for which) one reply was “It has wheels/this one has.”

Language Level 3 (3 words combination level) consists of six subsections;

1) Understanding Instructions 2 - Level of Real Object; the examiner placed eight objects in front of the examined child and asked her/him to follow the instructions (comprehension), for instance “Put the comb inside the book”, “Put the spoon on top of the glass.”

2) Large Number of Objects; the child was asked to show (eight times) the picture that depicted what the examiner said, for instance “Show me the flowers”, “Show me the chair.” Then she/he was asked to tell what eight pictures depicted (expression), for instance “What are we saying here?” and (for which) one reply was “flower”, and another “chairs.”

3) Characterisation of Object (Colours); the examined child was asked to show (eight times) the picture that depicted what the examiner said (comprehension), for instance “Show me the red hat”, “Show me the blue book.” Afterwards she/he was asked to tell what eight pictures depicted (expression), for instance “What are we saying here?” and (for which) one reply was “red book” and another “blue hat.”

4) Who is Doing What on What or with What; the examined child was asked to show (six times) the picture that depicted what the examiner said (comprehension), for instance “Show me the woman who is washing the dishes”, “Show me the man who is painting the wall.” Then she/he was asked to tell what six pictures depicted (expression), for instance “What are we saying here?” and (for which) one reply was “The woman is washing the clothes” and another “The man is building the wall.”

5) Position of Object 1; the examined child was asked to show (six times) the picture that depicted what the examiner said (comprehension), for instance “Show me the ball that is under the chair”, “Show me the cat that is inside the basket.” Then she/he was asked to tell what six pictures depicted (expression) for instance “What are we saying here?” and (for which) one reply was “The glass is under the chair” and another “The ball is inside the basket.”

6) Categorization of Meanings; the examined child was asked to show (four times) which picture among a group of four pictures did not fit with the others, for instance among a group of pictures that depicted animals she/he had to show the picture that depicted a flower (comprehension) and then (every time) she/he was asked to reply to the question “Why?” (expression).

Language Level 4 (early grammar level) consists of five subsections;

1) Object Position 2; the examined child was asked to show (eight times) the picture that depicted what the examiner said (comprehension), for instance “Show me the woman in front of the wall”, “Show me the cat between the chairs.” Afterwards she/he was asked to tell what eight pictures depicted (expression), for instance “What are we saying here?” and (for which) one reply was “The woman is behind the wall” and another is “The woman is next to the chairs.”

2) Double Characterisation of Objects; the examined child was asked to show (four times) the picture that depicted what the examiner said (comprehension), for instance “Show me the big red table”, “Show me the dirty yellow top/blouse.” Then she/he was asked to tell what four pictures depicted (expression), for instance “What are we saying here?” and (for which) one reply was “small red table”, and another was “clean yellow top/blouse”

3) Receiver and Effector; the examined child was asked to show that she/he understood (four times) and could use (another four times) active and passive voice, for instance the examiner asked “Who is dressing?”, “Who is combing her/his hair?” (comprehension). Then she/he was asked to tell what the person was doing, for instance “What is she/he doing here?” and (for which) one reply was “She/he is getting dressed” and another was “She/he is combing.” (expression)

4) When Something Happened; the examined child was asked to show (six times) the picture that depicted what the examiner said by understanding the correct tense (comprehension), for instance “Show who is eating”, “Show who has erased the blackboard.” Afterwards she/he was asked to tell what six pictures depicted (expression) by using the correct tense, for instance “What are we saying here?” and (for which) one reply was “She/he ate” and another was “She/he is going to erase the blackboard.”

5) Justification of Situations; the examined child was asked to show (three times) which picture between two pictures (comprehension) was the correct one, for instance the examiner asked “Which one cannot fly?” Every time she/he was also asked to reply to the question “Why?” (expression), for instance the reply (for which) was “Because it has no wings”.

Language Level 5 (advanced grammar level) consists of six subsections;

1) Who is Doing What 1; the examined child was asked (eight times) to show the picture that depicted what the examiner said in reference to the right nominative personal pronoun (comprehension), for instance “Show she is walking”, “Show they (in Greek the word “they” differentiates for women at the end) laugh.” Then she/he was asked to tell what eight pictures depicted by using the correct nominative personal pronoun (expression), for instance “What are we saying here?” and (for which) one reply was “He is driving” and another was “They (in Greek the word “they” differentiates for men at the end) are walking.”

2) Who is Doing What 2; the examined child was asked (12 times) to show the picture that depicted what the examiner said in reference to the correct objective personal pronoun (comprehension), for instance “Show she is shouting at him”, “Show he is showing them” (in Greek the word “them” differentiates for women at the end.) Then she/he was asked to tell what 12 pictures depicted by using the correct objective personal pronoun (expression), for instance “What are we saying here?” and (for which) one reply was “He is giving her” and another was “He is watering them” (in Greek the word “them” differentiates for men at the end.)
3) Possession; this subsection is divided into two parts; a) in the first part the examined child had to show (six times) the picture that depicted the appropriate (comprehension) possessive form, for instance “Show the lady’s cat/the cat of the lady”, “Show the girls’ apples/ the apples of the girls” and then the child had to reply six times (expression) by using the appropriate possessive form, for instance “What are we saying here?” and (for which) one reply was “the boy’s cat/the cat of the boy” and another was “the boys’ apples/the apples of the boys” b) in the second part the examined child had to show (10 times) the picture that depicted the appropriate (comprehension) possessive adjective, for instance “Show his hat”, “Show their eyes.” Then she/he had to reply 10 times (expression) by using the appropriate possessive adjective, for instance “Whose is this?” (showing the dress of the girl in the picture, showing the shoes of the children in the picture) and (for which) one reply was “It’s hers” and another is “theirs”.
4) Social Situations; the examined child was shown a picture (four pictures in total) and she/he was asked to reply appropriately according to the communicative situation, for instance (object request) the examiner said “Here we see Jimmy. Jimmy wants to reach the car, but he can’t. What is he saying to his father?” and (for which) any answer that included a request for help or for the object was considered appropriate. It was also noted if there was knowledge of social conventions, for example use of “please”.
5) Structure of Narrative; the examiner gave specific pictures to the child, and once she/he had looked at them carefully, she/he was asked to put them in the correct chronological order. The examiner wrote down the narrative and paid attention to the amount of information as well as to the form-syntactic sufficiency of the narrative.
6) Repetition of Narrative; the examiner told the story and asked the child to pay attention because she/he would have to repeat it afterwards. The examiner then wrote down the narrative that she/he was told and paid attention to the amount of information as well as to the form-syntactic sufficiency of the narrative. Where the examinee could not tell the story, the examiner used specific questions to collect data on the narratee’s level of receptive ability.

2.2.4 Parent External Factor Report

This research took place in the field and it was not possible to eradicate or fully control external factors; for example, sessions with speech therapists that took place outside the study and could have a positive influence in the verbal language development of the child continued. The interpretation of data was informed by a Parent External Factor Report. The Parent External Factor Report (see Appendix Five) was for parents/ significant others to indicate their opinions about the impact upon the verbal language ability of their child(ren), any changes in routine or unusual occurrence that may have happened between sessions. Any Parent External Factors were factored in each time children’s verbal language ability was analysed. Parent External Factor Reports were referred to in support of interpretating the significance of test scores (see Chapters Four and Five) and were discussed for future research (see Chapter Six). Altogether, the comparisons between the progress of participants and cross-evaluations of TRELA test scores, Observational Charts and Parent External Factor Reports allowed for increased confidence about whether singing the verbal language exercises could have any apparent value.

2.3 Designing the Intervention

Baseline assessment (three sessions)

Each participant took part, individually, in three, one-to-one sessions of VLD exercises; their communication was observed and their ability was assessed by the TRELA. Each participant's parent/ significant other (for example, guardian, therapist, key worker) completed a Parent External Factor Report for each session (i.e. three times for the three sessions). This gave three TRELA scores and associated Parental External Factor Report reports for each child.

The baseline for VLD of each participant was ascertained by calculating the mean average of the three TRELA scores. The baseline score determined the starting level within TRELA and the aim was for the participants to progress through the five levels, from their own starting level, whatever that may be. Parental External Factor Reports were noted and contributed to the interpretation of the TRELA scores.

Assignment

Participants were assigned to one of Levels 1–5 and either to the SiG or to the SpG, seeking as far as was possible to achieve a relatively even balance in the matched pairs of the total number of participants in each group and of each group's participant baseline score.

Session design

Using the baseline scores, the VLD exercises most pertinent to each participant's starting level (then subsequent developing levels) were ascertained. These were musicalised for the SiG participants. I musicalised the VLD exercises so that each child could experience singing at their own level of VLD.

Intervention

The intervention took place in a room in my house (3rd floor) specifically designed for this purpose because it was quiet and isolated from the rest of the house. There was an entrance from that floor and a waiting room (next to the room where the intervention was taking place) where the parents could stay until their child had finished the intervention session. In case of an emergency, they could very easily have access to their child. In the room where the intervention session was taking place there was an office (pc in it) with two chairs and a wardrobe (also a small toilet next to it). There was also a floor light at the first baseline sessions but this was soon taken away from the room because it was distracting for a couple of children. The room was designed to have only the basic things needed for the intervention to eliminate any stimuli (irrelevant to the intervention) from the environment so that the children would not be distracted from anything else. Even the use of loudspeakers on the pc could be a distracting stimulus for the children that they could play with and such incidents needed to be ; thus, there was only the use of the pc. The intervention sessions lasted from 20 to 30 minutes depending on the VLD level of the child once per week at the same afternoon/ evening time for each child so that the session wouldn't be tiring for them.

The works of Molnar-Szakacs et al. (2009), Molnar-Szakacs and Overy, were applied amongst others for the construction of the intervention (see Chapter 6, Subsection 3.3.10). Their bibliographical study is of great pertinence to my research since they conclude that forms of music behaviours that take place simply and have developed as humans have evolved, such as attaining knowledge of a song through mimicry, are engaging and will be the most beneficial to prosocial behaviours. Also, Lai et al. (2012) showed that the operating neural systems in the brain that elaborate speech and song were involved more and in a more efficient way for song than for speech in children with ASD and estimations of systemic nerve pathways connected with these activities were not distinct from controls. The intervention was constructed on these background literature underpinnings amongst others.

The researcher was also aware of taking notes for each participant, regardless of whether they were in the SiG or SpG, on Observational Charts straight after the intervention session had finished. Eleven attributes were observed and were referred to in support of interpretating the significance of test scores (see Chapters Four and Five): overall engagement, verbal engagement, nonverbal engagement, emotional engagement, cognitive understanding, embodied knowledge, how receptive the participant was to paralinguistic content, how receptive the participant was to extra-linguistic content, use of paralinguistic content by the participant, use of extra-linguistic content by the participant, and general wellbeing. Data were recorded for each attribute using a rating scale from 0 = Not Applicable to 7 = Excellent. For instance, it was noted in the Observation Charts that SiG participant 08 was marked again with a score of 6 (very good) for verbal engagement and for most of the attributes during the thirteenth and fourteenth session and with 6 for all the attributes during the fifteenth (last) session. It was also observed that the children who achieved language development through singing had a higher prevalence of emotional engagement, as indicated in the Observation Charts.

Intervention sessions SiG (15 sessions)
Each participant in the SiG participated individually in 15 one-to-one musicalised VLD exercises; their communication was noted in the researcher's Observational Charts, and their ability was assessed according to TRELA (after every three intervention sessions). Each participant's parent/significant other completed a Parental External Factor Report once per session (to indicate their opinion about the impact upon the verbal language ability of their child(ren) that any changes in routine or unusual occurrences may have had during the period).
The participant during the intervention was asked to sit and first listen to the musicalised words/ sentences/ song of the VLD exercises, depending on the level she/he was at and then sing them together with the instructor.
Singing Exercises for Language Level 1 (monolectic); the child was asked to sit and listen on the computer to a set of musicalised words. She/he could press the button and listen to (as well as see on the Sibelius programme) the musicalised words every time they were sung by the researcher. After listening to each musicalised word (see Appendix 7, Musical Scores Level 1) she /he was asked this time to sing each word together with the researcher.
Singing Exercises for Level 2; the child was asked to sit and listen on the computer to a set of musicalised combinations of words (subject-verb). She/he could press the button and listen to (as well as see on the Sibelius programme) the musicalised combination of words every time they were sung by the researcher. After listening to each musicalised word (see Appendix 7, Musical Scores Level 2) she /he was asked this time to sing each combination of words (subject- verb) together with the researcher.

Singing Exercises for Level 3; the child was asked to sit and listen on the computer to a set of musicalised combinations of words (subject-verb-adjective). She/he could press the button and listen to (as well as see on the Sibelius programme) the musicalised combination of words every time they were sung by the researcher. After listening to each combination of musicalised words (see Appendix 7, Musical Scores Level 3) she /he was asked this time to sing each combination of words (subject-verb-adjective) together with the researcher.
Singing Exercises for Level 4; the child was asked to sit and listen on the computer to a set of musicalised combinations of words. She/he could press the button and listen to (as well as see on the Sibelius programme) the musicalised combination of words every time they were sung by the researcher. After listening to each musicalised combination of words (see Appendix 7, Musical Scores Level 4) she /he was asked this time to sing each combination of words together with the researcher.
Singing Exercises for Level 5; the child was asked to sit and listen on the computer to a song. She/he could press the button and listen to (as well as see on the Sibelius programme) the song every time it was sung by the researcher. After listening to the song (see Appendix 7, Musical Scores Level 5) she /he was asked this time to sing the song together with the researcher.
During all the SiG intervention sessions data were also collected through the Observation Chart “Speak through Singing” (See Subsection 2.2.2 of this chapter and Appendix 6).
For some children a reward-motivational strategy was used that was probably applied to her/his learning style and that will be discussed later on in Chapter Six. Even though there were cases of participants standing up and periods that were intense at times, in general participants co-operated well and were trying happily in most cases. In all cases (and at all levels) participants were excitedly encouraged to sing as much as possible.

Since it was not practical to play an instrument, sing and do the research all at the same time the researcher used a music computer programme, Sibelius, in order to have music notation and add music sound to the melodies. The specific programme was suggested to me by a professional musician for its simplicity in writing melodies and its simplicity in producing them. The elements of simplicity and practicability are necessary when working with children with ASD and these should also apply in the music programme. The time meters that were used in the melodies were simple duple, simple triple and simple quadruple (time signature 2/4, 3/4, 4/4). The element of harmonious simplicity was my guiding principle in musicalising the VLD exercises because sound is especially noted as having the potential to overstimulate and trigger hyperresponsivity in children with ASD (see Chapter Three). At the same time there was a progression of the simplicity in the musicalisation of the VLD exercises according to each child’s VLD level. The words that were chosen also had to be simple and developmentally right for these specific children and for this purpose I chose familiar and daily used words for children for the study.

Intervention sessions SpG (15 sessions)

Each participant in the SpG participated individually in 15 one-to-one VLD exercises; their communication was noted in the Observational Charts and their ability was assessed according to the TRELA (after every three intervention sessions). Each participant's parent/ significant other completed a Parental External Factor Report once per session (to indicate their opinion about the impact upon the verbal language ability of their child(ren) that any changes in routine or unusual occurrence may have had during this period). There were the same VLD exercises at every level in the SpG as in the SiG with the exception that they were not musicalised.

The participant during the intervention was asked to sit and first listen to the words/ sentences of the VLD exercises, depending on the level that she/he belonged to and then repeat them together with the instructor.

Speaking Exercises for Language Level 1 (monolectic); the child was asked to sit and listen on the computer to a set of words. She/he could press the button and listen to (as well as see on the Sibelius programme) the words every time they were spoken by the researcher. After listening to each word (see same words in Appendix 7, Musical Scores Level 1 but not musicalised) she /he was asked this time to speak each word together with the researcher.

Speaking Exercises for Level 2; the child was asked to sit and listen on the computer to a set of combinations of words (subject-verb). She/he could press the button and listen to (as well as see on the Sibelius programme) the combination of words every time they were spoken by the researcher. After listening to each combination of words (see Appendix 7, Musical Scores Level 2 but not musicalised) she /he was asked this time to speak each combination of words (subject- verb) together with the researcher.

Speaking Exercises for Level 3; the child was asked to sit and listen on the computer to a set of combinations of words (subject-verb-object). She/he could press the button and listen to (as well as see on the Sibelius programme) the combination of words every time they were spoken by the researcher. After listening to each combination of words (see Appendix 7, Musical Scores Level 3 but not musicalised) she /he was asked this time to speak each combination of words (subject-verb-adjective) together with the researcher.

Speaking Exercises for Level 4; the child was asked to sit and listen on the computer to a set of combinations of words (subject-verb-object-adjective). She/he could press the button and listen to (as well as see on the Sibelius programme) the combination of words every time they were spoken by the researcher. After listening to each combination of words (see Appendix 7, Musical Scores Level 4 but not musicalised) she /he was asked this time to speak each combination of words with the researcher.

Speaking Exercises for Level 5; the child was asked to sit and listen on the computer to a short story. She/he could press the button and listen to (as well as see on the Sibelius programme) the story every time it was told by the researcher. After listening to the story (see Appendix 7, Musical Scores Level 5 but not musicalised) she /he was asked this time to try to tell the story together with the researcher.

For a couple of children a reward-motivational strategy was used that was probably applied to her/his learning style and that will be discussed later on Chapter Six. Even though there were cases of participants who stood up and there were intense periods at times, in general participants co-operated well and were trying happily in most cases. In all cases (and levels) participants were excitedly encouraged to speak as much as possible.

During all the SpG intervention sessions data were also collected through the Observation Chart "Speak through Singing" (See Subsection 2.2.2 of this chapter and Appendix 6).

Assessment of progress

Each participant's overall change in VLD was calculated by comparing their baseline (starting level) with their achievement levels (every three sessions). I used Vogindroukas et al.'s (2009) TRELA and countered the problem of mimicry by making sure that the vocabulary used for testing VLD was not the same as the vocabulary used for developing verbal language ability. The interpretation of changes in performance was informed by the notes in the researcher's Observational Charts (see Appendix 6) of the children's communication and the Parental External Factor Report.

2.4 Ethics

This research intervention involved participants who were vulnerable because they were legal minors, they had a diagnosed mental health condition, typically there would be comorbid presence of learning disabilities/ difficulties, and in all these respects their capacity to provide meaningful consent was compromised. The first level of gaining surety about consent from the prospective child participants was gaining consent from the parents/ guardians/ responsible persons (please see Appendix One: Project Information and Appendix Two: Consent Form). The second level of gaining surety about consent from the prospective child participants was inviting assent from the children. It was expected that very few, if any, of the prospective child participants would be able to fully understand and give consent unaided. If approval, assent, and unaided consent were secured, that was preferred, and it was proposed that participation be enabled. However, the Child Consent Form permitted the parent/ guardian/responsible person to assist the prospective child participant in understanding and completing the form; in such circumstance wherein approval, consent, and assisted consent were secured and the prospective participant understood their informed consent, it was proposed to enable participation. Further, the Child Consent Form permitted the parent/guardian/responsible person to actually complete the Child Consent Form on behalf of the child BUT with the child (L. Sanderson, 2010) ; in such circumstances, it was required that it would be indicated in answer to the first and second questions that the child had not completed the form himself/ herself; in every circumstance enabled participation was vigilantly monitored so that: if, in the opinion of any professional or responsible person, the child showed any signs of unwillingness/discomfort/unhappiness or similar with their participation in the project, their participation in the session was to be terminated immediately (please see Appendix Three: Child Consent Form).

The research also involved adult participants whose capacity to consent was not compromised (please refer to Appendix Four: Adult Consent Form). All documents were prepared in English and officially translated into Greek for prospective signing because all of the prospective participants had Greek as their native language. All prospective participants (adults and children) were approached via a specialist centre for ASD. To avoid any pressure, prospective participants were given one month (or more) to decide whether or not to participate in the study and were never offered or given any payment, incentives, or rewards for participation. Participants were never deceived or coerced and potential imbalance of power was avoided by recruiting participants from specialist clinics rather than from the special education school where I was working and specialising in working with children who had ASD. On all documents received by the prospective participants, I avoided suggesting that singing would improve the children's verbal language abilities so that prospective participants were not deceived into participating on the basis of what could be false promise.

Waltz (2009) argues in her study that informed consent and harm prevention caused by overstimulation are only two aspects of ethical concerns when conducting a research with children with ASD. Ethics and quality in education research are bound together by a number of issues such as subject and researcher mindsets, research design, agenda setting, and funding.

There was nothing particular about any aspect of the research project which involved any possible distress, discomfort, or harm (or offense) to participants. However, it is symptomatic of ASD that any child with ASD can have unpredictable distress responses to anything within their daily existence at any time. The known triggers are “overstimulation” and “under-stimulation” and these were both mitigated in this research project by expert knowledge that enabled the practitioner to be sensitised to the presentations associated with triggered behaviours. Two expert practitioners advised that there was no discernible risk: a practitioner-researcher of more than thirty years of experience working with ASD and a senior registered psychiatric speech and language therapist who specialises in working with Greek children who have ASD. I have more than a decade of professional and other pertinent experience working with children who have ASD.

In terms of participation within the research project, the procedure for mitigating distress was to immediately enable the child to act upon any impulse to cease participation (this would always be upheld and is routine professional practice in this field of work). The environment was secure so ceasing participation itself could not cause any harm. The most basic procedures for dealing with distressed children who have ASD serves to contain incidents and prevent or minimise any damage to anybody who could be affected, followed by a detailed report. All existing protocols and procedures were unwaveringly adhered to as requisite of the standard professional code of practice (BERA, 2018) (ALLEA, 2017).

Any and all participants could withdraw from participation at any stage without being under any obligation or without being subjected to any encouragement to say why. Additionally, if, in the opinion of any professional or responsible person, the child showed any signs of unwillingness/discomfort/unhappiness or similar with their participation in the project, their participation in the session was to be terminated immediately. Were any unforeseeable circumstances to arise, participants (both adults and children) were to be notified verbally in-person and by official written notification, if appropriate.

Whilst participation in the research did not pose any particular risks, working with children diagnosed with ASD presents risks to self and others. Managing this risk involved excluding any items or objects that could be used as weapons or that could be dangerous if used inappropriately. Working one-to-one with the child participants, at no time during the participatory aspects of the research intervention was I “lone working” because there were always other responsible adults at hand to intervene or assist.

In particular, people with ASD are prone to triggered behaviours resulting from overstimulation and understimulation. Although sensory impairments are common in autism spectrum disorder (ASD), few age-appropriate observational sensory assessments exist. Ramappa et al. (2023) examined sensory responsiveness in 41 ASD and 33 typically-developing (TD) youth aged 7–17 years using the Sensory Processing 3-Dimensional (SP3-D) observed Assessment and parent-reported Inventory. Compared to TD, ASD youth reported and observed more varied and severe symptoms of sensory responsiveness; however, there was no correlation between the two measures. In individuals with ASD, observed sensory over-responsivity (SOR) and sensory craving (SC) decreased with age, but through adolescence, SOR remained higher in ASD compared to TD. The results indicate that integrating multiple sensory measures is beneficial and that the SP3-D Assessment can identify SOR in ASD through adolescence.

Managing risks associated with overstimulation involved remaining sensitised at all times to known and potential triggers. Any known triggers (such as sudden loud noises/sounds/music for which any participant with ASD was unprepared) were excluded. Verbal and/or nonverbal and/or embodied consent was sought before introducing each stimulus in order to, wherever possible, assure preparedness. I enabled any participant with ASD to immediately self-withdraw from participation and/or move into a designated safe area. Whenever I or any other responsible person thought that a participant may have wanted to cease participation or that ceasing participation was in their best interests, the participant was enabled to choose to self-withdraw by immediately ceasing the current activity. Managing risks associated with understimulation involved remaining sensitised at all times to known and potential triggers. Any known triggers (such as introducing any stimulus that is beneath the intelligence level of the child with ASD) was avoided. It was crucial to remain aware of, and sensitised to the needs of, each child for appropriate stimulation and to continue to introduce stimuli that were ever-so-slightly more challenging (being cautious not to overstimulate).

People with ASD are also prone to obsessive compulsive behaviours. Often these behaviours pose no risk or danger to self or others and can be allowed to continue. However, if the behaviour had the potential for emotional upset or annoyance, gentle encouragement could be given to discontinue the behaviour but care should be taken to manage the risk of triggering overstimulation by impinging on the child's sense of personal space within that context, temporality, and circumstance (for example: by means of a distraction technique). If the behaviour poses a risk, there is a need to contain the incident by safely removing oneself and others from the environment, securing the environment, calling for assistance, and if necessary, calling emergency services. It is routine practice to report all incidents whether or not they could pose a risk or danger because the details could prove to be important in retrospect and offer prospects for learning how to improve the safeguarding of children who experience ASD.

Additional to the need for continuous monitoring for safeguarding, this research project involved adult participants providing notification of factors that, in their opinion, likely reduced or improved the child participant's verbal language performance (please refer to Appendix Five: Parent External Factor Report). To avoid unnecessary disclosures, there was no requirement to specify the factor(s), only to declare the probable impact so that the influence could be taken into account when considering VLD progress and whether it was attributable to something other than the VLD exercises. The research also involved observations of nonverbal and verbal language; continuous observation is routine whenever working with children who have ASD but observations are not always routinely recorded and are not ordinarily tailored to nonverbal and verbal language. Routine observations are ordinarily recorded for the purposes of safeguarding. In this research project, the routine observations were not limited to nonverbal and verbal language but the recording of observations for the purposes of research was limited to nonverbal and verbal language (please refer to Appendix Six: Observation Charts).

The only personal data that were collected for the research was the name of each person giving either approval, or/and consent. At the point of receiving approval/ consent all research documents were coded and stored securely separately from the approval/consent. The data collected within research documents pertained solely to language test (TRELA) scores and observations pertaining to verbal and nonverbal language and the Parental External Factor Report sheets. Approval/consent were stored in a locked filing cabinet that was only accessible by me. These are paper documents that are permanently and irretrievably destroyed by means of shredding at the end of the PhD. Data (which do not contain any sensitive or personal data) are stored as paper copies in a separate locked filing cabinet that was only accessible to me and these paper documents will be permanently and irretrievably destroyed by means of shredding. Data (which do not contain any sensitive or personal data) were transcribed to encrypted word files so that they could be shared for continuing supervisory guidance; this includes electronic data which will be permanently and irretrievably destroyed by means of deleting the files, back-up files, automated back-up files, and cache copies at the end of the PhD. All electronic data were stored on computers that were accessible only by username and password; only the Director of Studies and I could access electronic data. All data were permanently and irretrievably destroyed if a participant withdrew from the research (including any of: verification of successful award, failure, and voluntary withdrawal).

Adult and child participants were debriefed by me verbally at the end of their participation, during their ordinary attendance; as well as at the end of the research project. I had informed the parents that I was available for a period of up to one month after the research intervention, to continue to meet with the children so that they could get used to discontinuation of the project; however, the parents thought that there was no need for that. That is because vulnerable people and children are prone to forming attachments and this is true of children with ASD even though symptomatically they typically present with withdrawn behaviours and difficulties relating to others. Adult participants were informed about their own children's performance at the end of the research intervention (possible therapeutic dimensions of the output).

2.5 Summary

This second chapter described the research method and discussed its detail the context of some of its main methodological limitations and strengths. In particular, the discussion in this chapter explained why it was useful to use Observational Charts as well as Vogindroukas et al.' s (2009) TRELA and Parent External Factor Reports. After outlining the design of the intervention, this chapter also presented the ethical strategy for this research project in detail. The next chapter, Chapter Three, discusses key insights gained from a review of relevant literature and theory.

CHAPTER THREE: LEARNING AND SINGING IN ASD

3.1 Overview

The purpose of this chapter is to examine key research that can help understand how singing may be valuable to the VLD of children with ASD. To achieve this purpose, Chapter Three discusses a relatively diverse array of literature because there is no existing knowledge specific to the use of singing for VLD in ASD. Some of the literature/theories discussed in this chapter are particularly insightful about ASD but only indicative of how learning may take place. Some of the literature/theories discussed are not about ASD but are particularly insightful about learning and indicative of how learning may be adapted for children with ASD. Some of the literature/theories discussed are about how music supports language development but not necessarily in ASD and not through singing. Chapter Three is set out in four sections, including this first section that provides a brief overview of this third chapter. The second section is subdivided into two subsections concerned with defining ASD and discussing issues pertaining to the treatment/ support of people diagnosed with ASD. The third section is given over to discussing issues pertinent to learning in ASD with focus on my concern over VLD in ASD through the medium of singing. There is a wide variety of literature that considers learning in ASD and quite a bit on the edges of learning/VLD and/or music in ASD. There are many existing case studies pertaining to music therapy with children who have ASD and clinical studies pertaining to the neuroscience of ASD and music; however, there is very limited literature specific to the use of singing for VLD in ASD. In this section of Chapter Three, I consider some of that wider literature. Finally, in the fourth section, there is a brief summary of this third chapter including how it relates to the next chapter and to the entire thesis.

3.2 Autism Spectrum Disorder (ASD) and Educational Research

Bleuler (1950) first used the word '[e]autos' (which is derived from the Greek and translates into English as "self") in reference to symptomatic withdrawn behaviour presented in schizophrenia. Autism was defined by Kanner whose study of 11 children represented 'autism' as a 'complex developmental disorder involving communication, social interaction and activity of the imagination'. Autism was originally considered an ordinary stage of child development and the condition to which Kanner (1943) refers was considered as delayed development (effectively the child got stuck in the autism stage of ordinary child development). This understanding was revised by Tustin (1991) who re-classified autism as an exclusively pathological condition. Wing and Gould (1979) observed that autism could be present but without the presence of every feature that Kanner (1943) observed and this informed understanding of autism as a spectrum disorder (ASD). In reference to Asperger's syndrome and Kanner's (1943) 'early infantile autism', Wing and Gould (1979) note that these disorders although considered by their advocates to be distinct, have several common characteristics. Individual children may show mixtures of items from more than one syndrome'. Children with ASD are unable to maintain communication with other people and it can be extremely difficult to establish contact with them. The functions/operations/activities of emotional tuning, social interactions and communication have been ascribed to/associated with the acknowledged human mirror neuron system (MNS) (neurons that reply to the acts/activities of self and others), and an impairment of that system is a significant cause of some of the characteristics of autism. For this reason, it is of great importance to include a subsection (see 3.3.1) on Music Interventions and Learning in Neuroscience where the effects of music interventions on the mirror neuron system of children with ASD are shown**.** Symptomatically, children with ASD exclude themselves or are excluded because of the presentation of their symptoms and they typically experience impoverished social relations. For these reasons, children with ASD need appropriate stimulation and support with developing their language skills, social skills, and confidence.

As Pring outlines, "The job of the teacher is to facilitate that development through putting the learner in contact with further experience or with what others have said as they make sense of similar experiences" (page 13, first para, 2004). My research project is experimental and empirical since it engages the children with the experience of singing. Dewey argued that learning should be fruitful, adapting successfully to new situations, dealing with problems as they arise and nurturing capacities and skills and my research project is focused on that learning and to develop further the verbal language skills and capacities of children with ASD. Dewey (in Pring, 2004) showed features of education such as being adjectival and evaluative since the activities meet specific evaluative standards. He argues that any experience can be educational as long as there is a certain quality in that experience and a certain kind of learning which takes place and a fruitful engagement with an experience that contributes to the development of someone as a person. In my research there is that fruitful engagement and experience of singing that can contribute to the VLD of the children with ASD.

3.2.1 Symptomology

ASD is diagnosed as a mental health condition according to criteria specified in the *Diagnostic Statistic Manual* (DSM). The child participants in my study would have been diagnosed according to Widiger's (1994) *DSM-IV* criteria. That fourth edition of the DSM was revised nine years later and the classification of ASD changed considerably. Particularly, ASD symptomology was re-categorised in *DSM-V* (APA, 2013) and greater detail was given to sensory processing. In the *DSM-IV*, the diagnostic criteria for ASD are organised into three domains – social impairment, speech/communication deficits, and restricted-repetitive patterns of behaviour. In the *DSM-V*, the diagnostic criteria are condensed into two domains – deficits in social communication restricted-repetitive patterns of behaviour/interests. In the *DSM-IV*, there were five categories under the Pervasive Developmental Disorders – 'autistic disorder', 'Asperger disorder', 'childhood disintegrative disorder', 'Rett syndrome', and 'PDD-not otherwise specified' (Widiger, 1994) but in the *DSM-V*, there is only one category (that of 'ASD') with three severity levels that indicate the amount of support required, ranging from 'Level 1 Support required' to 'Level 3 Very Substantial Support required' (APA, 2013). A classification (such as ASD Level 2) is now aligned to a level of support ('Substantial Support required') (*ibid*) whilst the reorganisation of symptoms recognises that language *is* social and relational (rather than categorically distinct). From this perspective, both substantial changes can be regarded as streamlining. Aside from streamlining, there is additional emphasis on the role of the sensory system in ASD in the *DSM-V* because it seems to play a key role in the symptomology of ASD. This has important bearing on my research because traditional language development is cognitive whereas developing language by singing appeals to the sensory system. Children with autism struggle to modulate sensory inputs (Baranek, 2002; Baranek et al., 2005; Tomchek and Dunn, 2007) and that may be presented as increased receptiveness of auditory and visual incentives (Bonnel et al., 2003; Heaton 2003; Gernsbacher et al., 2008). Osorio et al. (2021) found that although there is a slight tendency for typical boys to demonstrate more sensory proceeding atypicalities, female children with ASD demonstrated notably more atypical replies in comparison to their male peers. This has useful effects for indicating/distinguishing female profiles with ASD. The sensory atypicalities of children with ASD can be a red flag when designing and performing music and singing activities for children with ASD and there needs to be a very careful and processive building of the exercises according to each child's developmental stage and sensitivities.

DSM-V (APA, 2013) ratifies the under- and overstimulation observed by families and professionals who work with children with ASD by declaring 'hyperresponsivity' and 'hyporesponsivity' symptomatic of ASD. Baranek, et al. (2006 in Marco et al., 2011) conclude that even though sensory hyper- and hypo-responsiveness are not unique to ASD, they appear to be more prevalent in this population than in other developmental disabilities. To those unable to communicate their distress (hyper/hypo responsivity) caused by particular (sensory) stimuli, aggressive and/self-injurious behaviour can take place. Hyperresponsivity involves hypersensitivity – being too sensitive to stimuli. For example, a low level of sensory stimulation (such as a quiet sound) can be intolerable and trigger clasping hands over the ears and wild screaming. Behaviours such as screaming at an extreme pitch for prolonged periods, throwing and/or smashing things, violently pushing others, covering ears, obsessive compulsive behaviours, harming themselves and/or others – are symptoms of hyperresponsivity. Singing is a form of sensory stimulation; for example, it stimulates hearing and the act of singing stimulates the sense of touch by vibrating the lips. Stimulating the senses risks triggering maladaptive behaviours in ASD because of hyperresponsivity. During my research intervention, one of the child participants did behave in a manner that resembled hyperresponsivity. S/he was shouting loudly, s/he couldn't sit down, and wanted to dance around the room, which could be interpreted as agitated excitement. However, s/he had very good eye contact with me and s/he was smiling to me very often, which indicated that s/he was at ease and comfortable in him/herself. Pleasant ease does not characterise hyperresponsivity; hyperresponsivity is characterised by self-harming, agitated, and challenging behaviours or self-protecting and obsessive compulsive behaviours.

Hyporesponsivity is being insufficiently responsive to (sensory) stimuli. Complexly, the behaviours associated with hyporesponsivity are the same as the behaviours associated with hyperresponsivity. However, self-protecting and obsessive compulsive behaviours (such as covering ears, rocking, spinning, flapping hands, tapping objects, phonetic sound bursts, and fixated staring) are more likely to occur first if a child with ASD is hyporesponsive, whereas agitated and challenging behaviours (such as screaming at an extreme pitch for prolonged periods, throwing and/or smashing things, violently pushing others, harming themselves and/or others) are more likely to occur first if a child with ASD is hyperresponsive. During my research intervention, there were not any children presenting symptoms of hyporesponsivity either in the SpG or in the SiG.

Both hyperresponsivity and hyporesponsivity can pertain to any one sense or any combination of senses or all sensory modalities. Sound is especially noted for triggering hyperresponsivity so the prospective benefits of singing are finely balanced against the potential maleficence of overstimulation. In these circumstances, it was critically important to remain acutely receptive of each child and offer up just enough stimulation, neither too little nor too much. In musicalising the VLD exercises, harmonious simplicity was my guiding principle. Simplicity could be under-stimulating; however, by knowing each child's VLD level and always aiming for progress, some cognitive stimulation was ever-present.

3.2.2 Treatments and Interventions

All treatments and interventions for children with ASD are positioned in the special educational context and draw on interdisciplinary knowledge. Green et al. (2006) conducted a survey for three months via the internet to find out which therapies and interventions are often used by parents for their children with ASD. They report common use of different therapies/interventions based on '522' respondents and explain that, for any respondent, the number of therapies/interventions used was influenced by the 'type' of ASD and the 'age' of the child (*ibid*). As opposed to my research intervention, Speech Therapy was the most widely reported, followed by Picture Exchange Communication System (PECS), then Occupational Therapy, Sensory Integration (SI), and next Play Therapy. Speech Therapy and Occupational Therapy are established professions whilst Axline's (1947) 'Play Therapy' is widely regarded as seminal literature of far-reaching influence across the therapeutic disciplines. PECS and SI are therapeutic interventions. Teaching and Education of Autistic and Related Communication Handicapped Children (TEACHH) (Mesibov et al., 2004) is another approach that uses environmental structure and strategies to encourage interaction, communication and positive behaviour in children with ASD.

Speech Therapy is the most widely reported therapy/intervention for children with ASD according to respondents to the online survey of Green et al. (2006). A Speech Language Pathologist (SLP) or Speech Therapist specialises in the diagnosis, evaluation, and treatment of language, communication, cognitive-communication, voice, and swallowing disorders so that the people can interact and function within a natural environment. For a child with ASD, the SLP/Speech Therapist plays an important role in diagnosis and treatment within a team of specialists, typically including paediatricians, child psychiatrists and/or psychologists. A speech therapy programme starts with evaluation of a patient's communication strengths and challenges and that evaluation forms the basis of individual goal setting. Similarly, in my research, participants take VLD tests and a baseline score is calculated to establish their starting level so that, for example, if participant P01 starts with a middling score at Level 1, the goal is to continuously improve the score at Level 1 and, if possible, progress through higher levels. Whereas, if participant P02 starts with a high score at Level 3, the goal is to complete Level 3 and, if possible, progress through higher levels. Typical goals in Speech Therapy include improving spoken language, learning nonverbal skills (such as signs or gestures), and using alternative methods of communication (such as computer-assisted technology or PECS). Although in my research intervention the goal is to improve spoken language that is to be achieved through the medium of singing which is not limited and depended upon just a linguistic context.

PECS is the second most widely reported therapy/intervention for children with ASD according to respondents to the online survey of Green et al. (2006). PECS is an alternative communication system that was developed by Bondy and Frost (2001) to teach children with limited speech to initiate communicative interactions. As visual interventions, PECS and Makaton are similar but distinct because PECS involves the child presenting a picture for exchange with the object of their desire (for example, presenting a picture of cake would be rewarded with cake). According to the PECS training protocol, children are taught to exchange a single picture for a desired item and then gradually they use a variety of attributes in their requests by constructing picture-based sentences. PECS can be developed to relatively high complexity by sequential or combined use of personalised pictures (for example, presenting a picture of mum, a picture representing asking a question, and a picture of playing football – indicating the child's desire to ask mum if s/he can play football). This visual intervention is dependent to some degree upon pre-conceptualisation of content and attributes by another (typically the therapist/key worker and parents); thus, the child starts to understand communication as an interpersonal exchange. For example, the child cannot exchange a picture of a basketball for the reward of basketball unless the therapist/key worker has available a picture of a basketball. In terms of singing, is the child merely mimicking vocalisations when they sing, or do they perceive singing as a significant form of communication? The latest could also apply depending on the level of understanding of the child and in that case, singing could offer a great potential for learning. Moreover, PECS limits expressivity because it offers a limited range of emotions to choose from. Singing, by comparison, offers the potential for nuanced expressivity in paralinguistic qualities such as tone, dynamics, and contour. Singing is not dependent upon linguistic content; emotions can be perceived in the qualities of vocalisation (for example, anger can be perceived in a sharp fortissimo staccato phrasing, if anger is present, regardless of the presence/absence of words).

Occupational Therapy (OT) is the third most widely reported therapy/intervention for children with ASD according to respondents to the online survey of Green et al. (2006). Historically, OT extends to the distant past (BCE) and has made use of creative practices since the 19th century AD. It is firmly grounded in the therapeutic values of having an occupation and has increasingly made use of fun play-based activities for sensory engagement in attempts to change how the brain reacts to touch, sound, sight, and movement. The section on OT states, "I aim to make participation fun." However, the goal of OT is meaningful participation, which is equivalent to fun, so the activity itself must carry this element.

There is a similarity with my research in the core attribute of playfulness because I aim to make participation fun and meaningful for the child, whether the participants are in the SiG or not. However, the participants of the SiG share this commonality more with OT because they are engaged in the playful and fun process of singing and in sensory engagement by singing compared to the SpG.

Sensory Integration (SI) is the fourth most widely reported therapy/intervention for children with ASD according to respondents to the online survey of Green et al. (2006). SI involves structured use of sensory engagement and there is commonality here with my research intervention since the musicalised VLD were structured not only based on each participant's cognitive level of VLD but also in a musical way that would not trigger hyper/hypo responsivity. Dawson and Watling explain the correlation between SI and ASD, by stating that sensory integrative impairment is a frequent abnormality for people with neurological learning dysfunctions such as an autism spectrum disorder' (2000, in Marco et al., 2011). SI was defined by Ayres (1973) as the neurological mechanism that assembles awareness from one's own body as well as from the surrounding environment, and allows one to use their body efficiently within that environment. Her studies in neuroscience identified eight senses, adding 'Vestibular' (structured within the inner ear), 'Proprioception' (one's body in space), and 'Interoception' (what's going on inside one's body) to the already commonly known sight, sound, smell, taste, and touch (*ibid*). Prospectively, singing is especially valuable for vestibular and interoceptive stimulation because it uses the body to produce sounds that are evident to the body (for example, singing from the stomach, out of the mouth, to the ears). Zhi-Min Shi et al. (2016) report that 'the acoustic waves of music act on the brain's limbic system and reticular formation of the brainstem and thereby, improve the excitability of nerve cells'. Their finding is generally supportive of my hypothesis that singing benefits interoceptive sensory engagement and the excitability of nerve cells could drive the readiness of nerve cell connections in the brain's limbic system.

Play Therapy is the fifth most widely reported therapy/intervention for children with ASD according to respondents to the online survey of Green et al. (2006). Axle's (1947) 'Eight Basic Principles' of 'Play Therapy' find application in very many therapeutic disciplines and have significant bearing on my research too. Axline's (1947, p. 73) first principle focuses on the aim to 'develop a warm, friendly relationship with the child' which can be quite challenging for a child with ASD who experiences 'deficits in social-emotional reciprocity' (Widiger, 2013) but which finds comfort in Axline's (1947, p. 73) second principle – 'The therapist accepts the child exactly as he is'. The remainder of Axline's principles have comparable bearing on how I managed the VLD sessions both with and without singing but it is the essence of playfulness that permeates Play Therapy which has the most significance in the use of singing in my research. Whilst I endeavoured to permeate every VLD session (with or without singing) with playful 'permissiveness' (*ibid*), I observed that emotional engagement and comfort were considerably more prevalent amongst the children who did VLD by singing. In my research, the activity's sensory components were well-balanced; the children were not overstimulated, and learning was made possible by their enjoyment and emotional involvement (learning only happens if the fun is present).

3.3 ASD, Music and Learning

This subsection is written in a thematic structure that follows an order from the more general background pertinent to my research to the more specific and pertinent to my research. This happens because there are many themes that are either close or very close to "the value of singing in the verbal language development of Children with ASD", such as music interventions and communication-learning in children with ASD (3.3.6), singing and learning in children with ASD (3.3.7) and music interventions and VLD in children with ASD (3.3.8). However, there are subsections in this subsection that cannot follow the usual linear rating of structure from the more general to the more specific since their level of pertinence with my research is the same (such as singing and learning in children with ASD and music interventions and VLD in children with ASD).

3.3.1 Music Interventions and Learning (in Neuroscience)

Gruhn in Haas and Brandes (2009) states that only in current times have we started to know the common underpinnings (neural activities) of language and music (vocalisation processes); both manners – speaking and singing – occur in activities of the phonatory system, go through the same vocal pathway and occupy the same neural areas. Thus, it is sensible to assume that singing and speaking have many basic commonalities in perception and production. Linguistic processing is primarily located within the left hemisphere of the brain; whereas Altenmuller (1986), Brust (1980), plus Gates and Bradshaw (1977) report that music processing involves the whole brain: both cerebral hemispheres. Gates and Bradshaw (1977) conclude that cerebral hemispheres are concerned with music perception and that no literal differences are apparent. Kellar and Bever (1980) report that: left and right hemispheres are simultaneously involved and musical stimuli are capable of eliciting both right and left ear superiority. Singing may be particularly valuable for working with expressive-receptive speech amongst children who have ASD because music stimulates the whole of the brain and singing can be embodied. In theory, musical structures can help children with ASD to improve their phonological memory and apprehension which can encourage vocalisation. Typically, vocalisation in ASD is limited to the production of spontaneous tone sequences but, hypothetically, sustained exposure to singing could stimulate the child's perception, brain, and memory. When stimulated sensually by the activity of singing, recalling a word from the song may excite the child and motivate participation. In such a scenario, a critical factor is transferability into speech.

Blood and Zatorre (2001) studied neural mechanisms and cerebral blood flow changes in response to subject-selected music that excited intensely pleasant experience of "chills". As vigour of these chills rises, cerebral blood flow increases and decreases were detected in brain areas considered to be related to reward, motivation, emotion, and arousal, such as (ventral striatum, midbrain, amygdala, orbitofrontal cortex, and ventral medial) prefrontal cortex (these brain structures are known to be active in response to other euphoria-inducing stimuli, such as food). With regard to the prefrontal cortex (PFC), Dolcos et al. (2004) suggest in their findings that the enhancing power of emotion on memory modulation is partly due to an increase of PFC-mediated strategic, semantic, and working memory functions. Thus, the role of PFC is significant in emotional evaluation and memory, and removes the effects of arousal and valence over PFC areas connected with unlike cognitive functions. Though the studies of Hallam (2010), and Blood and Zatorre (*ibid*) were not for children with ASD there is no reason to conclude that similar outcomes could not be plausible for children with ASD. Thus, various pre-composed songs/exercises that are pleasing, engaging and appealing for children with ASD could be used to support their VLD.

3.3.2 Music Interventions and Language Development in Neurotypical Children

Hallam (2010) explores the empirical evidence relating to the positive effects of engaging with music amongst others on concentration and language development of (typical) children and its implications for the quality of the teaching. However, he outlines that the positive effects are possible only if engagement with music is an enjoyable and rewarding experience. Papadimitropoulou (2020) found that reading ability and reading problems (for typical children) in the second grade of primary school seem to be prognosticated by the level of progress of the children's rhythmic competence in kindergarten. In other words, there seems to be a connection between rhythmic ability and future reading ability. Previously, Jayne M. Standley (2008) in her meta-analysis of 30 studies had found large benefits when contingent music is used to reinforce reading behaviour or when music activities incorporate specific reading skills matched to the needs of identified children. Although the children in Papadimitropoulou's and Standley's studies were typical and reading ability comes much later than verbal ability, the specific studies support my hypothesis of the possible value of singing (since there is always rhythm in the singing) for VLD (since verbal ability is a requisite to reading ability) for children with ASD.

3.3.3 Singing Interventions and Language Development in Patients with Non-fluent Aphasia

Zhang et al. (2022) went through a systematic review and analysis of 39 clinical trials and case studies that studied Melodic Intonation Therapy (MIT) on non-fluent aphasia after stroke. MIT is a highly imitative speech therapy technique based on singing that engages an auditory-motor mapping network as well as sensorimotor feedback regions through the association of hand tapping and intoned vocal output. They argue that because MIT requires personalised and numerous intervention sessions, language assessment scales are the most practical and convenient method of assessment. From the existing evidence of those 39 clinical trials and case studies, MIT was found to be effective and have positive results in the scales testing. However, they also found that, similar to my research, there is a matter of concern in the future to secure that both the request for sample size and long-term intervention (of MRI detection) can be reached. That is because most of the samples of those 39 clinical studies involved six participants. Although there were four that could address the minimum number for statistical significance, there was no long-term intervention for comparison in order for the cumulative effect to be detected making the one-time immediate effect insufficient.

3.3.4 Music Interventions in Neurotypical Children and Children with ASD

Thaut (1987) reports that: children presenting with ASD appeared to prefer musical stimulus to visual stimulus when compared with children without ASD; although Thaut's report had insufficient statistical significance, the study reports that children with ASD showed more motor reactions during periods of music than children without ASD, and that children with ASD appeared to listen to music longer than their peers without ASD. Thaut (1988) compared children with ASD and their peers without ASD and discovered that children with ASD produced spontaneous tone sequences almost as well as children without ASD and significantly better than a control group of mentally retarded children. Thereby, music apparently offers potential for learning development, perhaps especially amongst children with ASD and language within this population, in particular, has pronounced need for development (this project focuses solely upon VLD). Previously, Blackstock Edward (1978) reported that when children with ASD and neurotypical children were asked to choose an option between musical and verbal content, children with ASD chose music, while neurotypical children had no preferred choice. In addition, children with ASD listened to both types of content mainly with the left ear. Comparatively, neurotypical children showed a tendency to listen more frequently to music with the left ear whereas they listened to verbal content with the right ear.

Schwartzberg and Silverman (2018) studied the effects of presentation style and musical elements on the sequential working memory of individuals with and without ASD. Memory is important to VLD, for example, the need to recall words. However, Schwartzberg and Silverman (*ibid*) focused on comparing a live presentation style versus a pre-recorded presentation style. Regarding research question one, which was on presentation style, live versus recorded, found that participants demonstrated a significantly more accurate recall during the live presentation. This was encouraging for my research because I was always present and interacting with the children as they learned verbal language in my project. Regarding research question two, which was the musical element, they compared rhythm versus melody but found no significant recall difference between the melodic and rhythmic musical elements. However, mean recall for the melodic element tended to be slightly higher compared to the rhythmic element. Of more relevance to my research is their research question three, which was their between-group comparison (*ibid*), ASD versus NT (neuro–typical). Participants in the NT group demonstrated a significantly higher mean recall than the participants with ASD. However, their findings are questionable in relation to sampling and distribution. Particularly, of the 29 participants with ASD, the ages of the participants ranged from 9 to 21 years with a mean age of 15.69 years. A convenience sample was utilised for the NT participants (n=30). NT participants were university students enrolled in an undergraduate Introduction to Music Therapy course offered at an Upper Midwest University. Although exact ages for the NT participants were not obtained, participants' ages ranged from 18 to 22. Therefore, there was considerable discrepancy in the age distribution (9–21yrs for ASD and 18–22yrs for NT). Moreover, there was considerable discrepancy in education level because the ASD participants were school students whereas the NT participants were university students. In my research, the age range is 5–11 years, and all participants are diagnosed with ASD.

In learning, comparisons of presentation style are a subject of research. Paivo's (1991) 'Dual Coding Theory' asserts that learning occurs best when information is presented and received both visually and verbally. Similar to Schwartzberg and Silverman (2018), Paivo (1991) compared live instruction with pre-recorded instruction and found that dual coding was potentially distracting in pre-recorded instruction. Significantly, participants appeared to use the auditory cue (musical prompt) as a mnemonic device (Thaut, et al. 2005; Thaut, et al. 2014) to recall the information being shown to them. An example of this was observed when many participants sang or hummed the melodic or rhythmic motif as they placed their picture cards on their scoring sheet. This is supportive of the use of the auditory cue of (my) singing in my research intervention as a mnemonic device that supports learning and a medium that could improve VLD. Also, Limb (2006) and Schon et al. (2010) noted right frontal stimulation during song in both autistic and control subjects and that supports prior mentioned MRI observations using both song and music stimuli.

3.3.5 Verbal (Receptive and Expressive) Language Development in Children with ASD

Children with ASD have language deficiency and expressive-receptive speech is missing or minimal; this characteristic alone excludes such children from much social interaction and often from inclusive education in Greece. There is evidence in studies that many children with ASD (Luyster et al., 2008; Mitchell et al., 2006; Kjelgaard and Tager-Flusberg 2001; Boucher, J. 2012), especially during the preschool and toddler years (Ellis Weismer et al., 2010**;** Hundry et al., 2010; Volden et al., 2011), characteristically have an atypical developmental profile resulting in higher expressive over receptive language. These findings are in agreement with Charman et al. (2003), who found that 134 preschool children with ASD had, to a great extent, retardation in vocabulary, with receptive vocabulary weakened to a larger degree than expressive vocabulary. Kover Sara et al. (2013) found that boys with ASD experience delays in receptive vocabulary pertinent to age and nonverbal comprehension and even though receptive vocabulary was found to fall behind as expressive vocabulary measures increased, surprisingly this judgement held no more after considering for nonverbal comprehension. Although Loucas et al. (2008) found in children with specific language impairment (SLI) that receptive language was less weakened than expressive, he also found that in 9- to 14-year-olds with both ASD and impaired language the receptive language precedence over expressive language did not exist.

The above studies support that some preschoolers with ASD, as they grow up, enact an expressive advance earlier in growth and a receptive advance later on. Nevertheless, Longard et al. (2017) found in their study that the difference seems to be very small in the first three years of life. Specifically, they found in their study 33% of HR (High Risk later diagnosed with ASD) children were in a descending expressive language pattern and 44% were in the descending receptive language pattern during the first three years of life compared to a LR (Low Risk) control group. Interestingly in their findings there was a strong relationship between the early developmental patterns of expressive and receptive language abilities. Specifically, they found that expressive and receptive language patterns were so closely related that nearly all children in the descending expressive, as well as receptive language patterns, could be found in both, and this correlation was also seen across HR-ASD siblings.

Kwok et al. (2015) in their meta-analysis study of 74, presented equally impaired receptive and expressive language skills for children and youth with ASD. They assert, though, that some unique children with ASD may have an expressive advance compared to receptive language profile. However, this profile is not typical enough to be a valuable indication of ASD. They conclude with a possibility of a difference at the level of grammar and syntax between expressive and receptive language requiring further research. It is important to note that different language measures could account for inconsistency in the findings across studies of expressive and receptive language development in children with ASD and another the age of children with ASD.

3.3.6 Music Interventions (Music Therapy) and Communication-learning in Children with ASD

Lee (2006) notes that one can use music as an incentive and different teaching approach for specific abilities that may be more demanding for the children to succeed in if ordinary non-music teaching methods are used. Whipple (2004) in his meta-analysis comparing music to no-music contexts in supporting children and adolescents with ASD, pointed out a notable advantage of music intervention, involving: improved suitable social interactions, reduced improper, stereotypical, and self-arousal actions, advanced vocalisations, signals, and cognition, communicative behaviour and participation with others. Reviews of Kaplan and Steele (2005) and Wigram and Gold (2006) have since also described constant and great advancements in communicative actions and receptiveness of feelings as a result of music interventions.

Srinivasan and Bhat (2013) state that animated music interventions that highlight engagement by way of singing, music construction, and arranged rhythmical activities must be encouraged in contrast to submissive listening. Srinivasan and Bhat (*ibid*) are of the opinion that various creative, incorporated rhythm-developed interventions based on singing, music-devising, joint effort, and interactive synchrony (e.g. pace and rhythm during social interactions) can be useful to decrease the main societal communicating deficiencies and conceptus-motor and developmental coexisting disorders of children with ASD. Brownell (2002) investigated the effect of a musical presentation of social story information on the behaviours of four students with autism. A unique social story was created for each student that addressed a current behavioural goal. Subsequently, original music was composed using the text of the social story as lyrics. Results suggested that the use of a musically adapted version of social stories is an effective and viable treatment option for modifying behaviours with this population.

Zhi-Min Shi et al. (2016, p. 140) found that ‘Autistic children have been found to possess an even higher ability to mimic music than some normal children with musical talent’ and they cite (*ibid*) that ‘the acoustic waves of music act on the brain's limbic system and reticular formation of the brainstem and thereby, improve the excitability of nerve cells’. They used six research articles from Chinese publications to examine the significance of music therapy on mood, behaviour, language, and social skills in 300 children with autism aged 2–7 years old. The outcomes of this meta-analysis reported that all 300 children showed development in mood, behaviour, language, and social skills. However, Zhi-Min Shi, et al. (*ibid*) are critical of the research on which they base their meta-analysis, reporting that Randomised Control Trials did not cite specific randomisation and configuration of control methods, and only two stated the precise number of withdrawals.

3.3.7 Singing and Learning in Children with ASD

The study of Fong and Lee (2012) verifies Whipple's (2004) theory that music practices are effective for people with ASD. Their case study showed that music intervention improves the individual's suitable communication abilities and that singing grows the individual's memory ability, helps them apprehend turn taking and also increases their ability to mimic. In my research, I am specifically seeking to use singing to support the children to learn verbal language and, in my research, the children all have ASD. Children with ASD typically find learning verbal language highly challenging; therefore, in both aspects, Lee's (2006) writing and Fong and Lee 's (2012) case studies are encouraging for a positive finding in my hypothesis.

The study of Kern, et al. (2007) assessed the changes in two young children with ASD from one by one composed songs on the individual behaviors. Their research was concerned with the morning entry routine which involves exchanging greetings on the way into the classroom for inclusive education. A music therapist first composed a song corresponding to the specific steps of the morning greeting routine, separately for each child, and then she/he informed the children's teachers to sing those songs at the time of that routine. The research method in their work is 'a single subject withdrawal design' *(ibid*) so there is no comparison with other children but each participant is compared with self, looking for changes in behaviour attributable to the intervention. Kern, et al. (2007) report that each of those modified songs supported the children in walking into the classroom, greeting the teacher and/or peers and occupying themselves in play. When the song was used for greeting, for one of the child participants, the number of peers who greeted him was also measured and rose. The findings suggest that singing may help social communication but there are evident limitations in the study apparent in the size of the participant cohort, inconsistent use of measurements, and the attribution of meaning which is based on the presumption that the intervention caused the change in behaviour and that mimicry does not sufficiently explain it. In my research, I use Vogindroukas et al.'s (2009) TRELA which deals with the problem of mimicry by substituting words so that the vocabulary used for testing VLD is not the same as the vocabulary used for developing verbal language ability.

Pasiali (2004) prescribes 'therapeutic songs' for the regaining of social skills. In her research there were three children with ASD. Pasiali (*ibid*) set the instructions to the tune of a favourite song of the child, aimed at the modification of a behaviour that was deemed undesirable by the parents. This research was informed by the emergent practice of 'Social Stories' which is a special education approach to modifying problematic behaviours. Pasiali (*ibid*) reports that songs that give directives are a practicable intervention with children who have ASD. Although this research indicates prospects for training compliance, it is insufficient for developing verbal language. Comparatively, Vaiouli et al.' s (2015) research is more promising with regard to the developmental intentions of my research and I attribute this to engagement. In their research, Vaiouli et al. (*ibid*) used participatory music improvisation to engage three young children with autism in a kindergarten classroom. By comparison with baselines, the researchers evaluate focus on faces, response to joint attention, and initiation of joint attention and discovered that all children improved in joint attention and actions of social engagement. Attention is important for the development of verbal language because the children need to be attentive to what they are learning. The finding of this research that music improves social engagement is also prospectively very important in my research because the *DSM-V* redefines the issue of language in 'ASD' as 'deficits in social communication' (Widiger, 2013) and thus they are interconnected in a supplementary way.

3.3.8 Music Interventions and Verbal Language Development in Children with ASD

As stated by Aldridge (1995), who directed the course of a pilot study in the remedy intervention of children with developmental delay, music therapy is a method that can promote important improvements in speech capability and social skills, especially in children with ASD. Wibke Groß et al./Linden and Ostermann (2010) observed that music therapy can have a positive impact on basic aspects of speech advancement, i.e. significant improvements in memory relating to phonology and the children's conception of sentences for children with developmental speech disability.

3.3.9 Singing and Reading Language Development in Children with ASD

Specifically in relation to singing and reading advances in children with ASD, Porter (2021) in his meta-synthesis of qualitative research outlines the significant strengths of using singing activities in early literacy development and how they have advanced word reading practices specifically for children with ASD. Also, Kelly (in Porter, 2021) argues that singing is one musical therapy that can be used to advance reading capabilities in children with several learning disabilities.

3.3.10 Singing and Verbal Language Development in Children with ASD

Oldfield (2006) in her work has seen a number of children with autism who sing rather than speak and she wrote that the reliable structure of amicable children's songs will in many cases be an approach encouraging children to vocalise. In her case studies, a child acknowledged some tunes and at times finished the songs by singing the last word. Another child brought vocal sounds to his musical dialogues and vocalized to himself when he was playing with toys at nursery or on his own. Miller and Toca (1979, cited by Oldfield, 2006, p. 90) concluded on a three-year-old boy with autism who was encouraged to develop language through an adjusted structure of melodic intonation therapy that many forms of vocalisations and syllables and sung words should be creatively invited.

Molnar-Szakacs et al. (2009) believe that because children with ASD feel safe and secure in repetitive patterns, the foreseeable and repeated structure of musical sounds could meet the requirements of that purpose. They argue that the Mirror Neuron System (MNS) could become efficiently activated for children with ASD with participation, involvement and familiarity with these musical patterns, musical simulation and coordination. That efficient engagement of MNS could shift the positive reception of musical sound patterns to the positive reception of the person making them, who behaves in expected, well-known ways that are reassuring and friendly rather than puzzling (Molnar-Szakacs and Overy, 2006). The role of MNS has also been connected with activation of cognitive functions such as speech and language (Restle et al., 2012; Rogers et al., 2014; Nuttall et al., 2018). Their bibliographical study is of great pertinence to my research since they conclude that forms of music behaviours that take place simply and have developed as humans have evolved, such as attaining knowledge of a song through mimicry, are engaging and will be the most beneficial to prosocial behaviours. In contrast those (music behaviours) that have developed as social inventions such as learning to play an instrument from notation will be less beneficial for education and therapy value.

Yan et al. (2021) studied the improvement of lexical tone production in Mandarin low verbal and nonverbal children with ASD. They used Auditory-Motor Mapping Training (AMMT) treatment sessions for fifteen Mandarin children who were singing (intoning) and tapping the target words via an application and fifteen more participants who received control (non ATMM) treatment sessions. The results are promising for the speech production of children with ASD since the AMMT approach accelerated more effectively the rate of lexical tone and word learning of the Mandarin low verbal and nonverbal children with ASD than of the control participants. This research study is of great pertinence to my study not only because it also used singing in the treatment sessions and an application (Sibelius in my study) but because of the more effective results among the participants who used that treatment. The low verbal participants showed higher improvement compared to the nonverbal participants and that is something that will be discussed in Chapter Six in relation to my study.

On the same path is the research of Chenausky et al. (2017) who also used AMMT not only for a paired minimally verbal child with ASD but also for a paired more verbal child with ASD. All four paired participants received 25 sessions of intervention and the two matched who did not receive an intonation based (AMMT) treatment received Speech Repetition Therapy (SRT). Again the results were promising for the production of spoken language both for the minimally verbal children with ASD as well as the more verbal child with ASD. Although they found a significant effect in favour of AMMT treatment participants (especially for correct use of syllables and consonants, and for correct use of vowels for the more verbal pair), it is notable that there were only two AMMT treatment participants (one minimally verbal and one more verbal child with ASD). In my research there were participants from different verbal language stages and this is something that will also be discussed in Chapter Six. Slightly different research was conducted by Chenausky et al. (2016) with 23 minimally verbal children with ASD, seven of whom were paired and for whom the results were also promising for teaching spoken language in children with ASD (see Discussion in Chapter Six).

The AMMT treatment was initially developed for nonverbal and minimally verbal children with ASD by Wan et al. (2011) whose objective was to forward speech production by using intonation and bimanual motor activities, specifically the use of a pair of drums. In an AMMT session through intensive repetition, the introduced target words or phrases were at the same time intoned and tapped on the tuned drums (drum tuned to a fixed pitch, one at C4 or 261.626 Hz, and the other at E^{b} or 311.127 Hz, see Discussion in Chapter Six). In their study, they aimed to give "proof of concept" for AMMT. Six nonverbal or minimally verbal children with ASD participated five times per week in 40 AMMT sessions. During the baseline and the treatment period, and similarly to my research design, assessments were conducted periodically (specifically after sessions 10, 15, 20, 25, 30, 35, and 40). However, my research design had fewer sessions (15 sessions for each of the 15 participants, once per week, in comparison to 40 sessions five times per week) and there was a set of 15 items consisting of objects and words or phrases linked to the children's daily activities. Similarly to my research the children were led through different steps: from listening, to production together and simultaneously, to production assisted to some degree, to instant repetition and eventually to producing the aimed word/phrase by themselves (unaccompanied). However, in my research those steps happened in a more natural way, with the researcher giving the freedom and time to each child to follow his/her own pace and the researcher following that pace. The use of Boardmaker pictures (Mayer-Johnson Inc., Solana Beach, CA, 1997) as visual cues to facilitate the AMMT is an approach that was not taken in my research design. The researchers came to the conclusion that the AMMT holds promise for the acquisition and development of expressive language in children with ASD since all children (who had no or minimal verbal output before the treatment) demonstrated notable progress in the articulation of words and phrases, and these were not learned during intervention sessions.

Lai et al. (2012) showed that the operating neural systems in the brain that elaborate speech and song were involved more and in a more efficient way for song than for speech in children with ASD and estimations of systemic nerve pathways connected with these activities were not distinct from controls. The researchers combined MRI functional connectivity and Diffusion Tensor Imaging (DTI) to investigate the neural systems that are sensitive to language and music (specifically song) in low functioning children with ASD and children without ASD of the same age in order to examine the contradiction between deficient language and maintained music activities. In the study, 36 children with ASD took part (twelve of whom were imaged while alert and 27 of whom received MRI assessment under light propofol sedation for medical purposes, after parental consent) and 21 typically developing children. Both frontal and temporal -parietal regions are known to be engaged in both language and music process in typical participants (Koelsch et al., 2002; Brown et al., 2006; Limb, 2006; Schon et al., 2010; Patel, 2011). Lai et al. (ibid) stated there were no differences in parent valuation of music liking in the ASD group contrary to language deficiency. This agrees with a prior report (Boso et al., 2009) that shows no difference between low-functioning participants with ASD and control participants in their liking for harmonious and enjoyable musical stimulations. Similarly, although there was reduced speech activity in the neural positions/places in participants with ASD, the song stimulus effected an extended activation of the left inferior frontal gyrus as well as extended frontal-posterior functional association comparable to speech stimulation. The findings of this study in low-functioning participants with ASD are in agreement with the outcomes of another imaging study in high-functioning participants with ASD (Caria et al., 2011) and control participants, which again during music stimulus revealed similar activation in the frontal (left inferior frontal gyrus involved) and temporal regions. All these findings confirm preserved music and song functioning in participants with ASD and specifically decreased and increased activation with regard to speech and song stimuli defined as in the order given.

The results of both these studies (Lai et al., 2012; Caria et al., 2011) give a supportive basis to the explanation of the results of my research since all ASD participants who had verbal singing exercises in my research progressed more in comparison to the participants who did verbal exercises only. The results in the above-mentioned research were similar for both low- (Lai et al., 2012), and high-functioning participants (Caria et al., 2011) with ASD. It remains to be discussed in Chapter Six of my study whether there was a big difference in the progress of ASD participants who were at a low VLD stage and those who were at a more advanced level not only in comparison to the above two research studies, and Chenausky et al. (2017) and Wan et al., (2011) but alongside Yan et al.'s (2021) research, where the low verbal participants showed higher improvement compared to the nonverbal, and if so try to understand that difference. It is also of great importance to know and discuss (in Chapter Six) whether those specific neural areas that are activated through song are also involved in the learning process by examining any correlation in children with ASD of the degree in singing participation with the degree of progress in the VLD.

3.4 Summary

European Disability Strategy 2021–2030 promotes an educational policy of equal opportunities for the participation, and learning of all students, including those with disabilities. This third chapter was dedicated to reviewing important research and theories that contribute to theoretical understanding of how singing may be valuable for the VLD of children with ASD. It was not specific to Greek children nor to the specific age range of the child participants in my primary research study. However, it sought to inform the original contribution to knowledge about how singing could, theoretically, be of value for developing the verbal language abilities of the children aged 5–11yrs who will participate in my study. In particular, the discussion within this chapter has identified how a playful fun experience of learning by doing, specifically by singing, adjusted to each child's stage of language development may enhance the language development of Greek children with ASD aged 5–11 yrs. Before discussing, summarising and concluding this thesis, the next two chapters, Chapters Four and Five, describe the primary research, present analysis of the primary research data, and evaluative discussion of the significance of those findings.

CHAPTER FOUR: ASD – SINGING FOR VERBAL LANGUAGE DEVELOPMENT I

4.1 Overview

The purpose of this chapter is to describe the primary research, present analysis of the primary research data, and evaluative discussion of the significance of those findings. To achieve this purpose, Chapter Four is structured in eight sections, including this first section that provides a brief overview of this fourth chapter. The second section presents the overall findings of the study. Sections Three to Six include some subsections and each discusses comparison of achievements between paired participants at VLD levels 1–5. The seventh section examines the receptive and expressive language development of the paired participants. The last section gives a summary of this chapter.

4.2 Findings of the Study

Overall, this research reports a positive finding – that, given the limitations of the study, singing could be valuable for the VLD of the participant cohort who are Greek children diagnosed with ASD and aged 5–11yrs.

Please note that rounding up or down was used for the calculation of overall scores, for instance 0.5 or more = 1; 1.4 or less = 1 for practical reasons and in order to have fewer figures. In the tables that follow, readers will see bracketed numbers ({ }); this indicates that three participants (P01, P09, and P18) graduated to the next level. I'm not adding the progress of two different levels (I can't combine the scores) because each level measures different things and has different scoring. Thus, if one of the paired participants moves to the next level and the other does not, they are not paired in the next level. The TRELA scores were not recalculated to percentages or otherwise normalised because here is a different scale in each level measuring different things and by normalising them and recalculated them to percentages I would have percentages in all levels and someone would mislead to connect and compare the scores from one level to another. The five levels measure different things and I retained the method measurement of scales the way the practitioner made the Trela test that was designed for practice and not for research. There would be no advantage on recalculating them to percentages except that people who don't understand the Trela test would be easier to address it yet that would make them less sensitive to the actual scoring. There is no bias or any significant changes in the results by using percentages although percentages may be clearer for the readers who are not used to the Trela and understood by practitioners who can understand eligibility would be lost if I turned it to percentages. In the following Table 4.0 one can see the age of the participants in each level and group and in Table 4.1 one can see the progress across all participants, groups and levels.

Participant Age in Group and Level					
TRELA Levels	1	2	3	4	5
SiG (Singing Group – 10 Participants)	P02 5.5 yrs P07 6 yrs P09 7 yrs P13 9 yrs P16 5 yrs	P14 5.5 yrs {P09} 7 yrs	P18 11yrs	P03 10 yrs {P18} 11 yrs	P04 6 yrs P08 5.5 yrs
SpG (Speaking Group – 5 Participants)	P11 5.5 yrs P17 11 yrs	-	P01 8 yrs	{P01} 8 yrs	P05 9 yrs P12 7.5 yrs

Table 4.0 Table Showing Participant Age in Group and Level

Progress across all Participants, Groups, and Levels						
Participant Count	1	2	3	4	5	Progress
SiG - Level 1	22 (P16)	17 (P09)	21 (P02)	16 (P07)	20 (P13)	96
SiG - Level 2	11 (P14)	2 {P09}				13
SiG - Level 3	10 (P18)					10
SiG - Level 4	10 (P03)	2 {P18}				12
SiG - Level 5	7 (P04)	17 (P08)				24
SpG - Level 1	10 (P17)	6 (P11)				16
SpG - Level 2						0
SpG - Level 3	6 (P01)					6
SpG - Level 4	2 {P01}					2
SpG - Level 5	3 (P12)	6 (P05)				9

Table 4.1 Table Comparing Progress of All Participants

Specifically, Level 1 of SiG had the highest progress of 97 points because it was the level with the most participants (5) in comparison to the other levels but also because it had the participants who made the greatest progress: P16 progressed 22 points, P09 progressed 18 points, P02 progressed 21 points, P07 progressed 16 points and P13 progressed 20 points. The progress of Level 1 in the SpG was 16 points and there were only two participants in that level, P17, who progressed 10 points and P11, who progressed 6 points. At Level 1 the lowest progress of a participant in the SiG was 16 points whereas the highest progress in the SpG in the same level was 10 points. At Level 2 there was only one participant in the SiG, P14, who progressed 11 points, and adding the 2 progress points of P09, who came from Level 1, that makes a total of 13 points of progress in that level. There were no participants at Level 2 of the SpG. The progress of Level 3 in the SiG was that of the only participant, P18, which was 10 points, and the progress of Level 3 in the SpG was again that of the only participant, P01, which was 6 points (4 points less than that of the SiG). The progress of Level 4 in the SiG was that of the 10 points of P03, and adding the 2 progress points of P18 who came from Level 3 that makes a total of 12 points of progress in that level. There were no participants at Level 4 of the SpG apart from P01 who came from Level 3 and whose progress was 2 points in that level. The progress for Level 5 in the SiG was 24 points; P04 progressed 7 points and P08 progressed 17 points. The progress for Level 5 in the SpG was 9 points (15 points less than that for the SiG); P12 progressed 3 points and P05 progressed 6 points.

In Chapter Six we will discuss three more tables from this chapter. Specifically, Table 4.4 comparing the progress of paired participants in the SiG and SpG, Table 4.5 comparing the progress of paired participants in the SiG and SpG but not including two scores each for P01 and P18 (discounting Graduation), and Table 4.6 comparing the progress of paired participants in the SiG and SpG but not including two scores each for P01 and P18 (discounting the Starting Level). Those specific tables will be discussed in relation to the progress in VLD and the age of those participants. For example, SiG participant P16, aged 5, had not only much more progress than his paired SpG participant but the highest progress of all the paired participants.

The sum total of overall progress for all the child participants was good, by taking into account the condition of ASD, and in relation to practitioner expectations and research on any expected improvement. Overall progress with VLD of the children in the SiG is practically valuable and agrees (see Chapter Three) with the findings of previous research in the field (Yan et al., 2021; Chenausky, et al. 2017; Chenausky, et al. 2016; Lai et al. 2012; Wan et al., 2011). The finding cannot have statistical significance due to the very small cohort of participants (fifteen), as discussed in Section 4.2 para 4. That means the finding cannot be (safely) generalised in answer to my hypothesis that: *singing is valuable to the VLD of Greek Children who are diagnosed with ASD and aged between 5 and 11yrs.* However, the size of the cohort lends depth, richness, and rigour to the internal validity (qualitative measures) of this study and combined with the positive outcomes provide rationale for continuing and future research into this phenomenon; it is strongly indicative of value and hence worth more research.

4.3 Comparative Evaluation of Paired Participants at Level 1

Comparative evaluation was conducted by pairing participants and assigning one to the SiG and the other to the SpG. Considering those paired participants whose starting level was Level 1, the combined progress of the two Level 1 participants in the SiG is 40 points whereas the combined progress of the two Level 1 participants in the SpG is 16 points. At Level 1, VLD progress is more than double for the cohort of participants who used singing for VLD. Moreover, one participant of the SiG progressed through Level 1 to Level 2 representing a level of progress that is not matched by either participant of the SpG, although one SpG participant completed Level 1 in the final test. From my 15 years of experience as a practitioner with children with ASD, progressing from Level 1 to Level 2 is quite remarkable for any child with ASD. Anyone working with children with ASD knows that the lower the language development of the child the more difficult to make progress in that field and that SiG participant excelled.

4.3.1 Comparative Evaluation of Paired Participants P16 (SiG) and P17 (SpG)

Specifically, at Level 1, SiG participant 16 progressed 22 points whereas the paired participant in the SpG, participant 17, progressed by 10 points. Participant 16 who did VLD exercises through singing made more than twice as much progress as participant 17 who did ordinary VLD exercises.

Baseline assessment sessions

Paired SpG P17:

For the baseline assessment, participant 17 (SpG) scored 56/78, 59/78, and 52/78. It was noted in the Observational Charts that participant 17 was grumbling at the beginning of the three baseline assessment sessions. In the first and second baseline assessment sessions her/his mother entered the room but soon she left (in the first, I said she needed the toilet) and then in the second baseline assessment session when I spoke to the child in a whisper she/he calmed down. In the third baseline assessment session her/his mother gave me smarties and told me to give them to her/him in order to calm her/him down and co-operate (I gave her/him three smarties in that session). For this child a reward-motivational strategy was probably applied to her/his learning style as discussed later on Chapter Six. The Parent External Factor Reports indicated no influence over any of these three baseline scores. Based on mean average, the starting point for participant 17 (SpG) was calculated as 56/78.

Paired SiG P16:

For the baseline assessment, participant 16 (SiG) scored 32/78, 66/78, and 60/78. As was noted in the Observational Charts, the child was not paying any attention and had no concentration at all during the first baseline assessment session. In the second baseline assessment session she/he was not sitting and we had to stop the session and repeat the session another time/ arrange another session. She/he co-operated at the end and spoke some words only after her/his mother gave me a kinder sweet and told me to show it to her/him. In the third and fourth baseline assessment sessions her/his mother had brought smarties and told me to give them to her/him in order to get her/him to speak the words. As for participant 17, for this participant also a reward-motivational strategy was probably applied to her/his learning style. The Parent External Factor Reports notified a matter expected to have a small positive influence over VLD in the first and second baseline scores (nothing in the third) so they do not help to explain the substantial difference between the first and second scores (32 and 66 respectively). The first low score being taken when the child had not fully settled into the environment probably explains the difference in results. The baseline doesn't reflect what the child was capable of and she/he could have done much better so in that light the implication of any conclusion that the child made big progress from the baseline in the first SpG is in doubt. Comparison with participant 17 (SpG) does substantiate this consideration because participant 17 did settle into the environment without any evident difficulties and the three scores are relatively consistent for participant 17. Based on mean average, the starting point for participant 16 (SiG) was calculated as 53/78. Had I discounted the first score as inaccurate, the baseline score would have been 63/78 which would nevertheless have confirmed the placement of participant 16 (SiG) at Level 1 but also accounted for nearly all of the difference in progress between participants 16 (SiG) and 17 (SpG). Singing would have made a very small (2 points) positive difference in progress between these paired participants.

First, second, third sessions and first TRELA test

Paired SiG P16:

It was noted in the Observational Charts that participant 16 (SiG) sang nearly all the words in the first three sessions of singing VLD exercises well; however, in the third session she/he did not sing so well as in the previous two. It was also noted in the Observational Chart of the first SpG that she/he was concentrating and she/he did well. Participant 16 (SiG) scored 69/78 in the first TRELA test which occurred after three sessions of singing VLD exercises – and the Parent External Factor Reports indicated no influence throughout this period. A score of 69 is quite a leap from 53 (the baseline) and potentially adds weight to consideration of discounting the first baseline assessment score. In any circumstance, 69 still represents the highest score this participant had achieved out of the four scores taken up to and including this first TRELA test.

Paired SpG P17:

It was noted in the Observational Charts that participant 17 (SpG) was very happy, playful, wanted hugs and spoke all the words (though a couple of them not clearly and properly) in the first three sessions of VLD exercises. It was also noted in the Observational Chart of the first test that she/he was very happy, wanted hugs and I let her stand during the test since it seemed to me that helped her to focus better. Participant 17 (SpG) scored 64/78 in the first TRELA test which occurred after three sessions of VLD exercises only – and the Parent External Factor Reports indicated no influence throughout this period. Participant 17 (SpG) progressed 8 points from their baseline score of 56, compared with participant 16 (SiG) who made twice as much progress (16 points). However, if 63 had been the baseline score of participant 16 (SiG) then the progress made at this stage by participant 16 would only have been 6 points. In this hypothetical case, there is no rational explanation as to why singing VLD exercises would limit progress compared with VLD exercises only but both participants' progress would be comparable (VLD exercises only showing a 2-point lead on singing). From this set of data, it is neither possible to confirm nor refute consideration of discounting the first baseline score, yet it seems it was well below the ability of the participant.

Third, fourth, fifth sessions and second TRELA test

Paired SiG P16:

In the Observational Charts it was noted that participant 16 (SiG) sang all the words melodically, yet some of them were not clear, in the fourth and fifth sessions of singing VLD exercises. Moreover, in the fifth session she/he sang three words in tune and simultaneously with me. In the sixth session of singing VLD exercises she/he sang all the words melodically on her/his own (after listening to the melodies) and simultaneously with me (not after listening to the melodies). In the second test it was noted that participant 16 at the beginning was tense and suddenly she/he left the room but once I talked to her/him softly she/he entered the room again (her/his mother also entered but she left the room straight away). For every correct answer we were doing "Give me five!" and I was saying "Bravo!" to her/him. During the test she/he gave me a hug and at the end of the test she/he gave me a kiss on the cheek (!). I think she/he was very stressed at the beginning and then she/he was very happy and excited that she/he was doing well. Participant 16 (SiG) scored 71/78 in the second TRELA test which occurred after another three sessions of singing VLD exercises – and the Parent External Factor Reports indicated no influence for the fourth session nor for the second TRELA test but a small positive influence for the fifth and sixth sessions. A score of 71, however, represents progress from the first TRELA score of 69 and supports the theory that singing VLD exercises may be valuable. My observations support a theory of linear progress in the narrative of rapid progress followed by little progress (that is a score sequence of 53, 69, & 71).

Paired SpG P17:

In the Observational Charts it was noted that participant 17 (SpG) spoke all the words again in the fourth, fifth and sixth sessions of VLD exercises; however, she/he couldn't pronounce the consonant v (in Greek) properly and she/he was also omitting the consonant r. In the fourth session she/he hugged me and kissed me a couple of times. She/he also hugged me in the fifth session of VLD exercises and was very playful. In the second TRELA test it was noted that she/he was co-operative and concentrated. Participant 17 (SpG) scored 68/78 in the second TRELA test which occurred after another three sessions of VLD exercises only – and the Parent External Factor Reports indicated no influence throughout this period. Participant 17 (SpG) progressed 4 points from the first TRELA score of 64, compared with participant 16 (SiG) who progressed 2 points from the first TRELA score of 69. Comparison between these paired participants may suggest that singing is not so beneficial to VLD (whether the first baseline score of the SiG participant 16 is discounted or not); however, as written above, little progress is expected when working with children with ASD.

Seventh, eighth, ninth sessions and third TRELA test

Paired SiG P16:

It was noted in the Observational Charts that participant 16 (SiG) sang all the words melodically on her/his own (after listening to the melodies) and simultaneously with me (not after listening to the melodies) in the seventh session of singing VLD exercises. In the eighth session she/he was also very good; she/he sang all the words in a better tune than before and two out of the four times simultaneously with me. She/he kissed me suddenly on the cheek and she/he wanted to sit on my knees (I didn't let her/him). She/he was also very good and co-operative in the ninth session, she/he sang all the words and in good tune. It was noted in the third TRELA test that although she/he stood up a few times (and was sitting again once I was telling her/him to sit down), she/he was co-operative and concentrated (although she/he wanted to "play" with the objects). Participant 16 (SiG) scored 75/78 in the third TRELA test which occurred after another three sessions of singing VLD exercises – and the Parent External Factor Reports indicated a small positive influence for the seventh and eighth sessions and for the TRELA test and no influence for the ninth session. Participant 16 progressed 4 points from the second TRELA score of 71.

Paired SpG 17:

It was noted in the Observational Charts that participant 17 (SpG) spoke all the words again in the seventh session of VLD exercises; however, she/he didn't speak a couple of consonants clearly again. In the beginning of that session, she/he was tense but as the time passed, she/he was doing better and becoming more co-operative. In the eighth session she/he was restless (couldn't sit) and was not very co-operative. She/he spoke all the words one time, however not clearly again (omitting a few consonants) and some of them quietly. She/he also spoke all the words (not clearly though few consonants) in the ninth session. I let her/him take the items out of the bag before speaking the words and at the end I told her/him "let's tidy them up" and so she/he did. It was noted that in the third TRELA test she/he was not very co-operative and concentrated in the beginning; she/he was not seated and while giving the replies she/he was standing. Later in the session she/he sat and as time passed, she/he had a better focus and was replying quietly. Participant 17 (SpG) scored 71/78 in the third TRELA test which occurred after another three sessions of VLD exercises only – and the Parent External Factor Reports indicated no influence throughout this period. Participant 17 (SpG) progressed 3 points from the second TRELA score of 68, compared with participant 16 (SiG) who progressed 4 points from the second TRELA score of 71. At this stage, linear progress appears as a prospective characteristic pattern of this child's learning style (56, 64, 68, & 71) and this child's engagement in learning and stress levels are much more even.

Tenth, eleventh, twelfth sessions and fourth TRELA test

Paired SiG P16:

In the Observational Charts it was noted that participant 16 (SiG) sang all the words in the tenth session of singing VLD exercises although she/he was in a hurry. She/he did not say the letter r in a couple of words and in another case she/he substituted it with the letter l (Greek). She/he had a bit of a runny nose, she/he was leaning on me and was also taking my hand trying to put it behind her/his head to skim/caress her/him. In the eleventh session she/he was co-operative even though she/he stood up twice (but sat down after being asked by me to sit) and sang all the words, some of them two times and some of them three times out of the four times that they should be sung. She/he was struggling to say the letter l in a word but after many repetitions from me she/he managed to say it properly twice. It was also noted in the twelfth session of singing VLD exercises that she/he was not co-operative at the beginning and was standing up. After holding her/his hand in a calm way she/he was listening, she/he calmed down, co-operated, sang all the words and she/he hugged me three times (!). However, she/he substituted the letter r with the letter l in all the words. In the fourth TRELA test it was noted that she/was not very well, she/he seemed tired and half of the test was done with both of us sitting on the floor instead of the chairs. Participant 16 (SiG) scored 75/78 in the fourth TRELA test which occurred after another three sessions of singing VLD exercises – and the Parent External Factor Reports indicated no influence throughout this period. Participant 16 made no progress from the third TRELA score of 75. It could be interpreted that this score disputes the existence of a pattern of leaps followed by regression. It could be interpreted as a form of progress that this score does not continue the pattern of leaps followed by regression. Given the condition that the child was unwell and seemed tired in the fourth TRELA test a no progress scores comes as no surprise. Most substantively it confirms achievement at the uppermost end of Level 1.

Paired SpG P17:

In the Observational Charts it was noted that participant 17 (SpG) spoke all the words again in the tenth session of VLD exercises, however quietly, omitting the consonants v and r, not speaking a few more of the consonants clearly. She/he seemed restless and couldn't sit. In the eleventh and twelfth sessions she/he spoke all the words again, and she/he carried on omitting the consonants v and r and not speaking a few more very clearly. In the twelfth session I told her/him that I would let her/him hold the objects and she/he would tell me the words (and so she/he did). At the beginning of the fourth test o TRELA test it was noted that she/was tense and couldn't sit but later on she/he sat down after she/he was told that that it was going to be easy (although she/he stood up a couple of times). She/he seemed sleepy at the end of that test. Participant 17 (SpG) scored 64/78 in the fourth TRELA test which occurred after another three sessions of VLD exercises only – and the Parent External Factor Reports indicated no influence throughout this period. Participant 17 (SpG) regressed 7 points from the third TRELA score of 71 which disrupts a pattern of otherwise linear progress. Compared with participant 16 (SiG) who made steady progress followed by no progress it seems that the expectation of fluctuation applied to participant 17.

Thirteenth, fourteenth, fifteenth sessions and fifth TRELA test

Paired SiG P16:

It was noted in the Observational Charts that participant 16 (SiG) sang all the words in the thirteenth session of singing VLD exercises, some of them two and some three times out of the four times, although she/he was either substituting the letter r with l or removing it from the words. In the fourteenth session of singing VLD exercises she/he sang all the words very well, in tune, four times out of the four. The same happened in the fifteenth session of singing VLD exercises and again she/he either did not say the letter r in the words or she/he substituted it with the letter l. In that session she/he was impatient and fraught. It was noted in the Observational Charts that participant 16 (SiG) could not easily sit and concentrate in the fifth TRELA test. She/he seemed tired and she/he kissed and caressed my arm. Participant 16 (SiG) scored 75/78 in the fifth TRELA test which occurred after another three sessions of singing VLD exercises – and the Parent External Factor Reports indicated a small positive influence for the thirteenth session and for the TRELA test and a much better influence for the fourteenth and fifteenth sessions. Consideration of the cumulative value of these small and more substantial positive influences over progress could potentially explain participant 16's VLD improvements better than singing, casting the value of singing into doubt. However, participant 16 made no progress throughout this period (despite the notification of substantial positive influences over progress). In the first TRELA test, the Parent External Factor Report indicated no influence yet there was progress of 16 points. In the second TRELA test, the Parent External Factor Report indicated a small positive influence yet there was progress of 2 points. In the third TRELA test, the Parent External Factor Report indicated a small positive influence and there was a progress of 4 points. In the fourth TRELA test, the Parent External Factor Report indicated no influence and there was no progress. There being no correlation between the notification of Parent External Factor Reports and the findings of TRELA casts doubt on the reliability of the Parent External Factor Reports. As noted in the Observational Charts, it is of great interest that participant 16, who made the highest progress in VLD amongst all the participants in the intervention, also scored a very high score in emotional engagement, specifically 6 out of 7, in most sessions (see Chapter Six, Subsection 6.4.2).

Paired SpG P17:

As noted in the Observational Charts, participant 17 (SpG) had a runny nose and was grumbling in the thirteenth session of VLD exercises. She/he spoke all the words, however she/he substituted the consonant v with z and she/he omitted the letter r in a word and e in another. In the fourteenth session of VLD exercises although she/he was kinetic (could not sit) she/he spoke all the words. Nevertheless she/he substituted the letter v with z in a word again, and omitted the letter e in another (but when I outlined later the e she/he said it properly). Also, in another word she/he omitted the consonants cr (κρ in Greek) three times out of four and substituted the letter v with f in the same word. The fourth time she/he spoke that word she/he also omitted the v (together with cr all four times). In the fifteenth session of VLD exercises her/his mother told her/him that she/he would get a couple of smarties afterwards and in general participant 17 was co-operative in that session although she/he sort of jumped a little while speaking the words. Again she/he omitted the consonants cr and v in a (Greek) word and also omitted/didn't pronounce clearly the letter r in four words. It was noted in the Observational Charts that participant 17 (SpG) could not sit at the (very) beginning of the fifth TRELA test; however, a few minutes later she/he co-operated and as time went on she/he was becoming very co-operative. Participant 17 (SpG) scored 66/78 in the fifth TRELA test which occurred after another three sessions of VLD exercises only – and the Parent External Factor Reports indicated no influence throughout this period. Participant 17, however, progressed 2 points from the fourth TRELA score of 64. Despite the progress of participant 16 (SiG) having halted, while participant 17 (SpG) made small progress, cumulatively, this data set supports the hypothesis that singing could be valuable for VLD of children with ASD.

Level 1, Comparing Participants 16 and 17 (P16 & P17)							
TRELA	Baseline	Test 1	Test 2	Test 3	Test 4	Test 5	***Overall Progress***
SiG – P16	53	69	71	75	75	75	***22***
Cumulative Progress		*+ 16*	*+ 2*	*+ 4*	*0*	*0*	
SpG – P17	56	64	68	71	64	66	***10***
Cumulative Progress		*+ 8*	*+ 4*	*+ 3*	*- 7*	*+ 2*	

Table 4.2 Table Comparing the Progress of SiG P16 and SpG P17

4.3.2 Comparative Evaluation of Paired Participants P09 and P11

Additionally, at Level 1, SiG participant 09 progressed 18 points and progressed further into Level 2. For the sake of comparability, the progress of participant 09 at Level 2 is considered separately and factored separately into the overall analysis. That is because there is a categorical distinction of grading at each level of TRELA and different scoring. Thus, considering progress at Level 2 as a simple linear continuation of Level 1 is incorrect and could artificially inflate the findings of this Level 1 comparative analysis. The paired participant in the SpG, participant 11, progressed 6 points. Participant 09 who did VLD exercises by singing made three times as much progress as participant 11 who did ordinary VLD exercises.

Baseline assessment sessions

Paired SiG P09:

Both participants 09 (SiG) and 11 (SpG) had to do more than three baseline assessment sessions because they were firstly assessed at Level 2 (on their mother's suggestion) but then they were suitably assessed at Level 1. It was noted in the Observational Charts that participant 09 was not concentrating and paying attention in the first baseline assessment sessions but in the following ones she/he did concentrate and co-operate, apart from the third baseline assessment session where she/he had a runny nose, was coughing and was not paying attention. For the baseline assessment (excluding the scores of Level 2 since she/he could not reach the base score for that level), participant 09 (SiG) scored 57/78, 62/78, and 64/78. The Parent External Factor Reports indicated a small positive influence for the first and second baseline scores and much better influence for the third baseline score. However, improvement from the first to the second score is greater than improvement from the second to the third score, suggesting that influence from the Parent External Factor Reports does not weigh heavily on VLD for this participant. Based on mean average, the starting point for participant 09 (SiG) was calculated as 61/78.

Paired SpG P11:

As with participant 09 (SiG), participant 11 (SpG) was not concentrating in the first baseline assessment session. For some reason in the second she/he was saying "press the button to see the continuation". In the third baseline assessment session she/he concentrated well and co-operated even though she/he had something of a cold. In the fourth baseline assessment session her/his mother gave me some smarties to give her/him when she/he was not paying attention (one more child where the award-motivational strategy was applied in the learning). For the baseline assessment, participant 11 (SpG) scored 67/78, 73/78, and 76/78. The Parent External Factor Reports indicated much better influence for the first baseline score and a small positive influence for the other two baseline scores and it is plausible these influences can be seen in the scores. I calculated the starting point for participant 11 (SpG) as 72 (which is the mean average), thus she/he started with an advantage of 12 points compared to her/his paired SiG participant 09.

First, second, third sessions and first TRELA test

Paired SiG P09:

It was noted in the Observational Charts that participant 09 (SiG) sang two words in the first and second sessions of singing VLD exercises and in the third session she/he started to sing all the words somewhat melodically. It was also noted in the Observational Chart of the first test that she/he concentrated well. Participant 09 (SiG) scored 70/78 in the first TRELA test which occurred after three sessions of singing VLD exercises – and the Parent External Factor Reports indicated a small positive influence for the first and second sessions, a small negative influence for the third session, and no influence for the TRELA test. Compared with the baseline, 70 represents progress of 9 points.

Paired SpG P11:

It was noted in the Observational Charts that participant 11 (SpG) apart from one word (yoghurt) spoke all the words in the first session of VLD exercises. Nevertheless, there were a few words that she/he didn't speak properly, substituting some consonants and also omitting a vowel. In the second session she/he again spoke all the words apart from the word yoghurt and she/he seemed tired. In the third session it was noted that she/he spoke all the words apart from two (fork and pencil in Greek). She/he was not concentrating very well and she/he was speaking some of her own words (it was not possible to make sense of them). It was also noted in the Observational Chart of the first test that she/he was co-operative and I let her/him hold a doll while she/he was replying (she/he also spoke to the doll at times). Participant 11 (SpG) scored 72/78 in the first TRELA test which occurred after three sessions of VLD exercises only – and the Parent External Factor Reports indicated a small positive influence for the first and second sessions and for the TRELA test and a small negative influence for the third session. As the baseline starting point for participant 11 was 72, this score represents no progress. Compared to the 10 points of progress made by the paired SiG participant 09, this first stage comparison is indicative of the value that singing may have for VLD.

Fourth, fifth, sixth sessions and second TRELA test

Paired SiG P09:

In the Observational Charts it was noted that participant 09 (SiG) sang somewhat melodically the words and two of them in tune in the fourth session of singing VLD exercises, three of them in tune in the fifth session and four of them in tune in the sixth session of singing VLD exercises. Participant 09 (SiG) scored 73/78 in the second TRELA test which occurred after another three sessions of singing VLD exercises – and the Parent External Factor Reports indicated small positive influence for the fourth, and fifth sessions and the TRELA test and much better influence for the sixth session. Compared with the baseline, 73 represents cumulative progress of 12 points with 3 points of that progress attributable to three sessions of singing since the first TRELA test.

Paired SpG P11:

In the Observational Charts it was noted that participant 11 (SpG) spoke all the words in the fourth session of VLD exercises; however, in one of them she/he substituted the consonant v with a different consonant (Greek ð) and in another she/he substituted the consonants cr with p. She/he wanted to hold a doll during the session and she/he was also speaking to her. In the fifth session she/he was very kinetic; she/he kept standing up from her/his seat and I kept bringing her/him back (a couple of times with the motivation of smarties that her/his mother had suggested earlier). She/he spoke all the words and again she/he substituted the consonant v with the Greek ð in a word. In the sixth session of VLD exercises she/he spoke all the words again yet again she/he substituted the consonant v of a word with the Greek ð and in another the consonant k with p. She/he wanted to hold the doll again during the session. It was noted that in the second TRELA test, she/he was co-operative, was playing with the objects in a symbolic way, and in some cases it was taking her/him a couple of minutes to reply. Participant 11 (SpG) scored 76/78 in the second TRELA test which occurred after another three sessions of VLD exercises only – and the Parent External Factor Reports indicated a small positive influence throughout this period. Although, compared with the score of paired SiG participant 09, SpG participant 11 had a score that was 3 points higher, the cumulative progress of test group participant 09 was greater. The cumulative progress of SiG participant 09 was 12 points, compared with the cumulative progress of SpG participant 11 which was only 4 points. These 4 points of progress for SpG participant 11 are attributable to the three sessions of VLD exercises only since the first TRELA test. This second stage comparison supports the hypothesis that singing could be valuable to VLD because SiG participant 09's accumulative progress was three times the progress of SpG participant 11.

Seventh, eighth, ninth sessions and third TRELA test

Paired SiG P09:

In the Observational Charts it was noted that participant 09 (SiG) sang three words in tune in the seventh and eighth sessions of singing VLD exercises although she/he had a runny nose throughout the eighth session. In the ninth session she/he was co-operative, paying attention and sang all the words very well. She/he was also focused, co-operative and calm during the third TRELA test as noted in the Observational Chart. Participant 09 (SiG) scored 78/78 in the third TRELA test which occurred after another three sessions of singing VLD exercises – and the Parent External Factor Reports indicated a small positive influence for the eighth, and ninth sessions and for the TRELA test and much better influence for the seventh session. Compared with the baseline, 78 represents cumulative progress of 17 points with 5 points of that progress attributable to three sessions of singing since the second TRELA test. As noted in the Observational Charts, it is of great interest that participant 09, who made some of the highest progress in VLD amongst all the participants in the intervention, scored 6 out of 7 in emotional engagement in most intervention sessions (see Chapter Six, Subsection 6.4.2).

Paired SpG P11:

In the Observational Charts it was noted that participant 11 (SpG) both in the seventh and eighth sessions of VLD exercises spoke all the words but again she/he substituted the consonant v with the Greek δ, in another word the consonant k with p and again she/he wanted to hold the doll while speaking the words. In the ninth session she/he was very co-operative, she/he spoke all the words and after a few repetitions and reminding her/him of the smarties that her/his mother had suggested earlier she/he would get, managed to say the consonant v properly in the word (and not substitute it with another). She/he also firstly substituted the consonants kr of a word with pf, then she spoke the k properly yet she/he omitted the r. She/He was co-operative and focused well during the third TRELA test as noted in the observational chart (in the very beginning she/he asked me for one smartie). She/he wanted to hold the cards that I was showing to her/him and I told her/him for every card she/he must give me the answer then she/he could take it. Later on when I was asking the questions with the objects she/he wanted to hold (again) the doll. Participant 11 (SpG) scored 75/78 in the third TRELA test which occurred after another three sessions of VLD exercises only – and the Parent External Factor Reports indicated a small positive influence for the TRELA test but no other influence throughout this period. The cumulative progress of SpG participant 11 was only 3 points because during the three sessions of VLD exercises only (since the second TRELA test), participant 11 regressed 1 point. This third stage comparison continues to support the hypothesis that singing could be valuable to VLD. In this specific data set comparison of level of achievement, in-stage progress, and cumulative progress all show that singing could be beneficial.

The comparative analysis between these two participants concludes after the third TRELA test because having achieved 78/78, participant 09 of the SiG graduated to Level 2. However, the SpG participant (P11) was given a small advantage by consistent application of the procedure which stipulates five TRELA tests. Therefore, P11 had the opportunity to continue progressing. However, the participant could also have regressed – but did not (i.e. P11 did gain 3 points of advantage).

Tenth, eleventh, twelfth sessions and fourth TRELA test

Paired SpG P11:

In the Observational Charts it was noted that participant 11 (SpG) spoke all the words in the tenth, eleventh and twelfth sessions of VLD exercises; she/he substituted the consonants kr of a word with pf (in all those three sessions) again and the consonant v with the Greek δ. In the tenth and twelfth sessions, however, after repetitions and telling her/him to speak v like the v from another word (telling her/him that word) that she/he had spoken many times earlier she/he managed to speak it properly. She/he hugged me at the end of the tenth session. In the eleventh session she/he was calm, holding the doll again and speaking to her (at some point she/he wanted me to dress the doll and put her shoes on). In the twelfth session she/he also wanted to hold a small book apart from the doll and she/he was speaking words while holding them that made no sense to the researcher. In the fourth TRELA test it was noted that she/he was holding the doll during the whole session; she/he was replying to me by playing that the doll was replying and she/he wanted to play in a symbolic way with the doll, the small book and the cards that I was using. Participant 11 (SpG) scored 76/78 in the fourth TRELA test at Level 1 and the Parent External Factor Reports indicated no influence of the TRELA test but a small positive influence throughout the sessions. A score of 76 represents recovery of the 1 point of regression that participant 11 had shown in the third TRELA test.

Thirteenth, fourteenth, fifteenth sessions and fifth TRELA test

Paired SpG P11:

It was noted in the Observational Charts that participant 11 (SpG) was holding and speaking to the doll during the thirteenth, fourteenth and fifteenth sessions. Even though the first times (during those three sessions) she/he was substituting the consonant v with the Greek ð, later on I was emphasising the v and she/he managed to speak it properly in the thirteenth and fourteenth sessions. In the thirteenth session she/he also substituted the kr from a war with pf. In the fourteen session the first time she/he substituted the consonants kr with pf in a word, then she/he spoke the k properly but omitted the r, then she/he spoke the word with the kr properly, and the last time she/he substituted the kr again with pf. She/he didn't want to say three words and I reminded her/him of the smarties that her/his mother had suggested she/he would get if she/he would speak the words; thus, after that she/he spoke them. In the fifteenth session of VLD exercises she/he did not speak the letter r clearly in three words and she/he omitted it in another. Also, she/he either omitted the r in the word with consonants kr or she/he substituted the kr with pf. It was noted in the Observational Charts that participant 11 (SpG) was very co-operative, calm and concentrated well in the fifth TRELA test. With no influence reported in the Parent External Factor Report throughout the next period, participant 11 scored 78/78 in the fifth test of TRELA and thereby would have graduated to Level 2 had this not been the final test. Overall, both participants made significant progress. The SpG participant 11 did not, however, get to start Level 2 and I cannot know how much farther this participant could have progressed with VLD exercises only. By this measure, both the SiG and the SpG participants completed Level 1 and that is significant. However, it is remarkable that SiG participant 09 started with a deficit of 11 points yet completed Level 1 two sessions before SpG participant 11. In general children can have developmental "spurts" so this could be the case for participant 09; however, this is not very usual for children with ASD. The speed of progression for participant 09, as shown in the table below, is more important than the numbers; participant 09 reached the maximum score in the third TRELA test, so participant 11 could never have had a comparable score with her/him if they both reached the maximum.

Level 1, Comparing Participants 09 and 11 (P09 & P11)							
TRELA	Baseline	Test 1	Test 2	Test 3	Test 4	Test 5	***Overall Progress***
SiG – P09	61	70	73	78			***17***
Cumulative Progress	*9*	*+ 3*	*+ 5*		*NC**	*NC**	
SpG – P11	72	72	76	75	76	78	***6***
Cumulative Progress	*0*	*+ 4*	*- 1*		*+ 1*	*+ 2*	

*NC** = No Calculation of Cumulative Progress.

Table 4.3 Table Comparing Progress of SiG P09 and SpG P11

Comparative Evaluation at Level 2

Considering those participants whose starting level was Level 2, comparative evaluation is not possible because there were no SpG participants who commenced the research at Level 2.

4.4 Comparative Evaluation of Paired Participants at Level 3

Considering those participants whose starting level was Level 3, comparative evaluation is possible, although there was only one participant in each group, therefore an individual's cumulative progress score equates to their group's progress at this level. There was cumulative progress of 12 points at Level 3 for the SiG participant. Comparatively, there was cumulative progress of 6 points at Level 3 for the SpG participant. For the participant who used singing for VLD, VLD progress was greater than for the participant who used only VLD exercises. Remarkably, both the SiG and the SpG participants made progress through Level 3 to Level 4. In ASD, progress at higher levels of functioning is more common than it is at the lowest level but that both participants graduated to the next level is noteworthy.

4.4.1 Comparative Evaluation of Paired Participants P18 (SiG) and P01 (SpG)

At Level 3, since there was only one participant in the SiG and one participant in the SpG, the total progress of each group was the progress of each participant. Specifically, participant 18 of the SiG progressed 12 points and moved to the next Level (4) (where P18 progressed 2 points) whereas paired participant 01 of the SpG progressed 6 points and also moved to the next Level (4) (where P01 also progressed 2 points). Participant 18 who did VLD exercises by singing made twice as much progress as participant 01 who did VLD exercises only; however, both graduated to Level 4 and both made further progress of 2 points. They were both starting from a higher baseline (SiG18 from a lower score in comparison to her/his SpG 01 participant) and therefore could never show as much in that level progress.

Baseline assessment sessions

Paired SiG P18:

It was noted in the Observational Charts that participant 18 (SiG) was co-operative in the three baseline assessment sessions. However, in the first one she/he suddenly started crying when at some point I took back the objects I had given and placed in front of her/him in order to use them for the assessment. I decided to place them back in front of her/him and she/he calmed down. She/he also showed persistence afterwards with a (plastic) spoon (that was also an object of the assessment); she/he was not leaving it and was holding it until the end of the first baseline assessment session. For the baseline assessment, participant 18 (SiG) scored 56/72, 61/72 and 62/72. The Parent External Factor Reports indicated no influence for this period. Based on mean average, the starting point for participant 18 (SiG) was calculated as 60/78.

Paired SpG P01:

Participant 01, as happened with other participants, had more than three baseline assessment sessions because she/he was first placed in a higher level, where she/he could not achieve the baseline score of that level (she/he achieved 24/50 of Level 4 in the first baseline assessment session and then 19/50 in the second baseline assessment session). She/he was then placed at Level 3 where the mean average of those three assessment sessions was calculated. It was noted in the Observational Charts that the child in the first baseline assessment session of Level 3 was not concentrating, was standing up and was in a hurry to reply. In the second assessment session of Level 3 she/he was not concentrating well and was not paying much attention. However, in the third and last baseline assessment session the child had a much better focus and co-operated well. For the baseline assessment, participant 01 (SpG) scored 66/72, 61/72 and 71/72. The Parent External Factor Reports indicated no influence for the first baseline score and a small positive influence for the other two baseline scores. Based on mean average, the starting point for participant 01 was calculated as 66/78.

First, second, third sessions and first TRELA test

Paired SiG P18:

It was noted in the Observational Charts that participant 18 (SiG) sang all the words well in the first three sessions of singing VLD exercises. It was noted that she/he enjoyed the first session, she/he was coughing a bit in the second session and was in a bit of hurry and not very focused on some words in the third session. It was also noted in the Observational Chart of the first test that she/he was concentrating well. Participant 18 (SiG) scored 68/72 in the first TRELA test which occurred after three sessions of singing VLD exercises – and the Parent External Factor Reports indicated no influence throughout this period. Compared with the baseline, 68 represents progress of 8 points.

Paired SpG P01:

In the Observational Charts it was noted that participant 01 (SpG) spoke all the words again in the first session of VLD exercises and at the end of the session she/he could remember four words out of the eight. In the second session she/he spoke all the words again even though she/he was coughing and had a blocked nose. She/he also spoke all the words in the third session of VLD exercises and she/he seemed to know them well. In the first TRELA test it was noted that she/he was very good yet she/he could have concentrated even better. Participant 01 (SpG) scored 70/72 in the first TRELA test which occurred after three sessions of VLD exercises only – and the Parent External Factor Reports indicated a small positive influence throughout this period. Compared with the baseline score of 66/78, 70 represents progress of 4 points for participant 01 (SpG). Compared to the 8 points of progress made by paired SiG participant (18), this first stage comparison supports the hypothesis that singing could be valuable to VLD.

Fourth, fifth, sixth sessions and second TRELA test

Paired SiG P18:

As noted in the Observational Charts participant 18 (SiG) sang all the words well and in tune in the fourth and fifth sessions of singing VLD exercises. She/he was in a bit of hurry, with some tension at the beginning of the fourth session and seeming a little tired. In the sixth session of singing VLD exercises she/he sang most of the words very well and in tune and was concentrating well (although in a few cases she/he couldn't keep timing). In the second test it was noted that participant 18 was tired (I was then informed that she/he had two extra lessons before) and in the middle of the test she/he asked me "Have we finished?" After that question she/he was not concentrating and didn't want to carry on so we took a break for five minutes (she/he had a couple of smarties during the break) and then we carried on. Participant 18 (SiG) scored 72/72 in the second TRELA test which occurred after another three sessions of singing VLD exercises – and the Parent External Factor Reports indicated no influence throughout these sessions and a small positive influence for the TRELA test. Compared with the baseline, 72 represents cumulative progress of 12 points with 4 points of that progress attributable to three sessions of singing since the first TRELA test.

Paired SpG P01:

In the Observational Charts it was noted that participant 01 (SpG) spoke all the words again in the fourth, fifth and sixth sessions of VLD exercises; she/he knew the words well, was concentrating and remembered many of them (in the sixth session she/he remembered most of them). In the second TRELA test it was noted that she/he was co-operative and concentrated. Participant 01 (SpG) scored 72/72 in the second TRELA test which occurred after another three sessions of VLD exercises only – and the Parent External Factor Reports indicated small positive influence throughout this period. Compared with the baseline, 72 represents cumulative progress of 6 points with 2 points of that progress attributable to three sessions of VLD exercises only since the first TRELA test. This data set supports the hypothesis that singing could be valuable to VLD because SiG participant 18's cumulative progress was twice the progress of SpG participant 01.

Level 3, Comparing Participants 18 and 01 (P18 & P01)							
TRELA	Baseline	Test 1	Test 2	Test 3	Test 4	Test 5	***Overall Progress***
SiG – P18	60	68	72				***12***
Cumulative Progress		*+ 8*	*+ 4*	*NC**	*NC**	*NC**	
SpG– P01	66	70	72				***6***
Cumulative Progress		*+ 4*	*+ 2*	*NC**	*NC**	*NC**	

Table 4.4 Table Comparing Progress of SiG P18 and SpG P01

4.5 Comparative Evaluation at Level 4

Considering those participants whose starting level was Level 4, comparative evaluation is not possible because there were no SpG participants who commenced the research at Level 4. However, two participants progressed from Level 3 to Level 4 and of these participants, participant 18 was in the SiG and participant 01 was in the SpG. Both participants further progressed 2 points each at Level 4 so there remains no differentiation between singing VLD and VLD exercises alone at this level.

4.5.1 Comparative Evaluation of Paired Participants P18 and P01

Seventh, eighth, ninth sessions and third TRELA test

Paired SiG P18:

It was noted in the Observational Charts that participant 18 (SiG) co-operated and sang all the words in the seventh session of singing VLD exercises but not well in tune, and she/he seemed a bit anxious. In the eighth session she/he was restless in the chair, not concentrating and was singing silently. In the middle of the session, she/he stopped singing and wasn't saying anything. When I told her/his mother, she gave her/him smarties and then she/he finished the session. She/he was very good, focused and co-operative in the ninth session; she/he sang all the words and in good tune. It was noted in the third TRELA test that she/he was co-operative and concentrating (although she/he seemed tired at some point). Participant 18 (SiG) scored 44/50 in the third TRELA test which occurred after three sessions of singing VLD exercises – and the Parent External Factor Reports indicated no influence throughout this period.

Paired SpG P01:

It was noted in the Observational Charts that participant 01 (SpG) was co-operative and spoke all the words again in the seventh session of VLD exercises; however, she/he was in a hurry and quite kinetic while seated. In the eighth session she/he was co-operative and spoke all the words; however, she/he didn't speak two words properly because she/he was in a hurry (added a syllable at the beginning of a word and spoke the first two syllables of another word the wrong way round). She/he was co-operative and spoke all the words very well in the ninth session. It was noted that in the third TRELA test she/he was co-operative, nevertheless not very focused and quite kinetic while seated. Participant 01 (SpG) scored 40/50 in the third TRELA test which occurred after three sessions of VLD exercises only – and the Parent External Factor Reports indicated a small positive influence throughout this period. Compared with paired participant 18 (SiG), this first stage comparison supports the hypothesis that singing could be valuable to VLD because SiG participant 18's score was 4 points higher than that of SpG participant 01.

Tenth, eleventh, twelfth sessions and fourth TRELA test

Paired SiG P18:

In the Observational Charts it is noted that participant 18 (SiG) was in a hurry to sing in the tenth session of singing VLD exercises and at times she/he did not sing well or sing all the words. In the eleventh session she/he was co-operative, was singing gently, was adding more of his own words after the names (i.e. Popi, Tasos, Despina) in the VLD exercises and was holding a doll dog pretending that it was sleeping in her/his play. It was also noted in the twelfth session of singing VLD exercises that she/he was co-operative and sang well all the time and for all the exercises. In between the exercises she/was saying other things and was playful. In the fourth TRELA test it was noted that she/was co-operative and concentrating. However, participant 18 (SiG) scored 43/50 (1 point regression from the third TRELA test) in the fourth TRELA test which occurred after another three sessions of singing VLD exercises – and the Parent External Factor Reports indicated no influence throughout this period.

Paired SpG P01:

In the Observational Charts it was noted that participant 01 (SpG) spoke all the words very well in the tenth and twelfth sessions of VLD exercises (could remember by heart six out of the eight), although she/he seemed absent-minded and not very well emotionally. In the eleventh session she/he was sleepy (seemed sleepless) and spoke all the words sleepily. In the fourth TRELA test it was noted that even though she/he was kinetic she/he co-operated well. Participant 01 (SpG) scored 40/50 again in the fourth TRELA test which occurred after another three sessions of VLD exercises only – and the Parent External Factor Reports indicated a small positive influence with the twelfth session and no influence for the tenth and eleventh sessions and the TRELA test. Comparatively, paired participant 18 (SiG) regressed 1 point whereas SpG participant 01 remained at the same score.

Thirteenth, fourteenth, fifteenth sessions and fifth TRELA test

Paired SiG P18:

It was noted in the Observational Charts that participant 18 (SiG) seemed tired in the thirteenth session of singing VLD exercises. Nevertheless, she/he co-operated, yet she/he did not sing all the words the first two times but the later two times she/he did. In the fourteenth session of singing VLD exercises she/he sang nearly all the exercises all the time and very well (she/he was remembering them). She/he sang all the words four times in the fifteenth session of singing VLD exercises, some of them loudly and some of them quietly. In that session she/he was restless in the chair, yawning and seemed tired. It was noted in the Observational Charts that she/he co-operated and concentrated in the fifth TRELA test. Participant 18 (SiG) scored 46/50 (3 points of progress from the fourth TRELA test) in the fifth TRELA test which occurred after another three sessions of singing VLD exercises – and the Parent External Factor Reports indicated no influence throughout this period.

Paired SpG P01:

As noted in the Observational Charts, participant 01 (SpG) in the thirteenth session of VLD exercises was co-operative, spoke all the words (could remember some by heart), however not very clearly since she/he was placing her/his hand in front of her/his mouth and was a little kinetic. In the fourteenth session of VLD exercises she/he was co-operative, however firstly she/he didn't speak the words clearly again and after re-minding her/him to speak "loudly and clearly" she/he corrected herself/himself. In the fifteenth session of VLD exercises she/he was very co-operative, spoke all the words, seemed to remember most of them by heart, yet she/he was speaking quietly and not very clearly. It was noted in the Observational Charts that participant 01 (SpG) in the fifth TRELA test was not very focused. Participant 01 (SpG) scored 42/50 in the fifth TRELA test which occurred after another three sessions of VLD exercises only – and the parent external factor reports indicated a small positive influence with the thirteenth and fifteenth sessions and no influence with the fourteenth session and the TRELA test. Compared with paired participant 18 (SiG), this third and final stage comparison supports the hypothesis that singing could be valuable to VLD because SiG participant 18 progressed 4 points more than SpG participant 01.

Overall, participant 18 (SiG), apart from a minor lapse of 1 point, showed both significant and steady progress at Level 4. Participant 01 (SpG) also showed steady progress. Although, the overall in-stage progress for both participants was 2 points, SiG participant 18 achieved a higher score (46/50) compared to SpG participant 01 who achieved (42/50). SpG participant 01 started Level 4 with a score of 40/50 whereas her/his SiG participant 18 started with a higher score of 44/50 thus it was easier for SiG participant 18 to finish with a higher score than her/his SpG participant 01. This is not unexpected, because fluctuations are expected in the performance of children with ASD.

Level 4, Comparing Participants 18 and 01 (P18 & P01)							
TRELA	Baseline	Test 1	Test 2	Test 3	Test 4	Test 5	***O v e r a l l Progress***
SiG – P18				44	43	46	**2**
Cumulative Progress					- 1	+ 3	
SpG– P01				40	40	42	**2**
Cumulative Progress					0	+ 2	

Table 4.5 Table Comparing Progress of SiG P18 and SpG P01

4.6 Comparative Evaluation of Paired Participants at Level 5

Considering those participants whose starting level was Level 5, the sum total of progress of the two children in the SiG was 24 points, Comparatively, the sum total of progress of the two children in the SpG was 9 points, At Level 5, VLD progress was more than double for the cohort of participants who used singing for VLD compared with those who did VLD exercises only.

4.6.1 Comparative Evaluation of Paired Participants P04 and P12

Specifically, at Level 5 SiG participant 04 progressed 7 points whereas the paired SpG participant 12 progressed 3 points. Participant 04 who did VLD exercises by singing made more than twice as much progress as participant 12 who did VLD exercises only.

Baseline assessment sessions

Paired SiG P04:

SiG participant 04, as happened with many participants, took more than three baseline assessment sessions (she/he took four) because she/was not placed from the beginning at the right level according to her/his abilities. It was noted in the Observational Charts that participant 04 was very focused and co-operative in the three baseline assessment sessions of Level 5. For the baseline assessment, participant 04 (SiG) scored 69/76, 67/76 and 71/76. The parent external factor reports indicated a small negative influence for the first baseline score, a small positive influence for the second baseline score and no influence for the third baseline score. Based on mean average, the starting point for participant 04 was calculated as 69/76.

Paired SpG P12:

Participant 12 (SpG) had four baseline assessment sessions because she/he firstly took an assessment at Level 4. Since she/he scored 42/50 at Level 4 she/he then took part in a baseline assessment session for Level 5. It was noted in the Observational Charts that she/he was very focused and co-operative in those three baseline assessment sessions for Level 5. For the baseline assessment, participant 12 (SpG) scored 67/76, 74/76, and 73/76. The Parent External Factor Reports indicated a small positive influence for the first and second baseline scores and a very positive influence for the third baseline score. Overall, there was no apparent correlation between the Parent External Factor Reports and the scores. Based on mean average, the starting point for participant 12 (SpG) was calculated as 71/76.

First, second, third sessions and first TRELA test

Paired SiG P04:

It was noted in the Observational Charts that participant 04 (SiG) told me she/he liked the singing VLD exercises a lot in the first session. In the second session she/he could remember some lyrics, sang little and in the third session she/he sang much more. It was also noted in the observational chart of the first test that she/he was concentrating and she/he did very well, paying attention. Participant 04 (SiG) scored 76/76 in the first TRELA test which occurred after three sessions of singing VLD exercises – and the Parent External Factor Reports indicated no influence for the test and the first session, and a small positive influence for the second and third sessions. SiG participant 04 progressed 7 points from the baseline score of 69 and achieved the highest possible score at Level 5 (final Level). The Parent External Factor Reports shed a little light on her/his progress (a small positive influence for the second and third tests) and the observation notes indicate that this participant was very focused during the test as well as during the second and third sessions. She/he scored 7 in the Observation Charts (excellent, highest score) for verbal and nonverbal engagement, cognitive understanding and general wellbeing during the test and the third session. In the test she/he scored 6 for the rest of the attributes and in the third session he/she also scored 7 (excellent) for emotional engagement. It seemed that singing had a beneficial effect both on her/his concentration and cognitive and emotional engagement.

Paired SpG P12:

In the Observational Charts it was noted that participant 12 (SpG) spoke nearly all the words of the sentences in the first session of VLD exercises only after listening to me speaking them four times. In the second session she/he seemed to know the sentences, she/he was paying attention and spoke them. She/he also spoke all the sentences in the third session of VLD exercises simultaneously with me and she/he seemed to know them very well. In the first TRELA test it was noted that she/he had a bit of a runny nose. Participant 12 (SpG) scored 72/76 in the first TRELA test which occurred after three sessions of VLD exercises only – and the Parent External Factor Reports indicated a small positive influence for the test and the first and third sessions, and no influence for the second session. SpG participant 12 progressed 1 point from her/his baseline score of 71, compared with SiG participant 04 who made seven times as much progress. This first stage comparison supports the theory that singing could be beneficial to VLD.

Fourth, fifth, sixth sessions and second TRELA test

Paired SiG P04:

In the Observational Charts it was noted that participant 04 (SiG) in the fourth session of singing VLD exercises knew the lyrics and even though she/he seemed tired she/he sang them, but not so well (apart from the last fourth time when she/he sang well and loudly). In the fifth and sixth sessions she/he sang much , all four times in tune and simultaneously with me. She/he was also very good on the rhythm, concentrated and seemed to enjoy it, especially in the fifth session. In the sixth session of singing VLD exercises she/he seemed a little tired and the last, fourth time she/he relaxed, laid her/his head on the desk and sang more melodically. In the second test it was noted that SiG participant 04, even though she/he seemed tired, concentrated very well. Participant 04 (SiG) scored 76/76 again in the second TRELA test which occurred after another three sessions of singing VLD exercises – and the Parent External Factor Reports indicated a small positive influence for the test and no influence for the fourth, fifth and sixth sessions. SiG participant 04 managed to remain at the highest possible score, demonstrating no progress here because no further progress was possible according to the five levels of TRELA tests.

Paired SpG P12:

In the Observational Charts it was noted that participant 12 (SpG) knew and spoke all the sentences in the fourth, fifth and sixth sessions of VLD exercises, nearly perfectly. She/he was very good, concentrated, and in the fourth session we finished a bit earlier. In the second TRELA test it was noted that she/he was (again) co-operative and focused. Participant 12 (SpG) scored 70/76 in the second TRELA test which occurred after another three sessions of VLD exercises only – and the Parent External Factor Reports indicated a small positive influence for the fourth and sixth sessions, and a very positive influence for the test and fifth session. However, SpG participant 12 regressed 2 points from the first TRELA score of 72, compared with SiG participant 04 who made no progress (but who had already achieved the highest score of 76).

Seventh, eighth, ninth sessions and third TRELA test

Paired SiG P04:

It was noted in the Observational Charts that participant 04 (SiG) sang quietly all four times yet not very melodically or in tune in the seventh session of singing VLD exercises. In the eighth and ninth sessions she/he co-operated but again she/he did not sing very melodically (apart from the fourth time in the ninth session). It was noted that in the third TRELA test she/he was very focused and co-operative. Participant 04 (SiG) scored 76/76 again in the third TRELA test which occurred after another three sessions of singing VLD exercises – and the Parent External Factor Reports indicated a small positive influence for the seventh session and no influence for the test and the eighth and ninth sessions. SiG participant 04 remained at the same highest possible score, giving confidence that progress was sustained.

Paired SpG P12:

It was noted in the Observational Charts that participant 12 (SpG) had a runny and a blocked nose in the seventh session of VLD exercises. I spoke the sentences three times but it was only after the third time that she/he spoke them, almost perfectly, and the fourth time simultaneously with me. In the eighth and ninth sessions of VLD exercises she/he was very focused, she/he knew the sentences and spoke them almost perfectly. It was noted that in the third TRELA test she/he was very co-operative and concentrated. Participant 12 (SpG) scored 75/76 in the third TRELA test which occurred after another three sessions of VLD exercises only – and the Parent External Factor Reports indicated no influence for the seventh session, a small positive influence for the eighth session and a very positive influence for the test and ninth session. Participant 12 (SpG) did progress 5 points from the second TRELA score of 70, compared with participant 04 (SiG) who made no progress but who had already achieved the highest score of 76.

Tenth, eleventh, twelfth sessions and fourth TRELA test

Paired SiG P04:

In the Observational Charts it was noted that participant 04 (SiG) in the tenth session of singing VLD exercises co-operated and though the first two times she/he was only listening to me singing, the last two times she/he sang with me very well. In the eleventh session of singing VLD exercises, participant 04 (SiG) was a little tired, not very focused and was singing quietly. It was also noted in the twelfth session of singing VLD exercises that she/he had a runny nose, was tired and was singing quietly and slowly. In the fourth TRELA test it was noted that she/was very co-operative and concentrated, although before the test she/was upset with her/his mother for stopping the cartoons she/he was watching. That was on her/his mother's mobile phone while waiting in another room for our session to start, and I had to talk to her/him a little in order to get her/him to enter the room. Participant 04 (SiG) scored 76/76 once again in the fourth TRELA test which occurred after another three sessions of singing VLD exercises – and the Parent External Factor Reports indicated no influence throughout this period apart from a small positive influence for the twelfth session. SiG participant 04 remained at the highest score of the highest level of achievement.

Paired SpG P12:

In the Observational Charts it was noted that participant 12 (SpG) was very co-operative in the tenth session. She/he did not repeat the sentences after I spoke them the first time but the other three times she/he spoke them perfectly. In the eleventh and twelfth sessions of VLD exercises she/he was again very co-operative and knew the sentences perfectly. In the fourth TRELA test she/he was very focused and co-operative. Participant 12 (SpG) scored 73/76 in the fourth TRELA test which occurred after another three sessions of VLD exercises only – and the Parent External Factor Reports indicated a small positive influence for the test and tenth session, and no influence for the eleventh and twelfth sessions. SpG participant 12 regressed 2 points from P12's third TRELA score of 75 and compared with SiG participant 04, who remained at the highest possible score from the first TRELA test. This fourth stage comparison supports the theory that singing could be beneficial to VLD.

Thirteenth, fourteenth, fifteenth sessions and fifth TRELA test

Paired SiG P04:

It was noted in the Observational Charts that participant 04 (SiG) seemed tired and sleepy in the thirteenth session of singing VLD exercises. She/he was singing weakly and slowly and when I asked later her/his mother told me that she/he went to bed very late the previous night. In the fourteenth session of singing VLD exercises she/he seemed again sleepy and was not singing in a lively way. She/he sang all four times in the fifteenth session of singing VLD exercises, the first time quietly, the second was in a hurry (so I told him to sing louder and slower) and the last two were very good. In that session she/he was a little nervous. In the Observational Charts it was noted that she/was co-operative and concentrated in the fifth TRELA test. Participant 04 (SiG) scored 76/76 in the fifth TRELA test which occurred after another three sessions of singing VLD exercises – and the Parent External Factor Reports indicated a small positive influence for the test and no influence for the thirteenth, fourteenth and fifteenth sessions. Participant 04 of SiG remained at the highest possible score.

Paired SpG P12:

As noted in the Observational Charts, participant 12 (SpG) was very co-operative, knew and spoke the sentences perfectly in the thirteenth, fourteenth and fifteenth sessions of VLD exercises, although a little hurriedly in the fifteenth session. It was noted in the Observational Charts that participant 12 (SpG) was again very focused and co-operative in the fifth TRELA test. Participant 12 (SpG) scored 74/76 in the fifth TRELA test which occurred after another three sessions of VLD exercises only – and the Parent External Factor Reports indicated no influence throughout this period. Participant 12 of SpG progressed 1 point from the fourth TRELA score of 73 but did not recover their highest score of 75. Compared with participant 04 (SiG) who remained at the highest score of 76, this fifth and final stage comparison supports the theory that singing could be beneficial to VLD. Support for the hypothesis, at this level, is clearest in the comparison of overall progress, with SiG participants showing cumulative progress of 7 points compared to the accumulative progress of 3 points made by SpG participant 12. It is remarkable however that participant 12, although she/he didn't manage to progress a lot and reach the highest score of the final Level 5, as her/his paired SiG participant 04 did, showed a very high score (higher than SiG 04) in emotional engagement, specifically 6 and in a few sessions 7 out of 7. It may be the case that her/his emotional engagement was more expressive and apparent to the researcher (see Chapter Six, Subsection 6.4.2).

In the following table the scoring in brackets shows the difference of the overall scoring at the baseline, each level and for the overall progress had we accounted the scoring (subjective measurement) of the two descriptive subjections (ELD) at Level 5. The two scores cannot be added up since that score was made up. Since this scoring does not meet the criteria of measurements applied in the rest of TRELA (as justified in Chapter Two) it should not be accountable.

Level 5, Comparing Participants 04 and 12 (P04 & P12)							
TRELA	Baseline	Test 1	Test 2	Test 3	Test 4	Test 5	***Overall Progress***
SiG – P04	69 (+17)	76 (+18)	76 (+18)	76 (+18)	76 (+18)	76 (+18)	***7 (+1)***
Cumulative Progress	*+7*	*NC**		*NC**	*NC**	*NC**	
SpG – P12	71 (+16)	72 (+18)	70 (+18)	75 (+18)	73 (+18)	74 (+18)	***3 (+2)***
Cumulative Progress	*+1*	*-2*		*-+5*	*-2*	*+1*	

*NC** = No Calculation of Cumulative Progress.

Table 4.6 Table Comparing Progress of SiG P04 and SpG P12

4.6.2 Comparative Evaluation of Paired Participants P08 and P05

At Level 5, SiG participant 08 progressed 17 points whereas the paired participant, SpG participant 05 progressed 6 points. SiG participant 08 who did VLD exercises by singing made nearly three times as much progress as SpG participant 05 who did VLD exercises only.

Baseline assessment sessions

Paired SiG P08:

SiG participant 08 had four baseline assessment sessions (like many of the other participants) because she/he was firstly given an assessment at Level 4, where she/he achieved above the baseline score, and then was given an assessment at Level 5. It was noted in the Observational Charts that SiG participant 08 in the first baseline assessment session was in a hurry and sometimes was not paying attention. Although she/he was better focused in the second baseline assessment session, later, in the third one, she/he was not (again) paying enough attention. For the baseline assessment participant 08 (SiG) scored 55/76, 58/76 and 60/76. The Parent External Factor Reports indicated a small positive influence for the first baseline score, and no influence for the second and third baseline scores. Based on mean average, the starting point for participant 08 was calculated as 58/76.

Paired SpG P05:

As noted in the Observational Charts participant 05 (SpG) was in a hurry and not very focused in the first baseline assessment session for Level 5. In the second one she/he was concentrating and co-operative, and very focused and co-operative in the third one. For the baseline assessment, participant 05 (SpG) scored 61/76, 63/76, and 65/76. The Parent External Factor Reports indicated a very positive influence for all three baseline scores and there is clear evidence of continuous comparable progress which may have been influenced positively by the Parent External Factor Reports. Based on mean average, the starting point for SpG participant 05 was calculated as 63/76 and this is a true mean average which has not been adjusted (for the highest score) to account for any positive influence that may be attributable to the Parent External Factor Reports.

First, second, third sessions and first TRELA test

Paired SiG P08:

Even though the Parent External Factor Reports indicated no influence throughout this period, the observation notes show progress in the second and especially in the third session, where she/he was noted to have a better understanding thus marked 6 (very good) for cognitive understanding and 5 (good) for verbal engagement and most of the attributes. SiG participant 08 (SiG) scored 69/76 in the first TRELA test which occurred after three sessions of singing VLD exercises – and the Parent External Factor Reports indicated no influence throughout this period. Participant 08 of SiG progressed 11 points from the baseline score of 58. In both SiG participants at Level 5 there was a significant increase in the first TRELA score. In an attempt to understand this, it could be said that singing may be significantly different for them to improve concentration or willingness to perform well on the test. However, it was noted in the Observation Charts that during the first test he/she was coughing, blowing his/her nose and was absent-minded. Her/his general well-being was marked 3 (little) and his/her verbal and nonverbal engagement was marked 5 and 4 now. Her/his cognitive understanding was now marked 5 (good). All the above cannot explain the significant progress of 11 points from the baseline score. Only the notes and the marks mentioned before for the third session can partially explain it. However, it seemed that there was also a willingness to perform well on the test despite not feeling well.

Paired SpG P05:

In the Observational Charts it was noted that participant 05 (SpG) in the first session of VLD exercises did not like that we were not singing. Probably her/his mother had (wrongly) informed her/him that we would have singing sessions. She/he spoke a little bit of vocabulary in a singing way. In the second session she/he asked me to sing again and she/he spoke few sentences. She/he was focused and trying to speak all the sentences in the third session of VLD exercises. In the first TRELA test it was noted that she/he was somehow rushing to reply. Participant 05 (SpG) scored 67/76 in the first TRELA test which occurred after three sessions of VLD exercises only – and the Parent External Factor Reports indicated no influence throughout this period. Despite the Parent External Factor Reports changing from very positive to no influence, the progress made by SpG participant 05 was comparable with the baseline scores, showing a consistent increase of 2 points (baseline – 61/76, 63/76, 65/76, then 67/76). Participant 05 (SpG) progressed 4 points from their baseline score of 63, compared with participant 08 (SiG) who made more than twice as much progress. This first stage comparison supports the theory that singing could be beneficial to VLD.

Fourth, fifth, sixth sessions and second TRELA test

Paired SiG P08:

It was noted in the Observational Charts that SiG participant 08 sang most of the times in the fourth session and all the times in the fifth and sixth sessions. She/he was marked with 6 (very good) for verbal engagement and for most of the attributes. However, during the test he/she was not focused, he/she seemed tired and absent-minded and was marked with 5 (good) for verbal engagement and most of the attributes. Participant 08 (SiG) scored 67/76 in the second TRELA test which occurred after another three sessions of singing VLD exercises – and the Parent External Factor Reports indicated no influence throughout this period. SiG participant 08 regressed 2 points from their first TRELA score of 69 and the Parent External Factor Reports do not explain this regression (only the observational notes mentioned above).

Paired SpG P05:

In the Observational Charts it was noted that participant 05 (SpG) was focused, knew (remembered) the sentences and was speaking them in the fourth, fifth and sixth sessions of VLD exercises. In the fifth session she/he omitted a name in one sentence and in another she/he placed two words in the wrong syntactical order. In the second TRELA test it was noted that she/he concentrated but was a little hurried sometimes. Participant 05 (SpG) scored 71/76 in the second TRELA test which occurred after another three sessions of VLD exercises only – and the Parent External Factor Reports indicated no influence throughout this period. Participant 05 (SpG) progressed 4 points from their first TRELA score of 67, compared with participant 08 (SiG) who regressed 2 points from their first TRELA score of 69. This in-stage comparison casts small doubt on the prospective value of singing. However, comparison of cumulative progress up to this point refutes that small doubt because – for this second stage comparison – the cumulative progress of participant 08 (SiG) was 9 points whereas the cumulative progress of participant 05 (SpG) was 8 points.

Seventh, eighth, ninth sessions and third TRELA test

Paired SiG P08:

In the observation charts it was noted that SiG participant 08 made progress in the seventh, eighth and ninth sessions where he/she was marked 6 (very good) for verbal engagement and for most of the attributes. She/he was co-operative, smiling and sang all the times in the ninth session. It was also noted that during the test he/she was not very focused and was in a hurry; however, he/she retained marks of 6 for verbal engagement and for most attributes. If it wasn't for the rushing it is possible that he/she could have achieved a higher score for this test. Participant 08 (SiG) scored 70/76 in the third TRELA test which occurred after another three sessions of singing VLD exercises – and the Parent External Factor Reports indicated no influence throughout this period. Participant 08 recovered from the previous regression (of 2 points) and made a further progress of 1 point from the first TRELA score of 69, equating to 3 points of progress from their second TRELA score of 67.

Paired SpG P05:

It was noted in the Observational Charts that participant 05 (SpG) in the seventh, eighth and ninth sessions of VLD exercises was co-operative, could remember the sentences and spoke them. She made two very small mistakes in these sessions probably because she/he was a little hurried and not very focused. It was noted that in the third TRELA test she/he was co-operative and concentrated. Participant 05 (SpG) scored 71/76 again in the third TRELA test which occurred after another three sessions of VLD exercises only – and the Parent External Factor Reports indicated no influence throughout this period. Participant 05 (SpG) made no progress from the second TRELA score of 71, compared with participant 08 (SiG) who progressed 3 points from the second TRELA score of 67. In-stage and cumulative progress comparison refutes the small doubt about the value of singing for VLD that was cast by in-stage comparison for the second TRELA test.

Tenth, eleventh, twelfth sessions and fourth TRELA test

Paired SiG P08:

In the Observation Charts it was noted that SiG participant 08 was very co-operative and was marked again at 6 (very good) for verbal engagement and for most of the attributes during the tenth, eleventh, twelfth sessions and the test. Participant 08 (SiG) scored 72/76 in the fourth TRELA test which occurred after another three sessions of singing VLD exercises – and the Parent External Factor Reports indicated no influence throughout this period. SiG participant 08 made further progress of 2 points from her/his third TRELA score of 70.

Paired SpG P05:

In the Observational Charts it was noted that participant 05 (SpG) was very good and co-operative in the tenth session. She/he was paying attention, could remember and spoke the sentences very well (apart from adding the consonant m in front of a word as she/he was doing in the previous sessions). In the eleventh session of VLD exercises she/he knew the sentences by heart, perfectly, and was speaking them in a melodic way, although she/he was not in the SiG. In the twelfth session she/he was again very co-operative, knew and spoke the sentences, perfectly, even though she/he was coughing a little. In the fourth TRELA test it was noted that she/he was co-operative but also very hurried and not concentrating enough. Participant 05 (SpG) scored 69/76 in the fourth TRELA test which occurred after another three sessions of VLD exercises only – and the Parent External Factor Reports indicated no influence throughout this period. Participant 05 (SpG) regressed 2 points from the third TRELA score of 71 and compared with participant 08 (SiG) who made progress of 2 points from the third TRELA score of 70, this fourth stage comparison continues to support the theory that singing could be beneficial to VLD.

Thirteenth, fourteenth, fifteenth sessions and fifth TRELA test

Paired SiG P08:

It was noted in the Observation Charts that SiG participant 08 was marked again with 6 (very good) for verbal engagement and for most of the attributes during the thirteenth and fourteenth sessions and with 6 for all the attributes during the fifteenth (last) session. She/he was co-operative and was singing all four times well. During the test she/he was marked 6 for all the attributes with the exception of 7 (excellent) for verbal engagement. Participant 08 (SiG) scored 75/76 in the fifth and final TRELA test which occurred after another three sessions of singing VLD exercises – and the Parent External Factor Reports indicated again no influence throughout this period. SiG participant 08 progressed 3 points from the fourth TRELA score of 72.

Paired SpG P05:

As noted in the Observational Charts, participant 05 (SpG) was very co-operative, knew and spoke the sentences, perfectly, all four times in the thirteenth, fourteenth and fifteenth sessions of VLD exercises. However, it was noted in the Observational Charts that she/he was not very focused in the fifth TRELA test. Participant 05 (SpG) scored 69/76 in the fifth and final TRELA test which occurred after another three sessions of VLD exercises only – and the Parent External Factor Reports indicated no influence throughout this period. Participant 05 (SpG) made no progress from the fourth TRELA score of 69 and compared with participant 08 (SiG) who progressed 3 points from the fourth TRELA score of 72, overall support for the hypothesis that singing could be beneficial to VLD is maintained.

In the following table the scoring in brackets shows what the difference in the overall scoring at the baseline, each level and for the overall progress would be had we accounted the scoring (subjective measurement) of the two descriptive subjections (ELD) 5. Since this scoring does not meet the criteria of measurements applied in the rest of TRELA (as justified in Chapter Two) it should not be accountable.

Level 5, Comparing Participants 08 and 05 (P08 & P05)							
TRELA	Baseline	Test 1	Test 2	Test 3	Test 4	Test 5	***Overall Progress***
SiG – P08	58 (+10)	69 (+9)	67 (+13)	70 (+15)	72 (+17)	75 (+17)	***17 (+7)***
Cumulative Progress	*+11*	*-2*	*+3*	*+2*	*+3*		
SpG– P05	63 (+14)	67 (+16)	71 (+15)	71 (+15)	69 (+15)	69 (+16)	***6 (+2)***
Cumulative Progress	*+4*	*+4*	*0*	*-2*	*0*		

Table 4.7 Table Comparing Progress of SiG P08 and SpG P05

4.7 Receptive and Expressive Language Development of Paired Participants

The progress of RLD of paired participants was not similar for all levels in comparison to the progress of ELD. Specifically at Level 1, for the 3 participants out of the 4, the progress of RLD was lower (11, 3 and 5 points) in comparison to the progress of ELD (12, 7 and 9 points) for participants 16, 17 and 09 respectively. Participant 11 however had the same progress (3 points) both for RLD and ELD.

In contrast, at Level 3 for participant 01 the progress of RLD was a little higher (4 points) in comparison to the progress of ELD (2 points) and also with higher progress for RLD (again 4 points) in comparison to the regression of ELD (-2 points) when she/he moved to Level 4. However, participant 18 progressed the same (6 points) both for RLD and ELD at Level 3 but when she/he moved to Level 4 the progress of RLD was higher (2 points) in comparison to the nonprogress (0 points) of ELD.

At Level 5, the progress of RLD was higher (6 points and 4 points) for two of the participants (P04 and P05 respectively) in comparison to the progress of ELD (1 point and 2 points) and for the other two participants (P12 and P08) the progress of RLD was lower (-1 regression and 3 points respective) in comparison to the progress of ELD (4 points and 14 points). All the above results and what these changes in RLD and ELD mean will be discussed in Chapter Six.

Level 1, Comparing RLD & ELD of Participants 16 and 17 (P16 & P17)							
TRELA	Baseline	Test 1	Test 2	Test 3	Test 4	Test 5	***Overall Progress***
SiG – P16	RLD 39,3 ELD 13,3	RLD 51 ELD 18	RLD 50 ELD 21	RLD 51 ELD 24	RLD 49 ELD 26	RLD 50 ELD 25	***RLD*** ***11*** ***ELD*** ***12***
RLD Progress *ELD Progress*	*+ 12* *+ 5*	*- 1* *+ 3*	*+ 1* *+ 3*	*- 2* *+ 2*	*+ 1* *- 1*		
SpG – P17	RLD 46 ELD 10	RLD 50 ELD 14	RLD 51 ELD 17	RLD 51 ELD 20	RLD 49 ELD 15	RLD 49 ELD 17	***RLD*** ***3*** ***ELD*** ***7***
RLD Progress *ELD Progress*	*+ 4* *+ 4*	*+ 1* *+ 3*	*0* *+ 3*	*- 2* *- 5*	*0* *+ 2*		

Table 4.8 Table Comparing RLD and ELD Progress of SiG P16 and SpG P17

Level 1, Comparing RLD & ELD Participants 09 and 11 (P09 & P11)							
TRELA	Baseline	Test 1	Test 2	Test 3	Test 4	Test 5	***Overall Progress***
SiG – P09	RLD 46 ELD 15	RLD 50 ELD 20	RLD 51 ELD 22	RLD 51 ELD 27			***RLD 5 ELD 9***
RLD Progress *ELD Progress*	*+4* *+ 5*	*+ 1* *+ 2*	*0* *+ 2*	*NC**	*NC**		
SpG – P11	RLD 48 ELD 24	RLD 47 ELD 25	RLD 50 ELD 26	RLD 50 ELD 25	RLD 51 ELD 25	RLD 51 ELD 27	***RLD 3 ELD 3***
RLD Progress *ELD Progress*	*- 1* *+ 1*	*+ 3* *+ 1*	*0* *- 1*	*+ 1* *0*	*0* *+ 2*		

*NC** = No Calculation of Cumulative Progress.

Table 4.9 Table Comparing RLD and ELD Progress of SiG P09 and SpG P11

Level 3, Comparing RLD & ELD Participants 18 and 01 (P18 & P01)							
TRELA	Baseline	Test 1	Test 2	Test 3	Test 4	Test 5	***Overall Progress***
SiG – P18	RLD 34 ELD 26	RLD 37 ELD 31	RLD 40 ELD 32				***RLD*** ***6*** ***ELD*** ***6***
RLD Progress *ELD Progress*		*+ 3* *+ 5*	*+ 3* *+ 1*	*NC**	*NC**	*NC**	
SpG– P01	RLD 36 ELD 30	RLD 40 ELD 30	RLD 40 ELD 32				***RLD*** ***4*** ***ELD*** ***2***
RLD Progress *ELD Progress*		*+ 4* *0*	*0* *+ 2*	*NC**	*NC**	*NC**	

Table 4.10 Table Comparing RLD and ELD Progress of SiG P18 and SpG P01

Level 4, Comparing RLD & ELD of Participants 18 and 01 (P18 & P01)							
TRELA	Baseline	Test 1	Test 2	Test 3	Test 4	Test 5	***O v e r a l l Progress***
SiG – P18				RLD 23 ELD 21	RLD 24 ELD 19	RLD 25 ELD 21	***RLD*** ***2*** ***ELD*** ***0***
RLD Progress *ELD Progress*					+ 1 - 2	+ 1 + 2	
SpG– P01				RLD 20 ELD 20	RLD 23 ELD 17	RLD 24 ELD 18	***RLD*** ***4*** ***ELD*** ***-2***
RLD Progress *ELD Progress*					+ 3 - 3	+ 1 + 1	

Table 4.11 Table Comparing RLD and ELD Progress of SiG P18 and SpG P01

In the following tables the scoring in brackets shows what the difference of the scoring in the baseline, each level and the overall progress in the ELD would be had we added the total scoring (subjective measurement) of the two descriptive subjections at Level 5. Since this scoring does not meet the criteria for measurements applied in the rest of TRELA (as justified in Chapter Two) it is not accountable in the results.

Level 5, Comparing RLD & ELD of Participants 04 and 12 (P04 & P12)							
TRELA	Baseline	Test 1	Test 2	Test 3	Test 4	Test 5	***Overall Progress***
SiG – P04	RLD 34 ELD 35 (17)	RLD 40 ELD 36 (18)	RLD 40 ELD 32 (18)	RLD 40 ELD 36 (18)	RLD 40 ELD 36 (18)	RLD 40 ELD 36 (18)	***RLD 6 ELD 1 (1)***
Cumulative Progress *RLD Progress* *ELD Progress*	*+7* *+6* *+1 (+1)*	*NC** *0* *-4 (0)*	*NC** *0* *+4 (0)*	*NC** *0* *0 (0)*	*NC** *0* *0 (0)*		
SpG – P12	RLD 39 ELD 32 (16)	RLD 39 ELD 33 (18)	RLD 37 ELD 33 (18)	RLD 39 ELD 36 (18)	RLD 39 ELD 34 (18)	RLD 38 ELD 36 (18)	***RLD -1 ELD 4 (2)***
Cumulative Progress *RLD Progress* *ELD Progress*	*+1* *0* *+1 (+2)*	*-2* *-2* *0 (0)*	*+5* *+2* *+3 (0)*	*-2* *0* *-2 (0)*	*+1* *-1* *+2 (0)*		

*NC** = No Calculation of Cumulative Progress.

Table 4.12 Table Comparing RLD and ELD Progress of SiG P04 and SpG P12

Level 5, Comparing RLD & ELD of Participants 08 and 05 (P08 & P05)							
TRELA	Baseline	Test 1	Test 2	Test 3	Test 4	Test 5	***Overall Progress***
SiG – P08	RLD 36 ELD 22 (10)	RLD 39 ELD 30 (9)	RLD 39 ELD 28 (13)	RLD 36 ELD 34 (15)	RLD 39 ELD 33 (17)	RLD 39 ELD 36 (17)	***RLD 3 ELD 14 (7)***
Cumulative Progress *RLD Progress* *ELD Progress*	*+11* *+3* *+8* *(-1)*	*-2* *0* *-2* *(+4)*	*+3* *-3* *+6* *(+2)*	*+2* *+3* *-1* *(+2)*	*+3* *0* *+3* *(0)*		
SpG – P05	RLD 33 ELD 30 (14)	RLD 35 ELD 32 (16)	RLD 37 ELD 34 (15)	RLD 38 ELD 33 (15)	RLD 39 ELD 30 (15)	RLD 37 ELD 32 (16)	***RLD 4 ELD 2 (2)***
Cumulative Progress *RLD Progress* *ELD Progress*	*+ 4* *+ 2* *+ 2* *(+2)*	*+ 4* *+ 2* *+ 2* *(-1)*	*0* *+ 1* *- 1* *(0)*	*-2* *+1* *-3* *(0)*	*0* *-2* *+2* *(+1)*		

Table 4.13 Table Comparing RLD and ELD Progress of SiG P08 and SpG P05

4.8 Summary

This fourth chapter was dedicated to representing the primary data of the paired participants at Levels 1, 3, 4 and 5, describing how analysis was undertaken for those participants, and presenting evaluative discussion of that analysis. Chapter Four represents the culmination of my endeavour to test the hypothesis that singing could be valuable to the verbal language development of Greek children aged 5–11yrs diagnosed with ASD. In this chapter there is an overall positive outcome and detailed analysis that supports the positive finding that singing VLD exercises could be valuable. The next chapter, Chapter Five, represents a continuation of the primary data presentation but of the unpaired participants, describing how analysis was undertaken for those participants and presenting evaluative discussion of that analysis.

CHAPTER FIVE: ASD – SINGING FOR VERBAL LANGUAGE DEVELOPMENT II

5.1 Overview

The purpose of this chapter is to continue analysis of the primary research data for the unpaired participants, and evaluative discussion of the significance of those findings. To achieve this purpose, Chapter Five is structured in four sections, including this first section that provides a brief overview of this fifth chapter. The second section discusses the five participants who were not paired. The third section discusses the Receptive and Expressive Language Development of Unpaired Participants. Finally, in the fourth section, there is a brief summary of Chapter Five including how it relates to the final chapter and to the entire thesis.

5.2 Evaluation of Unpaired SiG Participants

At all of the starting levels where comparative evaluation is possible (Level 1, Level 3, and Level 5) there is consistent evidence of superior progress of the participants in the SiG, strongly indicating that singing could be valuable for the VLD of Greek children aged 5–11yrs and diagnosed with ASD. Comparison became possible at Level 4 because P01 and P18 graduated and at this level achieved the exact same score for cumulative progress so there is no distinction between singing VLD exercises and VLD only as cumulative progress at Level 4. However, the findings of those comparative evaluations account for only 10 participants and give no insights into progress at Level 2. This subsection considers the progress of the other five participants relative to the comparative evaluation. By assigning these five participants to the SiG and considering how their progress challenges or supports my interpretation of the comparative data, I further probe my hypothesis that singing could be valuable for the VLD of Greek children diagnosed with ASD aged 5–11yrs. The following represents consideration of unpaired SiG participants only; these five participants took part in singing for VLD.

5.2.1 Level 1 – Unpaired SiG Participants P02, P07, and P13

The three unpaired participants at Level 1 all made very good progress that correlates more closely with the paired SiG participants than it does with the paired SpG participants. The most progress made by an SpG participant was participant 17 who progressed 10 points. Meanwhile unpaired SiG participant 02 progressed 21 points, unpaired SiG participant 07 progressed 16 points, and unpaired SiG participant 13 progressed 20 points. The mean average progress of the three unpaired SiG participants =19 and comes close to twice the progress made by SpG participant 17 (=10) who did VLD exercises only. Overall, the progress results of unpaired participants at Level 1 support the hypothesis that singing could be valuable for the VLD of Greek children aged 5–11yrs who have ASD. Combined with the findings of the comparative analysis, there is a more convincing case for using singing for VLD but the study still lacks statistical significance due to the small cohort of SiG and SpG participants.

Unpaired SiG P02:

Baseline assessment sessions

It was noted in the first baseline assessment session of Level 1 that participant 02 was hyperactive and not concentrating. In the second baseline assessment session she/he had a better focus and co-operation than in the previous session. However, in the third one she/he was not concentrating, again, was touching my head and wanted to play with me. For the baseline assessment, participant 02 scored 18/78, 39/78, and 32/78. The Parent External Factor Reports indicated a very positive influence for all three baseline scores. Based on mean average, the starting point for SiG participant 02 was calculated as 30/78. Although the mean average starting point of participant 02 did not reach the base for scoring at Level 1, she/he was placed in that level because the previous, Pre-language Level, gives no basis for scoring VLD and thus for VLD exercises to take place. SiG participant 02 managed to achieve the base for scoring at Level 1 (40/78) at the first TRELA test (after three sessions of singing VLD exercises).

First, second, third sessions and first TRELA test

It was noted in the Observational Charts that participant 02 (TG) was happy, seemed to like the singing VLD exercises a lot in the first session and was making the sounds of the vowels. In the second session she/he seemed again to enjoy the singing VLD exercises and she/he said the first syllable of three different words. In the third session, although she/he didn't say any syllable, she/he was paying a lot of attention and seemed to enjoy it. It was also noted in the Observational Chart of the first test that she/he was in a big hurry. Participant 02 scored 40/78 in the first TRELA test which occurred after three sessions of singing VLD exercises – and the Parent External Factor Reports indicated no influence for the first session and a very positive influence for the second and third sessions. SiG participant 02 progressed 10 points from her/his baseline score of 30.

Fourth, fifth, sixth sessions and second TRELA test

In the Observational Charts it was noted that participant 02 (SiG) enjoyed the fourth session of singing VLD exercises, paid a lot of attention and she/he wanted to hug and kiss me. She/he spoke the word water (νερό – pronounced nero) in Greek and the last syllables of two different words (milk γαλα in Greek and bed κρεβάτι in Greek). However, in the fifth session she/he was not very calm and focused, her/his legs were tense and she/he was taking my hand searching for physical contact (maybe to comfort her/him). She/he spoke the word water in Greek again, the last syllable of the word milk in Greek (not clearly though) and she/he also spoke some other syllables that did not make sense (to me). In the sixth session of singing VLD exercises it was noted that she/he was grabbing my hands searching for physical contact to comfort her/him. She/he spoke the first syllable of the words water and sun in Greek, the first and last syllable of the word pencil in Greek, the last two syllables of the word yoghurt in Greek and the second and third syllables of the word television in Greek. In the second test it was noted that participant 02 (SiG) was co-operative, however, she/he was agitated and worried for a while about a picture that showed a baby crying. SiG participant 02 scored 36/78 in the second TRELA test which occurred after another three sessions of singing VLD exercises – and the Parent External Factor Reports indicated no influence throughout this period. Participant 02 (SiG) regressed 4 points from her/his first TRELA score of 30.

Seventh, eighth, ninth sessions and third TRELA test

It was noted in the Observational Charts that, although participant 02 (SiG) stood up a few times from her/his chair (I had to bring her/him back) in the seventh session of singing VLD exercises, she/he was paying attention to me. She/he spoke two words (milk and water in Greek), although she/he did not pronounce the consonants clearly, the first syllables of the words pencil and mum in Greek, and the last two syllables of the word television in Greek (though the consonant r was not clear). In the eighth session she/he spoke one syllable from each word (the second syllable of the words pencil and fork, the last syllable from the words milk and water, the first syllable of the words sun, yoghurt and bed, though she/he omitted the consonant r in those Greek words again). She/he also spoke the last three syllables of the word television in Greek yet she/he omitted the consonant r again. In the ninth session participant 02 (SiG) was paying attention and was trying to participate. She/he spoke one syllable of all the words that had two syllables and one or two syllables of the words that had more syllables than two, though she/he was omitting a few consonants. It was noted that in the third TRELA test she/he was concentrating, co-operative and said the word ball in Greek. Participant 02 (SiG) scored 38/78 in the third TRELA test which occurred after another three sessions of singing VLD exercises – and the Parent External Factor Reports indicated no influence throughout this period. SiG participant 02 progressed 2 points from the second TRELA score of 36.

Tenth, eleventh, twelfth sessions and fourth TRELA test

In the Observational Charts it was noted that participant 02 (SiG) was co-operative, paying attention and was trying to participate in the tenth and eleventh sessions of singing VLD exercises. She/he spoke one or two syllables of each word (omitting the consonant r twice). In the twelfth session she/he again spoke one or two syllables of most of the words. She/he did not speak any word that had three or more syllables and said the wrong syllables for one of the words. In the fourth TRELA test it was noted that she/was co-operative and was paying attention. Participant 02 (SiG) scored 50/78 in the fourth TRELA test which occurred after another three sessions of singing VLD exercises – and the Parent External Factor Reports indicated no influence throughout this period. Sig participant 02 progressed 12 points from the third TRELA score of 36.

Thirteenth, fourteenth, fifteenth sessions and fifth TRELA test

It was noted in the Observational Charts that participant 02 (SiG) was very good and co-operative in the thirteenth session of singing VLD exercises. She/he wanted to touch my hand otherwise she/he was restless in the chair. She/he spoke one or two syllables from each word apart from the word sun in Greek, and all the syllables of the word television in Greek (omitting the consonant r again). In the fourteenth session of singing VLD exercises she/he was holding my hand again, was looking me in the eyes and wanted to lay on my arm. She/he spoke all the syllables of the words water, yoghurt and television in Greek and one or two syllables of each of the rest of the words, apart from the word bed in Greek though she/he was trying but she/he did not manage to say any of the syllables correctly. Again, she/he was trying a lot in the fifteenth session of singing VLD exercises and was looking me in the eyes. She/he spoke all the syllables of the word television in Greek (omitting the consonant r) and one or two syllables of each of the rest of the words. This time though she/he was confusing some consonants (replacing them with the wrong ones). It was noted in the Observational Charts that she/was co-operative and concentrating enough in the fifth TRELA test. She/he was trying a lot but in the last part of the test she/he stood up and was replying to me while she/he was standing up (seemed tired). Participant 02 (SiG)scored 51/78 in the fifth and final TRELA test which occurred after another three sessions of singing VLD exercises – and the Parent External Factor Reports indicated again no influence throughout this period. SiG participant 02 progressed 1 point from the fourth TRELA score of 50. Participant 02, apart from a small lapse in the second TRELA test, showed steady and significant cumulative progress of 21 points. It is of great interest, as noted in the Observational Charts, that participant 02, who was one of the participants who made the highest progress in VLD amongst all participants in the intervention, also scored well in emotional engagement in most sessions. Specifically, her/his scores varied from 4 (= to a satisfying degree) to 6 (=very good) on a scale of 7 (=excellent) (see Chapter Six, Subsection 6.4.2).

Unpaired SiG participant 02's cumulative progress does not detract from the overall positive findings of the paired SiG participants because she/he also made good progress and this could be likely due to singing VLD exercises.

Unpaired SiG P07:

Baseline assessment sessions

Participant 07 had four baseline assessment sessions. Specifically, she/he was often standing up from her/his seat in the last baseline session, and we had to stop soon after the middle of the session to carry on the baseline assessment in another session because there was not enough time to finish the test. As noted in the Observational Charts participant 07 (SiG) was not concentrating in the baseline sessions, especially in the second and third (in the second she/he was coughing). For the baseline assessment, SiG participant 07 scored 16/78, 23/78, and 28/78. The Parent External Factor Reports indicated no influence throughout this period apart from a small positive influence for the first baseline score. Based on mean average, the starting point for participant 07 (SiG) was calculated as 22/78. Although participant 07's starting point was much lower than the base for scoring for this level she/he was placed in that level because the previous Pre-language Level (Play Development) gives no basis for scoring VLD and thus VLD exercises to take place.

First, second, third sessions and first TRELA test

It was noted in the Observational Charts that participant 07 (SiG) was paying a lot of attention in the first, second and third sessions of singing VLD exercises and was calm throughout those sessions. In the third session she/he felt so calm and relaxed that she/he laid her/his head on my legs. It was noted in the Observational Chart of the first test that she/he was not very co-operative. We had to stop the test session and finish it the next day because there was not enough time for her/him to finish it. Participant 07 (SiG) scored 19/78 in the first TRELA test which occurred after three sessions of singing VLD exercises – and the Parent External Factor Reports indicated no influence throughout this period. Participant 07 regressed 3 points from her/his baseline score of 22.

Fourth, fifth, sixth sessions and second TRELA test In the Observational Charts it was noted that participant 07 (SiG) seemed to like the fourth session of singing VLD exercises. She/he was paying attention and was calm. She/he sang the vowels of one word only (yoghurt). In the fifth session she/he was again paying attention and was so calm and relaxed that it seemed she/he needed to sleep. When I sang the word bed in Greek she/he pronounced some sounds and laid her/his head on me. When I asked her/him if she/he wanted to go to bed she/he was trying to say yes (in Greek it is pronounced ne and she/he pronounced it nnniiiiiii). In the sixth session of singing VLD exercises it was noted that she/he was tired and was rubbing her/his eyes. During the fifth session she/he suddenly stood up and ran out of the room, to the room that her/his grandmother was supposed to be waiting. To my surprise (as well) her/his grandmother was not there. She had been out of the room, talking on the phone and the child was just about to start crying. I tried to calm her/him down and while I was reassuring her/him that her/his grandmother was there, just behind the door, the grandmother came in (she probably heard us). It seemed that during the session she/he heard that her/his grandmother left the room and that's why she/he ran out. Once her/his grandmother came in, she/he entered the room again to carry on the session. However, she/he was not very calm and was not paying much attention. Maybe she/he was worried that her/his grandmother could leave again. In the second test it was noted that at some point participant 07 (SiG) told me two words (in Greek) that seemed to be "do not want to". When I repeated those words properly in a question form she/he smiled at me and showed me the correct answer, by tapping her/his finger on the card. She/he spoke some other syllables, and she/he was calm but did not seem to be really interested in the test. Participant 07 (SiG) scored 26/78 in the second TRELA test which occurred after another three sessions of singing VLD exercises – and the Parent External Factor Reports indicated no influence throughout this period apart from a small positive influence for the sixth session. SiG participant 07 progressed 7 points from her/his first TRELA score of 19.

Seventh, eighth, ninth sessions and third TRELA test

It was noted in the Observational Charts of the seventh session of singing VLD exercises that participant 07 (SiG), although she/he had a bit of a runny nose, was paying attention and was calm. She/he only spoke one of the two syllables of the word water in Greek. Although she/he did not speak or sing any syllable of the word yoghurt, when I asked her/him if she/he eats yoghurt she/he replied to me yes in Greek. Also when I sang the word milk in Greek she/he did not speak/sing any syllable and when I asked her/him if she/he drinks milk she/he nodded her/his head. In the eighth session she/he spoke one syllable from the word water in Greek again, was paying attention and smiling at me. She/he also wanted to sit on my legs and was moving her/his head to mine. In the ninth session she/he was again paying attention, was very calm, smiling at me (seemed to like the singing) and moving her/his head to mine. She/he spoke hey and yes at some point while I was singing and at some point, when I asked her/him if she/he wanted me to sing the word one more time she/he replied yes. It was noted in the third TRELA test that she/he was not co-operative, she/he stood up few times and she/he did not seem to be interested in the test. She/he showed some interest for a while when I reminded her/him of the tablet (and a teddy bear/doll) that her/his mother had told her/him she/he would have afterwards. She/he wanted to sit on my legs, to hug and caress her/him. Participant 07 (SiG) scored again 26/78 in the third TRELA test which occurred after another three sessions of singing VLD exercises – and the Parent External Factor Reports indicated no influence throughout this period. Participant 07 made no progress from the second TRELA score of 26. Although the child seemed to like the singing sessions she/he was not yet ready to speak or sing any of the singing VLD exercises and nor was she/he able to make any progress in the TRELA test. It seems that the very low baseline score of 22/78 made it difficult for this child to make progress (the lower the development the more difficult the progress).

Tenth, eleventh, twelfth sessions and fourth TRELA test

As noted in the Observational Charts participant 07 (SiG) in the tenth session of singing VLD exercises was calm, paying attention, looking me in the eyes and moving her/his head close to mine. She/he seemed tired and her/his grandmother had told me that the child had an episode in the session she/he had attended before. In the eleventh session she/he was calm and paying attention. It was noted that she/he spoke quietly (twice) only the last syllable from the word yoghurt in Greek. In the twelfth session of singing VLD exercises she/he was calm and was laying her/his head on me. Nevertheless she/he stood up a couple of times, but once I told her/him to sit down she/he did it at once. In the fourth TRELA test participant 07 (SiG) was restless, did not want to sit and co-operate. We had to stop the test and finish the other half of it in one of the following days because there was not enough time for her/him to finish it. In that second session she/he seemed sleepy and hypotonic. Participant 07 scored 36/78 in the fourth TRELA test which occurred after another three sessions of singing VLD exercises – and the Parent External Factor Reports indicated no influence throughout this period. The “crisis” that was mentioned by her/his grandmother could have been noted by her as a negative influence in the Parent (significant other) External Factor Report yet it was not. SiG participant 07 progressed 10 points from the third TRELA score of 26 and this progress seems quite significant, given the notes from the Observational Charts and especially in the fourth TRELA test.

Thirteenth, fourteenth, fifteenth sessions and fifth TRELA test

It was noted in the Observational Charts that participant 07 (SiG) was co-operative in the thirteenth session of singing VLD exercises. She/he was grabbing my hands searching for physical contact to comfort her/him and wanted to sit on my lap. She/he spoke the first syllable-vowel from the word sun in Greek and the last syllable from the word yoghurt (in Greek). Both in the thirteenth and fourteenth sessions of singing VLD exercises participant 07 was standing up and then was sitting when I was telling her/him to do so. She/he was paying attention in the fourteen session and spoke the first syllable from the word sun (in Greek). She/he spoke the last syllable from the word bed which has three syllables in Greek and the vowels of the other two syllables. For three words she/he pronounced some syllables that made no sense to the researcher. In the fifteenth session of singing VLD exercises, although she/he was paying attention, she/he did not speak any syllable of any word and seemed tired. In the fifth TRELA test, it was noted in the Observational Charts, that she/he seemed tired and not very interested (stood up a couple of times). Participant 07 (SiG) scored 38/78 in the fifth and final TRELA test which occurred after another three sessions of singing VLD exercises – and the Parent External Factor Reports again indicated no influence throughout this period. SiG participant 07 progressed 2 points from the fourth TRELA score of 36. Participant 07 (SiG) managed to get very close to the base of scoring at Level 1 (38/78, the base being 39/78) in the last TRELA test. Although she/he had a regression of 3 points in the first TRELA test, she/he made cumulative progress of 16 points at Level 1. This is quite significant taking into account she/he had the lowest baseline score of all the participants (the lower the development the more difficult the progress). That score of overall progress gives grounds for possible continuation of progress if the sessions had not ended.

Unpaired SiG participant 07's cumulative progress does not detract from the overall positive findings of the paired SiG participants because she/he also made good progress and this could be likely due to singing VLD exercises.

Unpaired SiG P13:

Baseline assessment sessions

SiG participant 13 had four baseline assessment sessions, like many of the participants, because she/he was not assessed at the appropriate level the first time; she/he was assessed at Level 2 where she/he scored 15/36, which was not high enough for the base score. It was noted in the Observational Charts that she/he was standing up and turning a floor light on and off at the beginning of all the three baseline sessions (I later moved the floor light outside the room). For the baseline assessment at Level 1, participant 13 scored 32/78, 43/78, and 48/78. The Parent External Factor Reports indicated no influence throughout this period. Based on mean average, the starting point for participant 13 was calculated as 41/78.

First, second, third sessions and first TRELA test

It was noted in the Observational Charts that participant 13 (SiG) seemed to like the singing VLD exercises in the first session. She/he spoke the word milk in Greek. Also, from the word television she/he spoke the first, and last syllable as well as the vowels from the other three syllables of that word. In the second and third sessions she/he was speaking, (not singing, and not clearly in the third session) every time after me (all four times) the singing VLD exercises. She/he was in a hurry to press the button on the computer to listen to (and see) the melody of the exercises. I was telling her/him that she/he should first repeat (after me, and with me) and then press the button and so she/he did. She/he seemed to enjoy the third session; she/he was playful, and she/he spoke one word (yoghurt) melodically. It was also noted in the Observational Chart of the first test that she/he was concentrating. However, after her/his mother's guidance, she/he wanted to have one smartie after completing each section of the test. The smarties are considered an external factor and the fact that there were some parents who used this motivational strategy of parental rewards (or others that I may not be aware of) could not be controlled for at that stage, and caused disruption to the research. Although motivational strategy may have therapeutic value to children with ASD we cannot know how other children in the research who were not using it (as far as I was aware) would have performed otherwise (see Chapter Six). Participant 13 (SiG) scored 53/78 in the first TRELA test which occurred after three sessions of singing VLD exercises – and the Parent External Factor Reports indicated no influence throughout this period. SiG participant 13 progressed 12 points from her/his baseline score of 41 and that progress may not have happened if the external factor of smarties could have been excluded.

Fourth, fifth, sixth sessions and second TRELA test

In the Observational Charts it was noted that participant 13 (SiG) enjoyed the fourth session of singing VLD exercises and was paying attention. She/he spoke (did not sing) all the words, though some not clearly (she/he omitted a few letters in words, especially consonants, for instance in the words sun and bed). Again, in the fifth and sixth sessions she/he seemed to enjoy the singing and was concentrating. She/he spoke (did not sing) the words syllable by syllable and some of them not clearly (again she/he was omitting letters from words for instance consonants from the words sun, bed, milk and yoghurt in Greek). In the sixth session of singing VLD exercises it was noted that she/he spoke each word more times than before and some of them a little melodically. In all those three sessions I had to remind her/him first to repeat after me and then press the button to listen to the melody of the next singing VLD exercise. In the second test it was noted that participant 13 (SiG) was not very co-operative, was in a hurry and a little tense. Nevertheless, SiG participant 13 scored 57/78 in the second TRELA test which occurred after another three sessions of singing VLD exercises – and the Parent External Factor Reports indicated no influence throughout this period apart from a small positive influence for the test. Participant 13 (SiG) progressed 4 points from her/his first TRELA score of 53 giving grounds for correlation with the Parent External Factor Report since it indicated a small positive influence for the second TRELA test.

Seventh, eighth, ninth sessions and third TRELA test

As noted in the Observational Charts participant 13 (SiG) was in a hurry in the seventh, eighth and ninth sessions of singing VLD exercises. She/he spoke all the words in those sessions, a little melodically for most of them in the seventh and eighth sessions and all of them melodically in the ninth session. It was noted in the third TRELA test that she/he was co-operative but in a hurry again and at the end of the test she/he seemed quite tired. Participant 13 (SiG) scored 52/78 in the third TRELA test which occurred after another three sessions of singing VLD exercises – and the Parent External Factor Reports indicated a small positive influence throughout this period. SiG participant 13 regressed 5 points from the second TRELA score of 57 giving no grounds for correlation with the Parent External Factor Report since it indicated a small positive influence for the second TRELA test (whereas it should have indicated negative influence). Only the observational notes could shed some light on this regression (SiG participant 13 being in a hurry and quite tired).

Tenth, eleventh, twelfth sessions and fourth TRELA test

In the Observational Charts it was noted that participant 13 (SiG) was co-operative, and paying attention in the tenth session of singing VLD exercises, although she/he was in a little bit of a hurry again. She/he spoke all the words but some of them not clearly; she/he was omitting a few syllables and consonants in five words; however, she/he managed to speak two of them properly the last time. In the eleventh session she/he was very co-operative, and was in the mood for singing. She/he sang all of them properly and close to the tone apart from one word (sun in Greek) where she/he omitted a vowel (she/he pronounced the syllable los in Greek instead of lios). In the twelfth session although she/he was co-operative, she/he was also stressed and hurried. Again, five words out of the eight of the session were not pronounced clearly (she/he was substituting and omitting consonants in those five words). In the fourth TRELA test it was noted that she/was co-operative but hurried again. Participant 13 (SiG) scored 54/78 in the fourth TRELA test which occurred after another three sessions of singing VLD exercises – and the Parent External Factor Reports indicated a small positive influence throughout this period apart from the tenth session where no influence was indicated. SiG participant 13 progressed 2 points from the third TRELA score of 52.

Thirteenth, fourteenth, fifteenth sessions and fifth TRELA test

Participant 13 (SiG) as noted in the Observational Charts was once again hurried in the thirteenth session of singing VLD exercises. She/he sang (not very melodically) clearly four out of the eight words of the session. She/he omitted and substituted again some consonants for the other four words. In the fourteenth session of singing VLD exercises her/his mother told me that she/he was ill for nearly two weeks before. In that session she/he was tense, impatient, and very hurried. She sang clearly (but not very melodically) only two words out of the eight. Again she/he was substituting and omitting consonants for the other five words (especially the consonant r). In the fifteenth session of singing VLD exercises it was noted that she/he was co-operative and was singing the words on her/his own (yet not simultaneously with me and not very melodically). It was noted in the Observational Charts that although she/was co-operative in the fifth TRELA test she/he was not very focused and seemed tired (especially in the section on expression in the TRELA test). Her/his mother told me after the session that she/he was tired from the rehearsals of the school celebration and had slept on the coach before our session ("which seldom happens" – her words). Participant 13 scored 61/78 in the fifth and final TRELA test which occurred after another three sessions of singing VLD exercises – and the Parent External Factor Reports indicated a small positive influence throughout this period apart from the thirteenth session where no influence was indicated. SiG participant 13 progressed 7 points from the fourth TRELA score of 54. Participant 13 (SiG) made cumulative progress of 20 points.

Unpaired SiG participant 13's cumulative progress does not detract from the overall positive findings of the paired SiG participants because she/he also made good progress and this could be likely due to singing VLD exercises.

All three of these unpaired participants who did sessions of singing VLD exercises made progress as shown on the tables, which continues to support the hypothesis that singing could be valuable for the VLD of children who are diagnosed with ASD and aged between 5 and 11 years. As noted in the Observational Charts, it is of great interest that participant 13, who was one of the participants who made the highest progress in VLD, amongst all the participants in the intervention, scored 6 out of 7 in emotional engagement in most intervention sessions (see Chapter Six, Subsection 6.4.2).

Level 1, Participants 02, 07 and 13 (P02, P07 & P13)							
TRELA	Baseline	Test 1	Test 2	Test 3	Test 4	Test 5	***Overall Progress***
SiG – P02	30	40	36	38	50	51	***21***
Cumulative Progress		*10*	*- 4*	*2*	*12*	*1*	
SiG – P07	22	19	26	26	36	38	***16***
Cumulative Progress		*- 3*	*+ 7*	*0*	*+ 10*	*+ 2*	
SiG – P13	41	53	57	52	54	61	***20***
Cumulative Progress		*+ 12*	*+ 4*	*-5*	*+ 2*	*+ 7*	

Table 5.1 Table Showing Detail of Progress for SiG P02, P07, and P13 (Level 1)

5.2.2 Level 2 – Unpaired SiG Participant P14 (& P09)

Unpaired SiG P14:

Baseline assessment sessions

It was noted in the Observational Charts that participant 14 (SiG) was not concentrating and was in a hurry in the first baseline session. In the following two baseline sessions she/he was very hurried. In the baseline assessment, participant 14 scored 18/36, 23/36, and 25/36. The Parent External Factor Reports indicated no influence throughout this period. Based on mean average, the starting point for SiG participant 14 was calculated as 22/36.

First, second, third sessions and first TRELA test

It was noted in the Observational Charts that participant 14 (SiG) seemed to like the singing VLD exercises a lot in the first and second sessions and wanted more. She/he spoke all the singing VLD exercises. She/he did not sing apart from a little at the end of the second session. In the third session she/he was very focused and in the middle of the session she/he started to sing some words of the (singing) VLD exercises. In contrast, as noted in the Observational Chart, she/he was not concentrating in the first TRELA test. She/he was very tense and had a runny nose. Participant 14 (SiG) scored 27/36 in the first TRELA test which occurred after three sessions of singing VLD exercises – and the Parent External Factor Reports indicated a small positive influence for the first and second sessions, and no influence for the third session and the first TRELA test. SiG participant 14 progressed 5 points from her/his baseline score of 22 which is good progress considering her/his health was not good in the test session.

Fourth, fifth, sixth sessions and second TRELA test

In the Observational Charts it was noted that participant 14 (SiG) in the fourth, fifth and sixth sessions of singing VLD exercises, was concentrating, was paying attention and sang all the singing VLD exercises. After listening to me I told her/him it was her/his turn to sing and then she/he could press the button to listen to the next melody-singing VLD exercise, and so she/he did. In the sixth session the fourth (last) time she/he sang the singing VLD exercises simultaneously with me (though not very in tune). In the second TRELA test, which occurred after another three sessions of singing VLD exercises, participant 14 (SiG) was co-operative, was paying attention and scored 28/36 – and the Parent External Factor Reports indicated no influence throughout this period. SiG participant 14 progressed 1 point only from her/his first TRELA score of 27.

Seventh, eighth, ninth sessions and third TRELA test

It was noted in the Observational Charts that participant 14 (SiG) was calm, paying attention and sang the singing VLD exercises in the seventh, eighth and ninth sessions of singing VLD exercises. She/he was singing a little slower in the rhythm and sang half of them in tune. In the eighth session she/he made up a lyric that she/he sang in her/his own melodic way (i.e. “I’m a child, I dance like a child”). During the ninth session she/he wanted to hold the little book from the objects of the test, that I had next to me. It was noted that in the third TRELA test she/he was tired (rubbing her/his eyes), not concentrating and in a hurry to finish the test. Participant 14 (SiG) scored 30/36 in the third TRELA test which occurred after another three sessions of singing VLD exercises – and the Parent External Factor Reports indicated no influence throughout this period. SiG participant 14 progressed 2 points from the second TRELA score of 28.

Tenth, eleventh, twelfth sessions and fourth TRELA test

In the Observational Charts it was noted that participant 14 (SiG) in the tenth and eleventh sessions of singing VLD exercises was co-operative and sang the singing VLD exercises, though most of them were not in tune and slower in rhythm. In the twelfth session she/he was very co-operative, was clapping her/his hands while singing the singing VLD exercises and sang more in tune and in rhythm than in the previous two sessions. In the fourth TRELA test it was noted that she/was co-operative but not focused enough and I reminded her/him to focus. SiG participant 14 scored 33/36 in the fourth TRELA test which occurred after another three sessions of singing VLD exercises – and the Parent External Factor Reports indicated no influence throughout this period apart from the eleventh session that indicated a small positive influence. Participant 14 (SiG) made a little progress of 3 points (from the third TRELA score of 30) so it is plausible that the Parent External Factor Report of the eleventh session could have exercised a small positive influence.

Thirteenth, fourteenth, fifteenth sessions and fifth TRELA test

Participant 14 (SiG), as noted in the Observational Charts, sang all the singing VLD exercises in the thirteenth session and most of them in the fourteenth and fifteenth sessions. She/he sang some of them in tune or close to tune. In the thirteenth session she/he could not keep herself/himself calm on the chair, was not very focused and I reminded her/him to focus. It was noted in the Observational Charts that although she/was co-operative in the fifth TRELA test she/he was again not very focused and in a little bit of a hurry to finish the test. SiG participant 14 scored 33/36 again in the fifth and final TRELA test which occurred after another three sessions of singing VLD exercises – and the Parent External Factor Reports indicated no influence throughout this period. The cumulative progress of participant 14 amounted to 11 points.

Unpaired SiG participant 14's cumulative progress does not detract from the overall positive findings of the paired SiG participants because she/he also made good progress and this could be likely due to singing VLD exercises.

Level 2, Participant 14 (P14)							
TRELA	Baseline	Test 1	Test 2	Test 3	Test 4	Test 5	***Overall Progress***
SiG – P14	22	27	28	30	33	33	***11***
Cumulative Progress		*+ 5*	*+ 1*	*+ 2*	*+ 3*	*0*	

Table 5.2 Table Showing Detail of Progress for SiG P14 (Level 2)

Unpaired SiG P09 (graduated from paired Level 1):

Tenth, eleventh, twelfth sessions and fourth TRELA test

In the Observational Charts it was noted that participant 09 (SiG), who graduated from Level 1, liked the new singing VLD exercises of Level 2. She/he was co-operative and sang the singing VLD exercises for that level. She/he struggled with two consonants in two verbs (θ, th substituted by χ, h and γ, very soft g substituted by ζ, z) but after looking carefully a few times at my mouth she/he managed to pronounce it correctly. The same approach was followed for all SiG and SpG participants (trying to make them look carefully at my mouth) when they were struggling with consonants. Her/his tune got better in every session and this shows that his/her focus was getting better and he/she was involved more efficiently. She/he also remained focused in the fourth TRELA test. For the fourth TRELA test, at Level 2, participant 09 (SiG) scored 25/36. The Parent External Factor Reports indicated no influence for the tenth session, a small positive influence for the twelfth session, and a small negative influence for the eleventh session and for the TRELA test. Despite these influences, SiG participant 09 achieved a good score for prospective continuing progress at Level 2.

Thirteenth, fourteenth, fifteenth sessions and fifth TRELA test

In the last three sessions it was noted in the Observational Charts that SiG participant 09 was co-operative and sang the exercises. In the last session she/he was coughing and was singing in a slower rhythm. She/he substituted the same consonants that were mentioned in the previous sessions again but this time she/he also substituted the consonant θ, th with σ, s. In the last fifth TRELA test participant 09 (SiG) seemed tired and her/his mother also confirmed that afterwards. SiG participant 09 did make further progress of 2 points in the fifth TRELA test and completed research participation with a score of 27/36. For this score, the Parent External Factor Reports indicated a small positive influence for the thirteenth session and much better influence for the fourteenth and fifteenth sessions and for the TRELA test. Whilst the cumulative benefit of those positive influences could have some bearing on this in-stage progress of 2 points, they are insufficient explanation for participant 09's cumulative progress (at Level 1) and of the substantial difference in cumulative progress between this participant and her/his paired SpG participant 11 (at Level 1).

Unpaired SiG participant 09's progress does not detract from the overall positive findings of the paired SiG participants because she/he also made progress at this level and this could likely be due to singing VLD exercises.

Level 2, Participant 09 (P09)							
TRELA	Baseline	Test 1	Test 2	Test 3	Test 4	Test 5	***Overall Progress***
SiG – P09	[redacted]				25	27	***2***
Cumulative Progress						+ 2	

Table 5.3 Table Showing Detail of Progress for SiG P09 (Level 2)

5.2.3 Level 4 – Unpaired SiG Participant P03

Unpaired SiG P03:

Baseline assessment sessions

SiG participant 03 had had more than three baseline assessment sessions because at the beginning she/he was not assessed at the appropriate level for her/his abilities, as happened for many other participants. It was noted in the Observational Charts that participant 03 was co-operative and concentrated in all three baseline assessment sessions for Level 4. However, in the second baseline assessment session she/he was less focused in comparison to the first and third ones. For the baseline assessment, participant 03 (SiG) scored 36/50, 37/50, and 43/50. Based on mean average, the starting point for participant 07 was calculated as 39/50. The Parent External Factor Reports indicated a small positive influence for the first baseline score, very positive influence for the second baseline score and no influence for the third baseline score. I did not make any adjustments based on the Parent External Factor Reports because throughout the research there has been no overall consistent relationship and very little correlation between the Parent External Factor Reports and the baseline and test scores. Overall, accounting for all fifteen participants, the Parent External Factor Reports have shown weak or no correlation with the baseline and test scores as noted here in this Chapter Five and in Chapter Four (see also Chapter Six). Interestingly, the mother of one participant asked me several times which answer she should give on the Parent External Factor Report and as it would not have been appropriate for me to influence her, I replied that it was her own personal subjective opinion that I was seeking. This occurrence of uncertainty does correlate with my finding that the Parent External Factor Reports do not sufficiently explain VLD progress (see Chapter Six) and that I can be somewhat confident that the main influence over VLD development could be participation in the research project.

First, second, third sessions and first TRELA test

It was noted in the Observational Charts that participant 03 (SiG) seemed to like the singing VLD exercises a lot in the first, second and third sessions and was paying a lot of attention, although she/he seemed a little tired in the first session. She/he was very enthusiastic when I was telling her/him to repeat and sing the singing VLD exercises once more and was replying “yeaaahhh!!!” and “nice!” SiG participant 03 scored 43/50 in the first TRELA test which occurred after three sessions of singing VLD exercises – and the Parent External Factor Reports indicated a small positive influence for these three sessions and no influence for the test. Participant 03 (SiG) progressed 4 points from her/his baseline score of 39. It was noted in the Observational Chart that, in some parts of the test, participant 03 (SiG) was not paying attention and was in a hurry to reply. It is well established that attention in ASD (and thus performance) varies wildly and this is characteristic of ASD. Thus in ASD there is not a clear pattern of progress-no progress-regression and fluctuations in scores were expected.

Fourth, fifth, sixth sessions and second TRELA test

In the Observational Charts it was noted that participant 03 (SiG) was concentrating and seemed to like and enjoy the fourth, fifth and sixth sessions of singing VLD exercises. Although in the fourth session she/he only spoke (did not sing at all) the singing VLD exercises, in the fifth she/he sang the last four times. In the sixth session she/he sang all the singing VLD exercises first on her/his own (not simultaneously with me when the melody was playing) and later, after she/he had listened to each singing VLD exercise from me three times, together and simultaneously with me. In the second test it was noted that overall, she/he was well focused; however, at some points she/he was little hurried and inattentive. SiG participant 03 scored 40/50 in the second TRELA test which occurred after another three sessions of singing VLD exercises – and the Parent External Factor Reports indicated no influence throughout this period apart from a small positive influence for the fifth session. Participant 03 (SiG) regressed 3 points from her/his first TRELA score of 43 and the Parent External Factor Reports do not contribute any explanation for this regression. The notes of the Observation Charts mentioned above shed a little bit of light on this matter of 3 points of regression.

Seventh, eighth, ninth sessions and third TRELA test

In the Observation Charts a significant increase in co-operation was noted and in the singing process in the seventh, eighth and ninth sessions of singing VLD exercises, that took place before the third TRELA test; in all three of those sessions participant 03 (SiG) sang all the singing VLD exercises either two or three times out of the four, simultaneously with me and seemed to enjoy that singing very much. There was also an improvement in tune, especially in the ninth session. She/he was also co-operative and concentrated in the third TRELA test, yet at some point she/he seemed absent-minded. SiG participant 03 scored 46/50 in the third TRELA test which occurred after another three sessions of singing VLD exercises – and the Parent External Factor Reports indicated no influence throughout this period. Participant 03 (SiG) made good progress of 6 points from the second TRELA score of 40.

Tenth, eleventh, twelfth sessions and fourth TRELA test

In the Observational Charts it was noted that participant 03 (SiG) in the tenth, eleventh and twelfth sessions of singing VLD exercises was again very co-operative, concentrated and sang all the singing VLD exercises. In the fourth TRELA test she/was co-operative, and was paying a lot of attention. It was not noted in the Observation Chart that she/he said a couple of times “I can make it”. This definitely showed her/his will and interest to progress and the tension she/he was probably experiencing. Moreover, to express this, it shows the degree of familiarity and comfort that she/he had achieved with me. SiG participant 03 scored 47/50 in the fourth TRELA test which occurred after another three sessions of singing VLD exercises – and the Parent External Factor Reports again indicated no influence throughout this period. Participant 03 (SiG) progressed only 1 point from the third TRELA score of 46.

Thirteenth, fourteenth, fifteenth sessions and fifth TRELA test

Participant 03 (SiG), as noted in the Observation Charts, was again very co-operative and remarkably sang all the singing VLD exercises all four times in the thirteenth, fourteenth and fifteenth sessions. She/he could remember the melodies and sang all the singing VLD exercises in tune in the last two sessions that took place before the final test. She/he was enjoying the singing VLD exercises in all those sessions and in some was yelling “yeah!” and “give me five”, “give me ten”. In the fifth TRELA test she/he was (again) very good and co-operative and it was noted that the one and only mistake she/he made was probably because she/he was in a hurry. SiG participant 03 scored 49/50 in the fifth and final TRELA test which occurred after another three sessions of singing VLD exercises – and the Parent External Factor Reports indicated no influence throughout this period, apart from the fifteenth session that indicated a small positive influence. Participant 03 (SiG) progressed 2 points from the fourth TRELA test of 47 and was very close to reaching the highest score in Level 4. SiG participant 03 made overall progress of 10 points.

Level 4, Participant 03 (P03)							
TRELA	Baseline	Test 1	Test 2	Test 3	Test 4	Test 5	***Overall Progress***
SiG – P03	39	43	40	46	47	49	***10***
Cumulative Progress		*+ 4*	*- 3*	*+ 6*	*+ 1*	*+ 2*	

Table 5.4 Table Showing Detail of Progress for SiG P03 (Level 4)

5.2.4 Receptive and Expressive Language Development (RLD and ELD) of Unpaired SiG Participants

The progress in RLD of unpaired participants was not similar for all levels in comparison to the progress in ELD. Specifically at Level 1 the RLD progress for SiG participants 02, 07 and 13 was very much higher (16, 15 and 11 points) in comparison to the progress for ELD (5, 1 and 9 points) respectively. Iin contrast, at Levels 2 and 4 the ELD progress for SiG participants 14, 09 (Level 2) and 03 (Level 4) was higher (6, 2 and 6 points respectively) in comparison to the RLD progress (5, 0 and 4 points respectively) and this is something that will be discussed in Chapter Six. At Level 3 and Level 5 there were no unpaired participants thus no data to compare.

Level 1, Participants 02, 07 and 13 (P02, P07 & P13)							
TRELA	Baseline	Test 1	Test 2	Test 3	Test 4	Test 5	***Overall Progress***
SiG – P02	RLD 29 ELD 1	RLD 39 ELD 1	RLD 34 ELD 2	RLD 37 ELD 1	RLD 46 ELD 4	RLD 45 ELD 6	***RLD 16 ELD 5***
RLD Progress *ELD Progress*		*+ 10* *0*	*- 5* *+ 1*	*+ 3* *- 1*	*+ 9* *+ 3*	*- 1* *+ 2*	
SiG – P07	RLD 22 ELD 0	RLD 19 ELD 0	RLD 26 ELD 0	RLD 26 ELD 0	RLD 36 ELD 0	RLD 37 ELD 1	***RLD 15 ELD 1***
RLD Progress *ELD Progress*		*- 3* *0*	*+ 7* *0*	*0* *0*	*+ 10* *0*	*+ 1* *+ 1*	
SiG – P13	RLD 35 ELD 6	RLD 43 ELD 10	RLD 48 ELD 9	RLD 39 ELD 13	RLD 42 ELD 12	RLD 46 ELD 15	***RLD 11 ELD 9***
RLD Progress *ELD Progress*		*+ 8* *+ 4*	*+ 5* *- 1*	*- 9* *+ 4*	*+ 3* *- 1*	*+ 4* *+ 3*	

Table 5.5 Table Showing Progress of RLD and ELD for SiG P02, P07, and P13 (Level 1)

Level 2, Participant 14 (P14)							
TRELA	Baseline	Test 1	Test 2	Test 3	Test 4	Test 5	***Overall Progress***
SiG – P14	RLD 15 ELD 7	RLD 17 ELD 10	RLD 18 ELD 10	RLD 19 ELD 11	RLD 20 ELD 13	RLD 20 ELD 13	***RLD*** ***5*** ***ELD*** ***6***
RLD Progress *ELD Progress*		*+ 2* *+ 3*	*+ 1* *0*	*+ 1* *+ 1*	*+ 1* *+ 2*	*0* *0*	

Table 5.6 Table Showing Progress of RLD and ELD for SiG P14 (Level 2)

Level 2, Participant 09 (P09)							
TRELA	Baseline	Test 1	Test 2	Test 3	Test 4	Test 5	***Overall Progress***
SiG– P09	[redacted]				RLD 19 ELD 6	RLD 19 ELD 8	***RLD*** ***0*** ***ELD*** ***2***
RLD Progress *ELD Progress*						0 + 2	

Table 5.7 Table Showing Progress of RLD and ELD for SiG P09 (Level 2)

Level 4, Participant 03 (P03)							
TRELA	Baseline	Test 1	Test 2	Test 3	Test 4	Test 5	***Overall Progress***
SiG – P03	RLD 21 ELD 18	RLD 22 ELD 21	RLD 20 ELD 20	RLD 23 ELD 23	RLD 23 ELD 24	RLD 25 ELD 24	***RLD 4 ELD 6***
RLD Progress		*+ 1*	*- 2*	*+ 3*	*0*	*+ 2*	
ELD Progress		*+ 3*	*- 1*	*+ 3*	*+ 1*	*0*	

Table 5. 8 Table Showing Progress of RLD and ELD for SiG P03 (Level 4)

RLD and ELD Progress across all Participants (Paired and Unpaired) for Different Ages, Groups (SiG and SpG), and Levels (1-5)						
Participant Count	1	2	3	4	5	Progress
SiG - Level 1 RLD	11 (P16) Aged 5	5 (P09) Aged 7	16 (P02) Aged 5.5	15 (P07) Aged 6	11 (P013) Aged 9	**58**
SiG - Level 1 ELD	12 (P16) Aged 5	9 (P09) Aged 7	5 (P02) Aged 5.5	1 (P07) Aged 6	9 (P13) Aged 9	**36**
SiG - Level 2 RLD	5 (P14) Aged 5.5	0 {P09} Aged 7				**5**
SiG - Level 2 ELD	6 (P14) Aged 5.5	2 {P09} Aged 7				**8**
SiG - Level 3 RLD	6 (P18) Aged 11 18 P18)					**6**
SiG - Level 3 ELD	6 (P18) Aged 11					**6**
SiG - Level 4 RLD	4 (P03) Aged 10	2 {P18} Aged 11				**6**
SiG - Level 4 ELD	6 (P03) Aged 10	0 {P18} Aged 11				**6**
SiG - Level 5 RLD	6 (P04) Aged 6	3 (P08) Aged 5.5				**9**

SiG - Level 5 ELD	1 (P04) Aged 6	14 (P08) Aged 5.5		**15**
SpG - Level 1 RLD	3 (P17) Aged 11	3 (P11) Aged 5.5		**6**
SpG - Level 1 ELD	7 (P17) Aged 11 (P17)	3 (P11) Aged 5.5 (P11)		**10**
SpG - Level 2 RLD				
SpG - Level 2 ELD				
SpG - Level 3 RLD	4 (P01) Aged 8			**4**
SpG - Level 3 ELD	2 (P01) Aged 8 (P01)			**2**
SpG - Level 4 RLD	4 {P01} Aged 8			**4**
SpG - Level 4 ELD	- 2 {P01} Aged 8 {P01}			**-2**
SpG - Level 5 RLD	-1 (P12) Aged 7.5	4 (P05) Aged 9		**3**
SpG - Level 5 ELD	4 (P12) Aged 7.5	2 (P05) Aged 9		**6**

Table 5.9 Table Showing RLD and ELD Progress of All Participants (Paired and Unpaired)

5.3 Summary

This fifth chapter was dedicated to representing the primary data of the unpaired SiG participants at Levels 1, 2 and 4, describing how analysis was undertaken for those participants, and presenting evaluative discussion of that analysis. It also examines the RLD and ELD of those unpaired SiG participants. Chapter Five represents a continuation of the culmination of my endeavour to test the hypothesis that singing could be valuable to the VLD of Greek children aged 5–11yrs and diagnosed with ASD. As for the paired participants in Chapter Four, in this chapter again, there is an overall positive outcome and detailed analysis that supports the positive finding that singing VLD exercises could be valuable. The next chapter, Chapter Six, provides a discussion of the research outcomes in relation to the research question and the literature.

CHAPTER SIX: DISCUSSION

6.1 Overview

The purpose of this chapter is to present a discussion of the data findings collected in the research study. To achieve this purpose, the chapter is divided into six sections. The first section provides a brief overview of this sixth chapter. The second section discusses the methodological limitations and key themes of the sample size and distribution of the research intervention. The third section provides a concise summary and interpretation of the research findings. This third section is further divided into five subsections: 6.3.1 Participation in Singing and in Singing in Tune and Progress of VLD in Children with ASD; 6.3.2 Emotional Engagement (in SiG and SpG Participants) and VLD; 6.3.3 Progress (between SiG and SpG participants) in Low and High VLD Levels in Children with ASD; 6.3.4 Age and VLD in the research intervention and in children with ASD; 6.3.5 The differences in the scoring of RLD and ELD in the research intervention and in children with ASD. The fourth section examines the role of the motivational-reward strategy as a factor that could possibly influence the outcomes of the research intervention. The fifth section discusses the implications and significance of the findings in relation to other research. Finally, the sixth section provides a brief summary of the chapter.

6.2 Size Sample and Distribution of Research Intervention

Although eighteen participants were initially recruited, three withdrew from the study, one of them before the baseline assessment was completed and the other two shortly after completing the baseline assessment. Since this is a qualitative study, the author places more emphasis on the Observation Charts and less on the calculations of data analysis. The participants were divided into five levels based on their verbal language abilities. At Level 1, there were 5 participants in SiG and 2 participants in SpG. At Level 2, there was only one participant in SiG. At Level 3, there was one participant in SiG and one in SpG. At Level 4, there was one participant in SiG and finally at Level 5, there were two participants in SiG and two participants in SpG. Levels 1, 3 and 5 were paired as well as Level 4 but only as a graduation of paired participants from Level 3 (see Table 4.2 in Chapter Four). There were more participants at Level 1 than any other level and the participants who remained unpaired were allocated to SiG in order to gain detailed insights about the prospective values of singing. I intentionally placed more participants in the SiG at Level 1 because it's the level with the minimum verbal language development hence any qualitative data that shows possible value of singing at that level would be more important. There is always a need for more insight for children with ASD with the lowest level of verbal language abilities and their progress with singing since speaking is extremely limited or absent and thus any value from singing in the VLD for that level would be of great importance. For this there was a depth of qualitative analysis both for them and for the rest of the 15 participants.

Progress was evaluated relative to individual baselines (that were calculated as mean average scores) and subsequently compared after every three intervention sessions with following scores for VLD, as determined by TRELA scores and supplemented by notes from the Observational Charts. The baseline scores of paired participants did not match (exactly) so I placed the higher scorer of each pair in the SpG. Doing so could have biased the results against the SiG participants because all the SpG participants started with a higher score compared to their paired singing participant yet that would make any final advantage among the SiG participants more valid. Also, one could have created an expectation that the SpG would maintain an overall advantage but as I assessed progress rather than individual scores fairness was maintained and bias was minimised because the decisive score was derived from the difference between scores rather than the score itself. Ten of the participants were paired and assigned (see 2.3 Assignment in Chapter Two) either to the SiG which involved musicalised singing VLD exercises or to the SpG which involved VLD exercises only by speaking. The remaining five participants were assigned to SiG. Specifically, I compared five SiG participants paired with five SpG participants, but I also assessed the five unpaired SiG participants and the progress of paired and unpaired participants was analysed.

6.3 Interpreting the Research Outcomes

The positive outcomes of my research are supported not only by a significant amount of relevant research (see in Chapter Three, Aldridge, 1995, Blackstock, 1978, Fong and Lee, 2012, GROß et al. 2010, Miller and Toca, 1979, Paivo, 1991, Schwartzberg and Silverman, 2018, Shi et al., 2016, Thaut, 1987, Whipple 2004) but also and more importantly by similar research to mine (see Chapter Three, Chenausky et al., 2017, Chenausky et al., 2016, Molnar-Szakacs et al., 2009, Yan et al., 2021, Wan et al., 2011). In addition, there is research in neuroscience that, to some extent, is supportive of the outcomes of this research intervention (see again in Chapter Three, Boso et al., 2009, Brown et al., 2006, Caria et al., 2011, Koelsch et al., 2002, Lai et al., 2012, Limb 2006, Patel 2011, Schon et al., 2010).

Lee's (2012) case study (see Chapter Three, Subsection 3.3.7) showed that music improves communication and emulation. Shi et al. (2016) found that children with ASD have a strength in mimicking music, and singing is a form of music. It could be that mimicry played an important role in the VLD of the SiG participants in comparison to SpG participants. However, mimicry cannot fully explain the research findings in this study. TRELA (Vogindroukas et al., 2009) uses substitute vocabulary in the tests meaning that TRELA is not a memory test and progress cannot be made by simply copying what was learned during the VLD exercises in the intervention sessions as the vocabulary is different. Nonetheless, there is some basis for suggesting that singing, due to its lively and playful nature, may enhance concentration and memory learning synapses (Blood and Zatorre, 2001), which could explain why the SiG participants made more progress in the TRELA test compared to the SpG participants (see Chapter Three, Subsection 3.3.1).

6.3.1 Participation in Singing and in Singing in Tune and Progress in VLD in Children with ASD

Past research has demonstrated that individuals with ASD have enhanced pitch sensitivity (Bonnel et al., 2003). Mottron et al. (2000) also found that individuals with high-functioning autism have enhanced pitch processing, specifically superior performance in pitch discrimination and categorisation. In relation to my study this means that the SiG participants in the highest level (Level 5) could possibly give a better performance in singing in tune in comparison to rest of the SiG participants at the other lower levels. However, that may not be the case only for high functioning autism as in my research the participants at Level 1 did well in the singing process and progressed more in the VLD than the rest of the participants. Stanutz et al. (2014) found that children with ASD demonstrated elevated pitch discrimination ability in the single-tone and melodic context, as well as superior short- and long-term pitch memory. One could think that there might be a correlation between participation in singing or singing in tune and progress in VLD since pitch discrimination and singing in tune require a high level of perception and cognitive mechanisms both of which are also essential for the VLD. However, as can been seen from the data, SiG participant 02 progressed more in VLD, yet she/he participated much less in the singing in comparison to SiG 13 and other participants and when singing her/his tune was not good in comparison to other participants. Although there is some pertinent research to mine (see Chapter Three, Subsection 3.3.10) there is no relevant literature and research with regard to the degree of singing participation and progress of VLD. Data from this research (see following paragraphs of this subsection) add to a gap in the (existing) knowledge of this matter. According to the data from my research, because of the small cohort of participants there is no clear answer about any correlation in children with ASD between the degree of participating in singing and in singing in tune and the impact that could have in their VLD. Thus, further research needs to take place to explore this matter.

In my study, all of the singing participants engaged in the singing process to varying degrees. However, two of the participants, both in Level 1, were unable to sing any words, but they did speak during the singing process. The remaining eight singing participants in my research intervention were able to sing the VLD exercises in tune to varying degrees (based on the number of times they sang and their ability to sing in tune). This subsection will examine the participants with the highest and lowest progress in VLD in terms of their participation in singing and their ability to sing in tune, and their progress in VLD.

SiG participants with the highest progress in VLD

P16

SiG paired participant 16 at Level 1 was the participant who made the highest progress in VLD, by achieving overall progress of 22 points, and she/he also sang most of the singing VLD exercises in good tune. Participant 16 started with a baseline score of 53 and showed stable progress (Test 1 69/78, Test 2 71/78, Test 3 75/78, Test 4 75/78 and Test 5 75/78). However, participant 16 did not manage to achieve the highest score of 78/78 at Level 1. For some reason she/he remained at the same score of 75/78 for the last three tests. This outcome, of the same remaining score in the last three tests of VLD, raises questions about the connection between singing in tune and VLD, as participant 16 was singing in tune for most of the words in the 10th–15th sessions (prior to the 4th and 5th TRELA tests).It is worth noting that participant 16 had a runny nose during the tenth session and was singing in a hurry for the last sessions, not singing all of the words all four times.

P02

Unpaired SiG participant 02, at Level 1, was the participant who made the next highest progress in VLD after participant 16, by achieving overall progress of 21 points. Although participant 02 did not manage to sing the VLD exercises well or in tune, she/he seemed to really enjoy the singing exercises, was paying attention and was trying her/his best during the sessions. I judged she/he participated well and as much as she/he could. The implications of this case study lead towards the issue of correlation with VLD being the level of engagement in the singing process rather than being in tune.

P13

Unpaired SiG participant 13, at Level 1, was the participant who made the next highest progress in VLD after participants 02 and 16 by achieving an overall score of 20 points of progress. She/he not only participated well in most sessions but she/he made sudden progress in her/his singing. Although she/he was speaking and not singing the words before the sixth session, in the sixth session she/he started to sing some words melodically and in the night session she/he sang all of the words melodically. In the following sessions she/he sang the words melodically but did not sing all of them in any session. As with the previous case study, the level of engagement in the singing process rather than being in tune may be more important for VLD.

P09

SiG participant 09 of Level 1 was one of the participants who managed to sing the singing VLD exercises in tune and achieved the highest score of that level within three TRELA tests with progress of 17 points before moving to Level 2. It is notable that she/he made nearly three times as much progress as her/his paired participant who did ordinary VLD exercises (17 points overall progress compared to 6 points overall progress for her/his paired SpG participant 11). She/he made stable progress by singing more words melodically in every session apart from session five where she/he had a runny nose. Interestingly, in the ninth session she/he sang (nearly) all the words in tune while being co-operative and focused. This fact, alongside the participant achieving the highest score in the TRELA test that followed this session, supports the idea that engagement in singing, especially when singing in tune, may be connected to progress in VLD.

As previously mentioned, three out of the four SiG participants with the highest scores in the VLD managed to participate well in the singing process in most sessions and sang either many or most words in tune. Examining the correlation between the degree of singing participation and the degree of progress in VLD suggests that the specific neural areas that are activated through song may also be involved in the learning process (see Lai et al., 2012, Chapter Three, Subsection 3.3.10). The following paragraphs will examine the SiG participants with the lowest scores in the VLD and their singing participation and ability to sing in tune.

SiG participants with the lowest progress in VLD

P04

SiG participant 04, of Level 5, had the lowest progress score of all SiG participants in the research and that was 7 points of overall progress. Despite this, participant 04 participated in the singing procedure and sang melodically, in good tune in some sessions, although quietly and in a tired way in most sessions. It appears that tiredness may have been a factor in both learning and performance on the tests, as participant 04 had the lowest score on the TRELA tests measuring VLD. However, participant 04 was still able to participate in the singing process to some degree.

P03

Unpaired SiG participant 03, of Level 4, had the next lowest progress score in VLD, after singing participant 04, and out of the rest of the SiG participants, and that was 10 points of overall progress. However, she/he participated well in the singing process and seemed to enjoy the singing sessions. In addition to participating fairly well in the singing sessions, participant 03 also improved in the singing process, singing more words, some of which were in tune. While participant 03 made progress during the sessions, she/he did not progress as well as the other participants on the TRELA tests measuring VLD. This specific case study suggests that the connection between engagement in singing and VLD is not always clear for SiG participants.

P14

Unpaired SiG participant 14, at Level 2, had the next lowest progress score in VLD, after unpaired SiG participant 03 and participant 04, and out of the rest singing participants, and that was 11 points of overall progress, regardless that she/he participated well in the singing process, was calm and was paying attention in the singing sessions. It came as a surprise in the eighth session that she/he made up and sang in her/his own melodic way “I’m a child, I dance like a child.” It was also noted that during the ninth session she/he wanted to hold a little book from the objects of the test that I had next to me. From the seventh until the eleventh session, she/he was singing slower in rhythm. From the above it seems that both the SiG participants who made the highest progress in VLD as well as the SiG participants with the lowest (in comparison to the rest of the SiG participants) progress in the VLD participated to a good degree in the singing VLD exercises leading to no clear conclusion between the degree of participation in singing and VLD. For this purpose, a specific scale could have been designed and completed measuring the level of participation in the singing process. This is something that should take place in future research.

Tryfon et al. (2007) found that performance of nonverbal rhythm synchronisation was similar both for children with ASD and Typically Developing children across all rhythm complexities (see Chapter Three). Both performed better with age and worse with higher complexity. In this study, while the synchronisation task was verbal rather than nonverbal, most participants were able to follow the rhythm when they participated in the singing process simultaneously with the researcher. There were a few exceptions in some sessions, where some participants either followed behind (participants 04 and 14) or ahead of the rhythm (participant 13). Participants 04 and 14, both of whom were in the SiG, had the lowest and one of the lowest progress scores in VLD, respectively, and both followed behind the rhythm. In contrast, participant 13, who was also in the SiG and had one of the highest scores in VLD, was ahead of the rhythm. This implication suggests that there may be a connection between rhythm and VLD.

It is not clear why some participants were more involved in the singing process and particularly able to stay in tune compared to others. It could be a matter of physiology or more likely a matter of practice, familiarity, and confidence with the singing process. In a meeting with the parents before the study began, all parents were asked if their child(ren) had any specific singing sessions outside of school, and none of them replied positively. However, no data were collected on the participants' level of familiarity with singing in their family environment (Ellis et al., 2014) or in their school setting. In future research, a questionnaire could be designed and completed by the parents to gather information on their children's experiences with singing. This may have contributed to the outcome, as those with a high level of familiarity with singing may have been more confident in the singing process.

6.3.2 Emotional Engagement in SiG and SpG Participants and VLD

The reclassification of ASD in Widiger (2013) highlights the language and social aspects, specifying deficits in social communication and I argue that singing may offer a heightened sense of social participation compared to speaking. Vaiouli et al. (2015) found that participatory music improvisation helped to improve shared focus and social participation in three young children with ASD. Attention and engagement are essential for the development of verbal language in children, and individuals with ASD often struggle with these skills (Widiger, 2013). Dewey's (1938) theory of "learning by doing" can be applied to engage children with ASD through listening and speaking activities, but singing may be a more embodied and interoceptively rich experience that can benefit children with ASD.

Based on these findings, it seems that the improved progress of SiG participants may be due in part to appealing to their sensory processing needs. In my experience, singing is particularly effective for vestibular and interoceptive stimulation (Ayres, 1973). Widiger (2013) also emphasises the importance of the sensory system in ASD. While language development exercises appeal to cognitive engagement, singing appeals to the sensory system and may support emotional engagement. Visual communication systems, such as PECS, are limited in their ability to express emotions due to the limited range of emotions available to choose. In contrast, singing allows for more nuanced expression and is not dependent on pictorial or linguistic content, as emotions can be conveyed through the qualities of singing. Additionally, compared to speaking, singing may be more joyful and playful for children, stimulating their emotional engagement.

I observed that the children who achieved language development through singing had a higher prevalence of emotional engagement, as indicated in the Observation Charts. Additionally, those with the highest scores in language development demonstrated particularly strong emotional engagement in the Observation Charts. There is currently a lack of literature and research on the relationship between emotional engagement, singing participation, and progress in language development. This research helps to fill this gap in our understanding of this topic:

1. SiG participant 16 at Level 1 was the participant who made the highest progress in VLD and it was noted in the Observational Charts that on a scale of 1–7 in most intervention sessions she/he achieved a score of 6 (=very good) in emotional engagement.
2. Also, unpaired SiG participant 02, at Level 1, was the participant who made the next highest progress in VLD after participant 16, and her/his scores on the Observational Charts for emotional engagement varied from 4 (= to a satisfying degree) to 6 (=very good) on the scale of 1–7 (7=excellent).
3. Unpaired SiG participant 13 at Level 1 was the participant who made the next highest progress in VLD after participant 02 and 16 and also (like participant 16) scored 6 (=very good) out of 7 (=excellent) in emotional engagement in most intervention sessions.
4. SiG participant 09, of Level 1, was one of the participants who achieved one of the highest scores and also (like participants 16 and 13) scored 6 out of 7 in emotional engagement in most intervention sessions.

In order to make participation enjoyable for all participants (SiG and SpG), I followed Axline's (1947) first principle of developing a warm, friendly relationship with the child. This likely led to a heightened sense of "permissiveness" among the singing participants (Axline, 1947, p. 73).

The scores for emotional engagement were not so high for the SpG participants, with the exception of participant 12. Despite only progressing 3 points from a baseline score of 71/76 to a final score of 74/76, this participant consistently displayed high levels of emotional engagement during nearly all the intervention sessions. This participant had a rating of 6 out of 7 in most sessions and even reached a rating of 7 out of 7 in a couple of sessions. This high level of emotional engagement was also observed during the test sessions, with scores of either 6 or 7 out of 7. It is noteworthy that the participant achieved the highest possible score of 7 out of 7 in one of the baseline sessions too. It is noteworthy that this participant was the only SpG participant with consistently high levels of emotional engagement, and she/he displayed these high scores early on the study. It is possible that this participant has a natural tendency towards high levels of emotional engagement, regardless of her/his progress in VLD, or she/he simply adjusted well to the researcher's procedures and environment.

6.3.3 Progress between SiG and SpG Participants in Low and High VLD Levels in Children with ASD

According to Table 4.1 (of Chapter Four) when comparing the progress of all participants at Level 1, the progress of participants who used singing was very high in that level, in comparison to the participants who used only speaking. The progress was also very high in comparison to the VLD of the participants in all the other levels. At Level 1 there were participants who were either non speaking at all or their speaking was very limited (one word) and the outcomes of greater VLD for these participants are in agreement with the outcomes of similar research conducted by Wan et al. (2011). These results are of great importance for children with ASD. Similar research showed that progress was notable for both participants with low and high verbal development (Chenausky et al., 2017). It is also noted in my research that at the lowest level, Level 1 (See Chapter Three, Lai et al., 2012) and the highest level, Level 5 (See Chapter Three, Caria et al. 2011) the paired participants achieved the highest progress in comparison to the other levels which showed a total progress of 40 and 24 respectively. Nevertheless, that may be due to having more participants in these two levels in comparison to the other levels.

It is of great interest that the three highest scores of progress amongst all levels were achieved by SiG participants at Level 1 (one paired singing participant and two unpaired). Specifically participant P16 (the youngest of all, aged 5 yrs) progressed the most by 22 points from among the paired participants. Among the unpaired participants the next highest score for progress was achieved by another SiG participant at Level 1, P02 (aged 5.5 years old, very close in age to the previous participant) and she/he scored 21 points of progress. Then the next highest progress score was of unpaired participant P13, again at Level 1, who scored 20 points of progress and then unpaired P09, at Level 1 again, (aged 7 yrs) who progressed 17 points (see Table 4.1 of Chapter Four). Anyone working with children with ASD knows that the lower the VLD of the child the more difficult it is to make progress in that field**.** However, it may be the case that the intervention is more appropriate for ASD children with low VLD. These results are in agreement with the research of Wan et al. (2011, Chapter Three), Chenausky, et al. (2016, see Chapter Three), Yan et al. (2021, see Chapter Three) as well as the results in the research by Lai et al., 2012, who showed that the operating neural systems in the brain that elaborate speech and song were involved more and in a more efficient way for song than for speech in low functioning (low verbal ability) children with ASD. They are also in agreement with Boso et al.'s (2009) study that shows no difference between low-functioning participants with ASD and control participants in their liking for harmonious and enjoyable music.

Although the SiG participants in Level 5 made significant progress compared to the SpG participants (see Chapter Three, Caria et al., 2011), this progress was not as great as that in Level 1. The highest score at Level 5 was achieved by the SiG paired participant P08 who scored 17 points of progress, in comparison to the 6 points of progress made by his paired SpG participant in that level (see Table 4.1 of Chapter Four). Three participants at Level 1 had scored higher (22, 21, 20) than participant P08 of Level 5 who followed them in the scoring (with 17 points like P09 of Level 1). The other SiG paired participant P04 scored only 7 points of progress, in comparison to the 3 points of his/her SpG paired participant P12. This outcome in combination with the outcome of 17 points of the other singing participant at Level 5 does not allow for agreement or disagreement with the results of Wan et al. (2011, see Chapter Three), Chenausky et al. (2016 see Chapter Three) and Yan et al. (2021, see Chapter Three) as well as with the results in the research of Lai, et al. (2012), who showed that the operating neural systems in the brain that elaborate speech and song were involved more and in a more efficient way for song than for speech in low-functioning (low verbal ability) children with ASD. One of the two SiG participants at Level 5 (P04) scored a very high score (of 17 points of progress) yet the other one scored a low score (of only 7 points of progress). More participants in that level were needed in order to reach a conclusion about comparison with the results of the previously mentioned research.

The progress of SiG unpaired and paired participants at Levels 2, 3 and 4 agrees with the outcomes of Wan et al. (2011, see Chapter Three), Chenausky et al. (2016), Yan et al. (2021, see Chapter Three) as well as with the results in the research of Lai et al. (2012), who support that singing activates the operating neural systems in the brain that elaborate speech and song in low-functioning children with ASD in a more efficient way. Nor Level 2 nor 3 is the level with low functions children with ASD and in these levels SiG participants did not achieve a high progress score in comparison to the SiG participants, at Level 1, who did achieve the highest scores. Specifically, unpaired SiG P14 of Level 2 scored 11 points of progress, paired SiG P18 of Level 3 scored 10 points of progress (in comparison to the 6 points of his/her SpG paired P01) and unpaired SiG P03 participant of Level 4 also scored 10 points of progress (see Table 4.1 in Chapter Four).

6.3.4 Age and VLD in Children with ASD

Since in the SiG group the youngest child (5 yrs) progressed more than the older one (7 yrs), it may also be plausible that the intervention is more appropriate for younger children with ASD (Miller and Toca 1979, cited by Oldfield p. 90). It is also remarkable that the only two SiG participants of the same age at Level 1, paired participant 16 aged 5 and unpaired participant 02 aged 5.5 years, scored nearly the same in their progress in VLD, 22 and 21 respectively. These two participants were the only ones of the same age at the same level (though one of them was paired and the other one was unpaired). Participant 11 of SpG was also of the same age of 5.5 years, at Level 1, however she/he progressed only 6 points, 16 and 15 points less than participants 16 and 02 of the same age but in the SiG (paired and unpaired) respectively. Since there were not enough participants of the same age at the same level, we cannot make any general claim regarding the progress of VLD and the age of the participants. Yet, in this research two out of the three participants of the same age of 5/ 5.5 years old, at Level 1, made big and nearly the same progress and these were in the SiG in comparison to the one who made a small amount of progress and was in the SpG. Progress scores of 22 and 21 for VLD (for the SiG participants) is a significant difference in comparison to 6 VLD progress points (for the SpG participant). It could be due to random chance or due to the fact the child had language sessions in the past. It could also be due to the fact that one was going through a developmental spurt. In any case, the large difference in progress between the SiG and SpG participants of the same age is worth further investigation.

In a study by Knaus et al. (2009), MRI was used to measure specific areas in the brain (planum temporale, pars triangularis, and pars opercularis) that may be connected with language ability in 40 typically developing individuals and 40 developing individuals with ASD. The two groups were subdivided into younger (aged 7–11) and older (aged 12–19). In younger children with ASD, correlations were important between language and symptom severity scores with frontal language areas. Specifically in developing individuals with ASD the areas of pars triangular and opercularis together were larger than typical developing individuals. These findings suggest that these group differences may be related to autism symptom severity and language abilities.

In a study by Geurts and Embrechts (2008), 28 Dutch children with ASD aged 7–14 years were recruited and the CCC-2 was used to measure various aspects of communicative impairments, including language structure and pragmatic skills. The aim of that study was to find out if the profile of language abilities and deficiencies in preschoolers with ASD was similar to the language profile in children with ASD aged 7–14 years. On the CCC-2, kindergarteners with ASD appear to have a profile which is not like school-aged children. Preschoolers with ASD impairments were present in all CCC-2 scales, including the ones connected to language form (structural aspects) such as syntax. School-aged children with ASD depicted impairments in all scales aside from the scales connected to language form (structural aspects). There was an imbalance between the pragmatic/social impairments and the impairments of the structural aspects (form) of language in the older children with ASD while the contrary motive was depicted in the kindergarteners with ASD. Since the CCC-2 is a parental report, it is depicted that children with ASD, according to their parents, conquer some deficits at school age, especially the deficits in language structure (form) that appear not to be so important at that age. It could be that the developed language form is the effect of maturity and/or treatment sessions. However, treatment of pragmatics is less effective because the pragmatic difficulties are at the core of the ASD diagnosis and thus more continuous. These findings are consistent with those of Rapin and Dunn (2003), who reported that pragmatic impairments become more prominent as structural language impairments improve in children with ASD as they age.

Level 1:

It is difficult to determine whether the progress of VLD in children with ASD of different ages in each language level in my research is consistent with the findings of the above studies. Specifically, at Level 1, the outcomes do not offer agreement or disagreement with the studies of Geurts and Embrechts (2008) and Rapin and Dunn (2003) since Level 1 does not measure structural aspects of language. However, it can be examined whether they are closer in agreement with the outcomes of Klaus et al. (2009) who support that in younger children with ASD correlations were important between language and symptom severity scores with frontal language areas. The outcome of the first two participants at Level 1 is in agreement with the study of Knaus et al. (2009) since the youngest participant (SpG) progressed less. Specifically, participant 11 of SpG was 5.5 yrs and progressed 6 points from the baseline score whereas participant 09 of the SiG was 7 yrs and progressed 17 points from the baseline score. Level 1 is a level where children with ASD are either not speaking or use one word and thus one would expect that the 7-yr-old child would find it more difficult to progress in comparison to the 5.5-yr-old due to his/her lack of VLD (Level 1) for a longer period of time (7 years in comparison to 5.5 years). The singing intervention might have worked in her/his favour for she/he progressed much more than twice her/his pair.

However, at Level 1, the outcome of the next two participants is not in agreement with the study of Knaus et al. (2009) since the youngest participant (SiG) progressed more. Specifically, participant 17 of the SpG was 11yrs and progressed 10 points from the baseline score whereas SiG participant 16 was 5 yrs and progressed 22 points from the baseline score. This outcome, contradictory to the previous one, is more of an expected outcome in relation to age, although it is not in agreement with the study of Knaus et al. (2009). Participant 17 of SpG at the age of 11 yrs is still at Level 1 and participant 16 of SiG is at the same level yet at the age of 5 yrs. One would expect the much younger child (aged 5) who happened to be in the SiG to be able to progress more and indeed she/ he progressed more than twice the 11-yr-old who happened to be in the SpG. It seems probable that the singing intervention might have worked in her/his favour for she/he progressed much more than twice her/his paired SpG participant.

Level 3:

At Level 3, participant 01 of SpG was 8 yrs and had progressed 6 points from the baseline score after two TRELA tests, and just before moving to Level 4, whereas participant 18 of the SiG was 11 yrs and progressed 10 points. This outcome at Level 3 is in agreement with the study of Knaus et al. (2009) who support that in younger children with ASD correlations were important between language and symptom severity scores with frontal language areas since the youngest participant (SpG) progressed less. One would expect that the 11-yr-old child of the SiG would find it more difficult to progress in comparison to the 8-yr-old of the SpG due to his/her lack of VLD (Level 2) for a longer period of time (11 years in comparison to 8 years). The singing intervention might have worked in her/his favour for she/he progressed much more in comparison to her/his paired SpG. In the TRELA test for Level 3 there are two specific subsections that measure structural aspects of language and the outcome of only two tests with the same scores for both (SiG and SpG) participants in the structural measurements does not provide us with enough data to have a clear picture of whether it agrees or not with the results in Geurts and Embrechts' (2008) and Rapin and Dunn's (2003) studies who support that children with ASD conquer deficits in structural language at school age and as they grow. In those sections both participants gave only one wrong answer in the first test and none in the second test in which both reached the highest point and moved to Level 4. Yet one would expect, according to the outcomes of the above studies that the older participant (11 yrs, SiG) would have progressed more in those specific sections than her/his paired younger participant (8 yrs, SpG).

Level 4:

Both (SiG and SpG) participants then, at Level 4, progressed 2 points, after three TRELA tests. The same progress scoring for both SiG and SpG participants, in the fifth TRELA test, does not allow us again to agree with the outcomes of Knaus et al. (2009, see above) since the youngest participant 01 (8 yrs, SpG) should have progressed less than her/his older paired participant 18 (11 yrs, SiG). More importantly the same scoring of progress at this stage between the SiG participant and the SpG participant gives no value to the singing VLD exercises at Level 4. However, both participants moved from Level 3 and the SiG participant both started and finished with a higher score than his paired SpG participant. It would be really of great interest, were these participants able to carry on more intervention sessions, to see the in-stage progress outcome for those participants. At Level 4 this outcome (as at Level 3) does not allow us to agree with the outcomes of Geurts and Embrechts (2008) and Rapin and Dunn (2003) who support that children with ASD conquer deficits in structural language at school age and as they grow. That is because both participants had the same scoring in the subsection where structural aspects of language could be measured yet they were of different ages (8 yrs and 11 yrs). Specifically in the subsection of the TRELA test, at Level 4, where structural aspects of language could be measured, both participant 01 (8 yrs in the SpG) and participant 18 (11 yrs in the SiG) gave in total of 8 wrong answers. To agree with the aforementioned studies, the older participant (11 years old, SiG group) should have made more progress (made fewer mistakes) in the structural language measures than the younger participant (8 years old, SpG group).

Level 5:

At Level 5, there is consistency of disagreement of the results of the four participants with the outcomes of Knaus et al. (2009) who support that, in younger children with ASD, correlations were important between language and symptom severity scores with frontal language areas. Specifically, participant 12 (SpG) was 7.5 yrs and progressed 3 points from the baseline score whereas participant 04 (SiG) was 6 yrs and progressed 7 points from the baseline score. In order for the outcome of my research to agree with the outcomes of Knaus et al. (2009) the younger participant 04 (SiG) should have progressed less than paired older participant 12 (SpG). It seems possible that the singing exercises might have worked in her/his favour for she/he progressed more than the double in comparison to her/his paired SpG participant.

At Level 5, the results of the next two participants are not in agreement again with the outcomes of Knaus et al. (2009), who support that in younger children with ASD correlations were important between language and symptom severity scores and frontal language areas. Specifically, participant 05 (SpG) was 9 yrs and progressed 6 points from the baseline score whereas participant 08 (SiG) was 5.5 yrs and progressed 17 points from the baseline score. In order for the outcome of my research to agree with the outcomes of Knaus et al. (2009) the younger participant 08 (SiG) should have progressed less than the paired older participant 05 (SpG). However, the younger child (5.5 yrs) who was in the SiG progressed more in comparison to her/his older paired participant (9 yrs) who was in the SpG. The singing exercises might have worked in participant 08's favour for she/he progressed nearly three times more in comparison to her/his paired SiG participant.

There the is no consistency of agreement or disagreement in the results for the four paired participants with the studies of Geurts and Embrechts (2008) and Rapin and Dunn (2003) since the outcomes of the two paired participants disagree whereas the outcomes of the other two paired participants agree with the above studies. The TRELA test for Level 5 does measure structural aspects of language amongst other things. However, at that level, in the subsections where structural aspects of language could be measured, only by me using a scale out of ten (thus not taken into consideration in the results as justified in Chapter Two, Subsection 2.2 third paragraph) both participant 12 (7.5 yrs, SpG) and participant 04 (6 yrs, SiG) scored in total (mean average) 9/10. One would say that the same result for the structural aspects of language for both participants (aged 7.5 yrs and 6 yrs) is in disagreement with the studies of Geurts and Embrechts (2008) and Rapin and Dunn (2003) who support that impairments in the structural aspects of language are more apparent in younger children with ASD and tend to lessen as children grow up. In order for the outcome of my research to agree with the outcomes of the above studies, the older participant 12 (7.5 yrs, SpG) should have made more progress (given fewer wrong answers) than her/his paired younger participant 04 (6 yrs, SiG), in the subsection where structural aspects of language could be measured. However, the small age difference between those two participants (1.5 yrs) could be a factor amongst others (such as intensive speech sessions that the 6-yr-old child could have attended) explaining why there is no difference in those subsections between the two participants. Regardless of the same scoring in the structural aspects of language, it may be that the singing benefited participant 04 who scored in total more than his/her paired 12 of the SpG.

At Level 5, in the subsections of the TRELA test where structural aspects of language could be measured, only by me using a scale out of ten (thus not taken into consideration in the results as justified in Chapter Two, Subsection 2.2, third paragraph) participant 05 (9 yrs, SpG) scored in the five TRELA tests in total (mean average) 8/10 whereas participant 08 (5.5 yrs, SiG) scored 7/10 in total (mean average). One would say that the better scoring in the structural aspects of language of the older (9 yrs) participant 05 (SpG) in comparison to the younger (5.5 yrs) paired participant 08 of the SiG is in agreement with the studies of Geurts and Embrechts (2008) and Rapin and Dunn (2003), who support that impairments in the structural aspects of language are more apparent in younger children with ASD and tend to lessen as children grow up.

Progress of Paired Participants (SiG and SpG)			
	1	2	Progress
SiG - Level 1	22 (P16) Aged 5	17 (P09) Aged 7	39
SiG - Level 2			
SiG - Level 3	12 (P18) Aged 11		12
SiG - Level 4	2 {P18} Aged 11		2
SiG - Level 5	7 (P04) Aged 6	17 (P08) Aged 5.5	24
SpG - Level 1	10 (P17) Aged 11	6 (P11) Aged 5.5	16
SpG - Level 2			
SpG - Level 3	6 (P01) Aged 8		6
SpG - Level 4	2 {P01} Aged 8		2
SpG - Level 5	3 (P12) Aged 7.5	6 (P05) Aged 9	9

Table 6.1 Table Comparing Progress of Paired Participants of Different Ages in the SiG and SpG

Progress of Paired Participants Minus Graduation			
Participant Count	1	2	Progress
SiG - Level 1	22 (P16) Aged 5	17 (P09) Aged 7	39
SiG - Level 2			
SiG - Level 3	12 (P18) Aged 11		12
SiG - Level 4			
SiG - Level 5	7 (P04) Aged 6	17 (P08) Aged 5.5	24
SpG - Level 1	10 (P17) Aged 11	6 (P11) Aged 5.5	16
SpG - Level 2			
SpG - Level 3	6 (P01) Aged 8		6
SpG - Level 4			
SpG - Level 5	3 (P12) Aged 7.5	6 (P05) Aged 9	9

Table 6.2 Table Comparing Progress of Paired Participants in SiG and SpG of Different Ages but not Including Two Scores Each for P01 and P18 (Discounting Graduation)

Progress of Unpaired Participants			
Participant Count	1	2	3
SiG - Level 1	21 (P02) Aged 5.5	16 (P07) Aged 6	20 (P13) Aged 9
SiG - Level 2	11 (P14) Aged 5.5	2 {P09} Aged 7	1
SiG - Level 4	10 (P03) Aged 10		

Table 6.3 Table Comparing Progress of Unpaired Participants in SiG of Different Ages

6.3.5 Receptive and Expressive Language Development (RLD and ELD) in Children with ASD

A significant number of studies support the claim that toddlers and preschoolers with ASD show greater impairment in receptive compared with expressive language abilities (Boucher 2012; Luyster et al., 2008; Mitchell et al., 2006; Kjelgaard and Tager-Flusberg 2001; Weismer et al., 2010; Hudry et al., 2010; Volden et al., 2011; Loucas et al., 2008; Charman et al., 2003; Kover et al., 2013; see Chapter Three, Subsection 3.3.4). Hudry et al. (2010) found not only that on all three language measures they used, the receptive ability was relatively more impaired than expressive ability but also that the marked receptive language impairment affected at least one-third of preschoolers with autism in their sample. Kwok et al. (2015) (see Chapter Three, Subsection 3.3.4) argue in their meta-analysis that even though some children with ASD may have an expressive advance compared to receptive language profile, this profile is not typical enough to be indicative of ASD.

The variation in progress of my own participants does not allow me to agree or disagree with the previous research on this subject. It may be the case that until the age of 5.5 yrs there is a small advantage in ELD for some participants; however, the very small cohort in my research does not allow for such speculation. In my research (see Chapter Five, Table 5.9) there were five participants who were preschoolers, according to Greece's school system whereby children start at 6 yrs (aged 5 yrs, 5.5 yrs) and ten participants who were at school (aged 6yrs, 7 yrs, 7.5 yrs, 8 yrs, 9 yrs, 10 yrs and 11 yrs) and the scores for RLD and ELD were different for those from these different groups. However, of those five participants only one (P16) was 5 yrs and that participant from the preschoolers scored a little lower (11 points) in the RLD score in comparison to the 12 points for ELD. Four out of the five preschoolers were aged 5.5 yrs and the scores for RLD and ELD varied for these participants. Specifically, two of those four participants (aged 5.5 yrs) also scored lower for RLD. One of them (P08) scored very much higher for ELD (14 points in comparison to the 3 points for RLD). The other one (P14) scored (like P16) a little higher for ELD (6 points in comparison to the 5 points for RLD). There was one (P11) who scored the same score both for RLD and ELD (3 points in each) and one (P02) who, contrary to the above research, scored very much higher for RLD (16 points in comparison to the 5 points for ELD).

Of the fifteen participants in my research, ten were of school age and the RLD and ELD also varied for those participants. Remarkably, four of them scored higher for ELD (two of them in the SiG and the other two in the SpG), thus these outcomes somehow call into question the results of previous research that support that Receptive Language develops as children with ASD grow. Nevertheless, the cohort of my research is too limited to make any valid comments agreeing or disagreeing with previous research. However, it is also noted that four participants scored higher for RLD and were also placed equally (2 each) in the SiG and SpG, thus one cannot make any assumptions about whether singing could factor in these results. Although the cohort is very limited it seems from the findings in my study that at school age there is progress in both RLD and ELD both for SiG and SpG participants. In addition, two out of the ten school-aged participants were 6 yrs, the age of schooling in Greece, the borderline between preschoolers and schoolers. Very interestingly, both these participants were in the SiG and scored a comparatively higher score for RLD. Regardless of the grouping, these two participants (of 6 yrs), who scored higher for RLD, in addition to the four older ones, who also scored higher for RLD, make six participants out of 10 who scored higher for RLD. This supports the outcome of previous research that RLD develops more as children with ASD grow.

P07 (6 yrs) scored 15 points in comparison to the 1 point for ELD and P04 (6 yrs) scored 6 points, in comparison to the 1 point (also like P07) for ELD. It may be the case that the age of 6 yrs is a borderline where a big developmental shift occurs in Receptive Language or it may be the singing process could have also been a factor. However, as this is an outcome for only two participants, it would be interesting for it to be examined in future research with many more participants at that age. Two of those were 7yrs and, contrary to the scores of P07 and P04 aged 6 yrs mentioned above, they both scored higher for ELD. Specifically, P09 of the SiG scored 9 points in comparison to the 5 points for RLD (then 2 points in the next level, in comparison to the 0 points for RLD) and P12 of the SpG scored 4 points in comparison to the -1 regression for RLD. These results do not agree with the outcomes of previous research which claims that RLD improves relative to ELD as children with ASD grow older. One participant was 8 yrs and scored higher for RLD. Specifically, P01 scored 4 points in comparison to the 2 points for ELD and then at the next level again 4 points in comparison to the -4 regression for ELD (see Chapter Four). Two participants were aged 9 yrs and both also scored higher for RLD. P13 scored 11 points in comparison to the 9 points for ELD and P05 scored 4 points, in comparison to the 2 points for ELD. Contradictory to those scores there was P03 who was 10 yrs and scored higher for ELD, specifically 6 points, in comparison to the 4 points for RLD. The remaining two participants were at the age of 11 yrs and one of them scored the same both for RLD and ELD (6 points) at his/her level and higher for RLD (2 points, in comparison to 0 points for ELD) when she/he moved to the next level. The other participant, aged 11 yrs, scored (like P09, P12 and P03) higher for ELD, and specifically 7 points, in comparison to the 3 points for RLD.

6.4 Motivational-Reward Strategy

When people are motivated they perform better (Sansone and Harackiewicz, 2000). Motivation can be categorised as intrinsic, which is characterised by feelings of achievement and satisfaction or extrinsic, in which the satisfaction (/dissatisfaction) comes from outside such as goal attainment, rewards (or punishment). People are motivated by different things and their motivations might change over time. A lack of understanding of how behaviour affects the process, from (family) pressures and (personal) conflicts (see ibid) could cause motivational problems and allow people to lose focus from the main task of getting results. In my research I'm measuring performance and not ability or capability and performance is usually lower than capability. The environment in an ideal situation would allow children to show their abilities. It is expected that the same child can show their abilities differently in different environments. As a researcher, I could not control the different motivations the children experienced from their environment, but I recognised that I needed to particularly engage with this procedure if it arose.

Specifically, in the third baseline assessment session, P17's (SpG, Level 1) mother gave me 'smarties' and told me to give her/him in order to calm her/him down and get her/him to co-operate (I gave her/him three smarties in that session). For this child a motivational strategy was probably applied to her/his learning style and it seems that the child was aware of that and wanted to hold the objects in the twelfth session in order for her/him to speak the words. The same applied for P16 (SiG, Level1), who co-operated only at the end of the second baseline assessment session and spoke some words briefly, after her/his mother gave me a 'kinder sweet' and told me to show it to her/him. Also, in the third and fourth baseline assessment sessions her/his mother had brought smarties and told me to give them to her/him in order for her/him to speak the words.

Participant 11 (SpG) was a third child whose mother applied a specific motivational strategy (/and perhaps in school/ teaching setting) and this could be seen in many of the sessions I had with her/him during the research. Specifically, in the fourth baseline assessment session her/his mother gave me some smarties to give to her/him when she/he was not paying attention. During the first test of participant 11, I let her/him hold a doll while she/he was replying (she/he also spoke to the doll at times). It was noted that participant 11 (SpG) spoke all the words in the fourth session of VLD exercises, but again she/he wanted to hold a doll during the session, and she/he was also speaking to her. In the fifth session, she/he kept standing up from her/his seat and I kept bringing her/him back, a couple of times using the motivation of smarties that her/his mother had suggested to me earlier. It cannot be known, however, whether her/his behaviour could have been caused by listening to what her/his mother had told me about smarties earlier (in order to obtain the smarties). In the sixth session of VLD exercises she/he wanted to hold the doll again during the session. In the ninth session, after a few repetitions and reminding her/him of the smarties that her/his mother had suggested earlier that she/he would get, she/he managed to say the Greek consonant v properly in the word (and not substitute it with another). She/h was co-operative and focused well during the third TRELA test, as noted in the Observational Chart, and in the very beginning she/he asked me for one smartie. She/he also wanted to hold the cards that I was showing to her/him and later on she/he wanted to hold the doll (again). In the eleventh session she/he was calm, holding the doll again and was speaking to her (at some point she/he wanted me to dress the doll and put her shoes on). In the twelfth session she/he also wanted to hold a small book apart from the doll and she/he was speaking certain words that made no sense to the researcher while holding them. In the fourth TRELA test it was noted that she/he was holding the doll during the whole session, she/he was replying to me by pretending that the doll was replying and she/he wanted to play in a symbolic way with the doll, the small book and the cards that I was using. It was noted in the Observational Charts that participant 11 (SpG) was also holding and speaking to the doll during the thirteenth, fourteenth and fifteenth sessions. In the thirteenth session she/he didn't want to say three words but after reminding her/him of the smarties that her/his mother had suggested she/he would get she/he spoke them.

6.5 Answering the Research Question

This research project set out to test the hypothesis that: *singing could be valuable to the Verbal Language Development (VLD) of Greek Children who are diagnosed with Autism Spectrum Disorder (ASD) and aged between 5 and 11 years (5–11yrs)* and found an overall positive outcome that indicates prospective value for continuing and future research. The research sought qualitative insights and drew from the literature, more than a decade of experiential knowledge, and primary research. The primary research took the form of pre-test and post-test analysis, using Vogindroukas et al.'s (2009) 'Test of Receptive and Expressive Language Abilities' (TRELA) which is specifically designed for Greek children who have ASD; comparative analysis between SiG participants and SpG participants, supplementary evaluations based on unpaired participants and observations recorded throughout the entire project. This study also included Parent External Factor Reports – overall, accounting for all fifteen participants – the External Factor Reports revealed weak or no correlation with the baseline and test scores and did not sufficiently explain VLD progress. Thus, the Parental External Factor Reports should be better designed and distributed to the parents in future research. I can be quite confident that the main influence over VLD progress for most participants was participation in the research project rather than any notified external variable as informed by the parents.

In order to better address the basic research question, specific subquestions were formulated to help answer the research question for this project. An important subquestion that has been formed is whether there is a correlation between the degree of participation in singing and in singing in tune and the degree of progress in VLD in Greek children with ASD aged 5–11 yrs. It seems that the SiG participants who made the highest progress in VLD also participated to a very good degree in the singing exercises in contrast to the SiG participants with the lowest (in comparison to the rest of the SiG participants) progress in the VLD, who did not participate to such a good degree. However, we cannot give a definite answer to this matter because of the small number of participants; thus, further research needs to take place.

Another subquestion has been whether there was any correlation between the emotional engagement in Greek SiG and SpG participants with ASD aged 5–11 and their progress in VLD. From the Observational Charts, it seems that the SiG participants were more emotionally engaged than the SpG participants plus the SiG participants with the highest progress in VLD scored higher in the emotional engagement in comparison to most if not all the rest of the SiG participants. However, the small cohort of participants does not allow us to arrive at a definite outcome and further research is needed on this matter.

A third subquestion has been whether the progress in VLD between Greek SiG and SpG participants with ASD aged 5–11 yrs has been bigger in low or high VLD Levels. However, regardless of the outcome, since the number of participants in my study was small, further research is needed on this matter too. Data from my research show that the three highest scores in VLD were achieved by participants at Level 1 (lowest level) and then by participants at Level 5 (highest level), thus in agreement with previous research (see Subsection 6.3.3 of this chapter), it seems that children with ASD for some reason find it easier to progress more in the lowest and highest levels of VLD.

Another subquestion has been whether there was any correlation between the age of Greek SiG and SpG participants with ASD and their progress in VLD. Again, the small size of participants does not allow us to generalise the outcome although data from this research show it may be plausible that the intervention is more appropriate for younger children with ASD (Miller and Toca 1979, cited by Oldfield p. 90). Since there were not enough participants of the same age at the same level, we cannot make a claim regarding the progress of VLD and the age of the participants, only that in this research two out of the three participants of the same age of 5/ 5.5 years old, at Level 1, made really big progress and these were in the SiG in comparison to the one who made little progress who was in the SpG.

Finally, the last subquestion that was formed in order to address the main research question examined what progress was made by the SiG participants of this research project in RLD and what progress they made in ELD. Also, what progress did the SpG participants make in RLD and what progress did the same participants make in ELD (see data in Chapters Four and Five)? Data from this research show it may be the case that until the age of 5.5 yrs there is a small advantage in ELD for some participants; however, the very small cohort in my research does not allow for such speculation.

The main practical goal of this study was to show progress in developing receptive and expressive verbal language skills for all 15 participants. This was achieved because all participants (regardless of assignment to group) demonstrated progress in VLD. All five of the unpaired participants made good progress that correlates more closely with the paired SiG participants than it does with the paired SpG participants. This study demonstrates much better progress in the SiG participants who used singing to develop their verbal language and that is important in order to continue further research on this phenomenon.

Overall, this research suggests that singing may be valuable for the VLD of the participant cohort who are Greek children diagnosed with ASD and aged 5–11yrs. Overall, all the SiG participants achieved more progress with VLD compared to their paired SpG participants using only VLD exercises. At every starting level where comparative evaluation was possible (Level 1, Level 3, and Level 5) there is consistent evidence of superior progress among the SiG participants, strongly indicating that singing is valuable. However, the progress evaluation findings account for only ten participants and give no insights into progress at Level 2. Nevertheless, at Level 2, unpaired P14's (SiG) progress does not detract from the other paired SiG positive findings because P14 also made very good progress (of 11 points) through singing VLD exercises. Comparison of in-stage progress demonstrates fluctuations (in the range – regression, no progress, and varying degrees of progress) both when singing VLD exercises and when doing VLD exercises only, and these fluctuations are characteristic of ASD. Comparison of level of achievement in individual score demonstrates that the highest score was achieved by a participant doing singing VLD exercises. The greatest degree of in-stage progress was made by a participant doing singing VLD exercises, and the largest amount of cumulative progress was achieved by a participant doing singing VLD exercises.

Similar research (Chenausky et al., 2017; Chenausky et al., 2016; Lim, 2010; Yan et al., 2021; Wan et al., 2011; Molnar-Szakacs et al., 2009) are supportive of the positive outcomes of my research. It is important, however, to outline that although this study indicates the value of singing for the VLD of Greek children with ASD aged 5–11 yrs, there is no definite answer (according to the Observational Charts) about any correlation between the degree of participating in singing and in singing in tune and the impact that could have in the VLD of children with ASD. Because of the small cohort of participants further research is needed on this phenomenon. Although the scores of SiG participants in VLD progress at all levels are very high and very much higher in comparison to the SpG participants, one cannot conclude that singing has an apparent value for the VLD of children with ASD because of the very small cohort of participants in this research. This does not allow me to answer the research question in a certain, convinced way and generalise this outcome. Nevertheless, the positive data findings of this research give a positive basis for further and bigger research in the future, with a large number of participants, in order to be able to answer the research question appropriately.

Also because of the interdisciplinary character of this research, focus on necessary abilities can, in the future, progress team developmental work to a deeper degree within established interdisciplinary centres and training programmes for the following generation of interdisciplinary scholars (Aboelela, Sally W., et al., 2007). As outlined by Aboelela et al. (2007), although many researchers have tried interdisciplinary research because they have realised the constraints of their disciplinary approach when faced with complicated health care research questions, such research, in most cases, occurs in an unsystematic way, depending upon the initiative of the researcher. The evolution of interdisciplinary approaches within health-related research is a necessity and must increasingly become the standard as an essential, teachable research approach rather than the exception as a random unsystematic occurrence (ibid).

6.6 Summary

In this discussion chapter, I have considered the literature and data findings to identify some broader themes related to the research question. This study supports the need for further research in the future, particularly due to the specific limitations identified in the study. The final chapter, Chapter Seven, discusses the limitations of the study, summarises the entire thesis, and suggests ideas for continuing and future research.

CHAPTER SEVEN: SUMMARY AND CONCLUSIONS

7.1 Overview

The purpose of this chapter is to present a summary of the thesis and bring this study to a conclusion. To achieve this purpose, Chapter Seven is structured in four sections, including this first section that provides a brief overview of this seventh chapter. The second section explains the limitations of the research, lays claim to continuing research and indicates prospects for future research. Finally, in the fourth section, there is a brief summary of this seventh chapter and conclusion of the entire thesis.

7.2 Limitations and Future Research

This study provides a convincing rationale for continuing and future research into this phenomenon. In this research project, the elements of singing, VLD, and Greek children aged 5–11yrs with ASD frame the contribution to original knowledge, and the findings of this study support and complement the already published findings of the key literature. This project represents the first research regarding this specific matter but drew insights from key literature – existing case studies indicating that musical structures can help children with ASD to improve their phonological memory and apprehension and encourage vocalisation (Miller and Toca, 1979, in Oldfield, 2006).

There were, however, some limitations that should be considered in relation to these findings. The initial baseline assessment involved me making an informed guess about which level to test each participant at and to determine their starting positions. I consulted with participants' parents about this but some of the participants scored highly or below the base at the level they were initially tested at, which caused me to question if they were already at the right level. Starting a participant at too low a level could risk hyporesponsivity and/or demonstrate progress that is not truly developmental (because the participant was already at a higher level). In order to be sure I had the appropriate starting level for each participant, I had to test some of the participants at the next highest level in order to assign each participant to her/his appropriate starting level (four assessment baseline sessions instead of three in order to take the mean average of the closest three). In practice, this meant that SpG participant P01 and SiG participant P18 commenced at Level 3 but already had strong scores though still with potential to improve. Both P01 of the SpG and P18 of the SiG graduated to Level 4 and that is a remarkable achievement (see Chapter Four, Subsection 4.5.1) but less noteworthy when it is recognised that they were both already in a strong position to possibly complete Level 3. Another limitation of this study was that comparative evaluation of paired participants was not possible at Level 2 and, at Level 4; there was only partial comparison which became possible because P01 (SpG) and P18 (SiG) graduated from Level 3, so these gaps in the research also need further study.

Although (partial) comparison became possible at Level 4, because P01 (SpG) and P18 (SiG) graduated at this level, they both achieved the exact same score for cumulative progress. There is no distinction between singing VLD exercises and VLD only as cumulative progress at Level 4, although P18 of the SiG achieved a 4-point higher score than her/his paired P01 of the SpG. Furthermore, there were only two paired participants at Level 4, who had only three TRELA tests at this level, so this level needs further study. The gaps in the evidence base are targets for future research. Furthermore, there is a need to have a continued scale of measurement when moving from one level to the other thus the same scale of measurement for all levels (for instance the same scoring out of 60 for each of the levels).

Moving across the levels there was different scoring, i.e. Level 1 has a scoring out of 78, Level 2 a scoring out of 36, Level 3 a scoring out of 72, Level 4 a scoring out of 50, and Level 5 a scoring out of 76, and this complicates the picture of progress. However, one has to bear in mind that this test was designed as a diagnostic measurement of the level of VLD for Greek children with ASD at a specific time, and not as a progress research measurement for that VLD. The test, as it is now, is built upon a particular kind of model of how language development occurs in children with ASD and thus there are different sections at each level that measure different aspects of language according to that (see Chapter Two, Subsection 2.2.2). Getting a single, uniform measurement for each level that measures the same aspects of language (if possible) would allow for a much clearer picture about the progress in the VLD of children with ASD. Constructing this continuous same scoring scale for every level would probably require either an alteration in the existing TRELA test or the usage of another test that measures VLD but involves that specific element.

The design of a continuous (same scoring) scale of measurement for all five levels, although it would be very positive and more useful for the research in terms of articulating the progression in children's language, not be straightforward and the implications for that in practice are very complex. Potentially, that test would have to focus on only one dimension of language that could be measured at all five levels and that would be vocabulary. If syntax were also to be measured then the scale and the measurement could not start at the existing Level 1 of TRELA with that aspect of language, since there is no syntax at that level, only very little vocabulary. Thus, the measurement of VLD progress including the aspect of syntax would start from a higher level of VLD in children with ASD and there would be four or three levels, instead of the existing five of this TRELA test (by excluding the first levels).

The findings presented are methodologically limited to time and place – to the context of the study. The study included working on a one-to-one basis with only 15 participants, offering insufficient magnitude for generalisation – but it is reasonable to consider that the findings hold prospects for many children whose circumstances are comparable. Future research would benefit from larger cohorts of participants and randomised control trials which could allow generalisation of the research findings. That, however, would require significantly more funding and access to large numbers of participants than was possible in this study. In the request for a funded research project, commissioners can sidestep the methodology, the tight timeframe and participatory constraints (Booth et al., 2016).

In designing future research, it is also necessary to interview the parents about getting specific data for the participants because background factors may have had an impact on the outcomes for the participants. For instance, I could note for each participant if, how many and since what age they had speaking and/or singing sessions, and what is/was their child's relationship with singing. A factor not measured in my research study that could also have contributed to the VLD of those children is the amount of time that each participant had in (other) speech therapy sessions during the period that my intervention was taking place. That is something that could also be noted for each participant in future research.

It could also be noted if the parents or the teachers of the children apply a specific motivational-reward strategy to the learning style of the child. During my research intervention, I recognised that I needed to particularly engage with this procedure as it arose for specific children (see Chapter Six, Subsection 6.4). If I were to do further research, specific (or nonspecific) motivations-reward strategies would be taken into account from the beginning (as well as if they were arising during the research intervention) in order to better organise the sessions for each participant.

Another factor that could be measured in future research and be included in the parents' questionnaire is their level of education. Grandgeorge et al. (2009) showed that children raised by parents with a high level of education displayed earlier language development. Moreover, they showed earlier first words and phrases if their mother was at a high level of education, which reveals an additional gender effect. Although that research was conducted for typical children, there is no reason to assume this result could not somehow be applied to children with ASD as well; thus, children who progressed more in VLD could have been raised by a mother with a high(er) level of education (in comparison to the children who progressed less in the VLD). In my research I did not take that factor into account and it seems it would be very valuable for this to be included with a simple form in future research.

Another point that should be conducted differently is the Parental External Factors Report because in my research it did not seem to work properly; most of the time, the replies from the parents were not in accordance with their child's performance. There was also a mother who repeatedly asked me what reply she should give on that form. It is possible that three different things could have happened for the Parental External Factors Reports not to have worked properly: that the parents were mistaken, or they were not truthful, or they were truthful but their reply was not related to their children's learning progress. In order to limit the probability of those problems in future research the form could be easier for them to respond to by being more specific. The written form could be really detailed about specific factors that could impact performance in the intervention (either in a positive or in a negative way), instead of giving them a couple of examples as I did. I could have a list of those factors, for instance lack of sleep, accident, loss of a close person, lines, etc and ask them to tick the boxes. Also, I could add a blank box for the parent to fill in what they think could be/ was important, for instance, "Add anything else that has happened recently and you may think is important and could influence your child's performance in the intervention."

Singing could offer potential to better accommodate the learning styles of many children who experience learning difficulties and support what the UK government's Special Education Needs and Disability Act's (SENDA, 2001) legislation refers to as: 'reasonable adjustments'. Are there advantages to be achieved for children with ASD by singing instead of only speaking the specialist education curriculum? Singing is possible to offer a basis for participation for children with ASD through the elements of playfulness, permissiveness, fun, sensory stimulation and learning by doing, by enhancing the only speaking specialist education curriculum. That could be a future research study that requires all the abovementioned presuppositions. Developing knowledge and continuing debate pertaining to how to include children with ASD within education is a necessity that has not yet been met sufficiently. Aboelela, Sally W., et al. (2007) noted that interdisciplinary research may result in the solution of a discreet problem, a single or group of publications, the development of a new field and/or language. Bear A, and Skorton D, (2018) state that "Professional development of current and future faculty is necessary to promote interdisciplinary teaching and learning and additional research on effective pedagogical practices for interdisciplinary learning is needed."

7.3 Summary of the Thesis

In this thesis, after formulating the hypothesis and the basic research design, I outlined the methodological limitations and values, and examined the Observational Charts, the TRELA, and the Parent External Factor Reports. I designed the intervention, addressed the ethics, the ASD (symptomology, treatments and interventions), and studied previous research relating to the elements of ASD, music, singing interventions, learning, and VLD (Receptive and Expressive) amongst others. Then I evaluated the participant distribution, and analysed the findings of the study, both for paired and unpaired participants. Specific issues of this research study were discussed, i.e. participation in singing and in singing in tune and progress in VLD in children with ASD, emotional engagement in SiG and SpG participants and VLD, progress between SiG and SpG participants at low and high VLD levels in children with ASD, age and VLD in children with ASD, the RLD and ELD in children with ASD, and the motivational-reward strategy. Finally, specific limitations of this study were outlined (in the previous subsection) and the necessary steps for future research.

7.4 Summary

This seventh chapter was dedicated to summarising the thesis and drawing this study to a conclusion to support continuing research in the future. This interdisciplinary research project integrates the teaching and learning of children with ASD as well as speech therapy, music, and ASD and has implications for the design of educational curricula of the 21st century. Since the key findings of this study showed all SiG participants achieving more progress with VLD compared to their paired SpG participants using only VLD exercises, it is important to continue research on this phenomenon with a much bigger cohort of participants in order to accommodate the learning styles of children with ASD. A positive outcome of large-scale research would have decisive implications for connecting with children with ASD and for instructing appropriate objectives in language and communication in specialist education curricula.

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APPENDIX ONE: PROJECT INFORMATION SHEET.

"**Speak through Singing**"

Ourania Messini
C/o Colin Murrell
University of Central Lancashire, Preston, Lancashire PR1 2HE UK
School of Art, Design and Performance
Media Factory ME224

/7/2016

Hello.

My name is Ourania Messini (Rania); I'm a Greek PhD student at the University of Central Lancashire in Preston England and I have been given permission from the University and from your child's centre to invite you and your child to participate in my 'Speak through Singing' research project. The project will take place from September 2016 until June 2017. The project studies if singing has any value to the verbal language development of Greek children who are diagnosed with ASD and aged between 5 to 9 years.

If you allow your child to participate in this project, your child will either do verbal language learning by speaking or will do the same verbal language learning by singing, in either case learning will last for about 20-30 minutes per week. Once every three weeks for about 30-60 minutes, your child will do the verbal language development test: 'Test of Receptive and Expressive Language Abilities' (TRELA) that was suitably devised for Greek children with ASD by Doctors Vogindroukas, Grigoriadou, and Kampouroglou. The Test involves using words to identify or describe colours, shapes, spatial relationships, emotions, and stories. Also, in every session, I will make notes using everyday observations about your child's communication.

If you allow your child to take part in the project, I will ask you to also take part by notifying me every week of any important circumstances, using a simple impersonal form that will take less than one minute to complete. You and your child may withdraw from the project at any time, without giving any reason. Neither you nor your child will be named and all information collected will be secured in compliance with Data Protection legislation and held confidentially as anonymous data. For a period of up to one month after the learning is complete, I may continue to meet with your child so that he/ she can get used to the project having finished. Thereafter, I will analyse all of the Test scores and notes and let you know by the end of June 2019 what has been learned about the relationship between verbal language development and singing.

If you have any questions or concerns, you can contact me. I will keep you informed if there are any updates or changes that may affect you or your child and these will be communicated to you either verbally, in writing, or both. If you have any complaints, you can tell me or inform the University.

If you want you and your child to participate, you will need to read and complete the enclosed forms:
1. 'Adult Consent Form' – this is for you to allow yourself to participate.
2. 'Assent Form' – this is for you to allow your child to participate.
3. 'Child Consent Form' – this is for your child and you to allow your child to participate.
If you and your child want to participate, you will need to complete all 3 Forms and bring the detach slips back before September 2016.

You will also find enclosed:

4. 'Parent External Factor Report' – this is how you will participate by using this form to notify me of any important circumstances and bringing the form to your child's centre once every six weeks.

5. 'Observation Record' – this is the information that I will record every week when I observe your child's communication.

It is important to know that it may not be possible for you and your child to participate. Your child can only participate if you also participate by completing and returning the detach slip in **Form 1: 'Adult Consent Form'**. Your child can only participate if you allow your child to participate by completing and returning the detach slip in **Form 2: 'Assent Form'**. Your child can only participate if you also complete and return the detach slip in **Form 3: 'Child Consent Form'** and the answers to the three questions in that form are acceptable. It is acceptable for you to help your child to read and understand Form 3 so that your child can answer the three questions. It is also acceptable for you to help your child to understand Form 3 so that you can answer the three questions on *your child's behalf* but <u>with</u> him/ her.

If your child cannot understand the **5 points** in Form 3, you would answer '**NO**' to question three and, if you complete and return the detach slip with the answer '**NO**' to the third question, you will be asked if it is okay for a member of staff at your child's centre to help your child to understand the **5 points** in Form 3. If your child does understand the **5 points** in Form 3 and at the centre we have all 3 completed detach slips, you and your child will be able to participate. However, if your child does not understand the **5 points** in Form 3, you and your child will not be able to participate unless the Director of your child's centre allows it. Although unlikely and unexpected, if it is the opinion of any Professional or Responsible Person that your child is showing any signs of unwillingness/ discomfort/ unhappiness or similar at any time during his/ her participation in the project, your child will be allowed to stop straight away. You and your child may withdraw from the project at any time, without giving any reason. Please keep all of the information and documents for your own reference and return only the 3 completed and signed detach slips if you want you and your child to be able to participate in this educational research project.

Thank You.

Rania.

APPENDIX TWO: CONSENT FORM.

"**Speak through Singing**"

CODE:

Ourania Messini
C/o Colin Murrell
University of Central Lancashire, Preston, Lancashire PR1 2HE UK
School of Art, Design and Performance
Media Factory ME224

/7/2016

Hello. My name is Ourania Messini and I am a Greek PhD student at the University of Central Lancashire in Preston England. I am writing to ask if you would agree for your child to take part in my research project. The research project studies if singing has any value to the verbal language development of Greek children who are diagnosed with ASD and aged between 4 to 11 years. If your child takes part in the research project, they will either do verbal language learning by speaking or they will do the same verbal language learning by singing. The learning will take place at your child's ordinary centre during his/ her ordinary attendance and will take approximately 20-30 minutes per week; plus, once every three weeks, your child will have a verbal language development test which will take 30-60 minutes to complete (the exact duration will vary depending upon your child's level of verbal language development). If your child takes part in the research project, I will ask you to also take part by notifying me of any important circumstances, using a simple impersonal form that will take less than one minute to complete (please see the enclosed 'Parent External Factor Report').

Please could you read the following information and, if in agreement, sign at the bottom of the page? Please also help your child to read and understand the 'Child Consent Form' which is enclosed. Finally, if you are willing for your child to take part in this research project, please would you also take part yourself by completing the 'Adult Consent Form'?

The Research Project

This research project is approved by the relevant Ethics Committee of the University of Central Lancashire Preston Lancashire PR1 2HE England.

First, your child will work with me so that I can record his/ her starting level; this research uses the *'Test of Receptive and Expressive Language Abilities'* that was specifically devised for Greek children with ASD by Doctors Vogindroukas, Grigoriadou, and Kampouroglou in 2009 (hereafter referred to as the Test). The Test involves using words to identify or describe colours, shapes, spatial relationships, emotions, and stories.

Once I know your child's starting level, your child will continue to work with me to do the verbal language learning each week. Your child may do the verbal language learning by speaking or your child may do the verbal language learning by singing (in either case, your child may or may not speak or sing but I shall speak or sing and ask your child to speak or sing if they want to). Once every three weeks, I will use the Test and in every session some simple observations to record your child's verbal language abilities.

Every week, you will notify me of any important circumstances (such as your child's verbal language being affected by tonsillitis; you are not asked to tell me that your child had tonsillitis rather to tick a box to say that, for example, you expect your child to have not been as verbal this past six weeks). It is important that you

also notify me every week if there were no important circumstances (if circumstances have been much the same as any other period, you would tick ‘No’ and bring the form back to me).

The research will continue like this from September 2016 until approximately June 2017. For a period of up to one month after the learning is complete, I may continue to meet with your child at his/ her centre so that he/ she can get used to the project having finished. Thereafter, I will analyse all of the Test scores and notes, make a comparative analysis of all the data, and write-up the research findings; this is expected to be fully completed by the end of June 2020. When I have fully completed the study, I shall let you know what the research findings are. Within the publications, there will be no way of identifying any of the individuals who have participated within the research.
You and your child (referred to as ‘participants’) may withdraw from the research at any stage, without reason.

Participants will not be named and all information collected about participants will be secured in compliance with Data Protection legislation and held confidentially as anonymous data.

If you have any questions or concerns, please do contact me.

---------- detach here ----------

CODE:

I have read and understood the information given in this Assent Form. I agree for my child to take part in Ourania Messini’s 'Speak through Singing' research project.

Your Child’s Name: _____

Your Name: _____

Your Signature: _____

Date: _____

APPENDIX THREE: CHILD CONSENT FORM.

"**Speak through Singing**"

CODE:

Ourania Messini
C/o Colin Murrell
University of Central Lancashire, Preston, Lancashire PR1 2HE UK
School of Art, Design and Performance
Media Factory ME224

/7/2016

Hello, I'm Rania.
I'm a student in England.
I do a research.
I'm inviting you to help me do the research.
If you like, I can do language learning with you.

If you want to, I'll meet you for about 30 minutes, each week, from September this year until June next year. If you come and stay, we'll do the learning. Once every 3 weeks, I'll make notes with you and this will take us 30-60 minutes each time. It will help me to learn about language.

If you want to join in, it is important to know:

1. **You'll be in the 'Speak through Singing' research project.**
2. **You can stop coming whenever you want.**
3. **We'll learn words once every week.**
4. **I'll make notes with you once every 3 weeks.**
5. **Nobody will see the notes and your name will not be given.**

---------- detach here ----------

CODE:

On this Child Consent Form, please circle '**YES**' or '**NO**' to 3 questions:

- Did you do this form on your own? **NO** **YES**
- Did you get help doing this form? **NO** **YES**
- Do you (the Child) understand points **1-5**? **NO** **YES**

I want to be in Ourania Messini's 'Speak through Singing' research project about language:

Your Name: _____

Your Signature: _____

Witness Name*: _____

Witness Signature: _____

Date: _____

Thank You.

* The Witness must be a Parent/ Guardian/ Responsible Person; please help your child to understand this form. If you answer the 3 questions for your Child, please Circle '**NO**' to Question '1' and '**YES**' to Question 2.

APPENDIX FOUR: ADULT CONSENT FORM.

"**Speak through Singing**"

CODE:

Ourania Messini
C/o Colin Murrell
University of Central Lancashire, Preston, Lancashire PR1 2HE UK
School of Art, Design and Performance
Media Factory ME224

/7/2016

Hello, my name is Ourania Messini and I am a Greek PhD student with the University of Central Lancashire in Preston England. I am writing to ask if you would agree to take part in my research project. The research project aims to test the hypothesis: 'The value of Singing to the Verbal Language Development of Greek children who are diagnosed with Autism Spectrum Disorder (ASD) and aged between 5 to 11 years'. The research project seeks qualitative insights into whether listening to and participating within singing develop verbal language amongst the participant cohort, compared to verbal language development exercises alone. You are receiving this Adult Consent Form alongside an Assent Form and a Child Consent Form for your child.

Please could you read the following information and, if in agreement, sign at the bottom of the page.

You are invited to complete a Parent External Factor Report (see attached "Parent External Factor Report") to indicate any changes in weekly routine for your child that you believe may have had impact upon your child's verbal language ability during the past week. There is no need to disclose any personal information, only to let me know if you believe there has been anything outside of your child's ordinary routine that may have had a positive or negative impact upon your child's verbal language ability. Please contact me if you have any questions or concerns. Thank you for your time and consideration regarding your and your child's participation in my research project.

---------- detach here ----------

CODE:

I agree to complete the "Parent External Factor Report" once every week, from September 2016 until approximately June 2017 as a research participant within Ourania Messini's research poject. I understand that all information will be confidential and stored securely in compliance with Data Protection.

Your Name: _____

Signature: _____

Date: _____

APPENDIX FIVE: PARENT EXTERNAL FACTOR REPORT.

"**Speak through Singing**"

Ourania Messini

C/o Colin Mural

University of Central Lancashire, Preston, Lancashire PR1 2HE UK

School of Art, Design and Performance

Media Factory: ME224

Please tick your chosen answer(s); if you make a mistake, cross-out the whole answer and tick the correct answer:

1. Has there been anything (such as taking a language course or having tonsillitis) that you believe has affected your child's verbal language ability during the past week?

   Yes OR **No**

Thank You.
Please return this completed form to Ourania Messina

APPENDIX SIX: OBSERVATION CHART.

"**Speak through Singing**"

WEEK NUMBER: _____

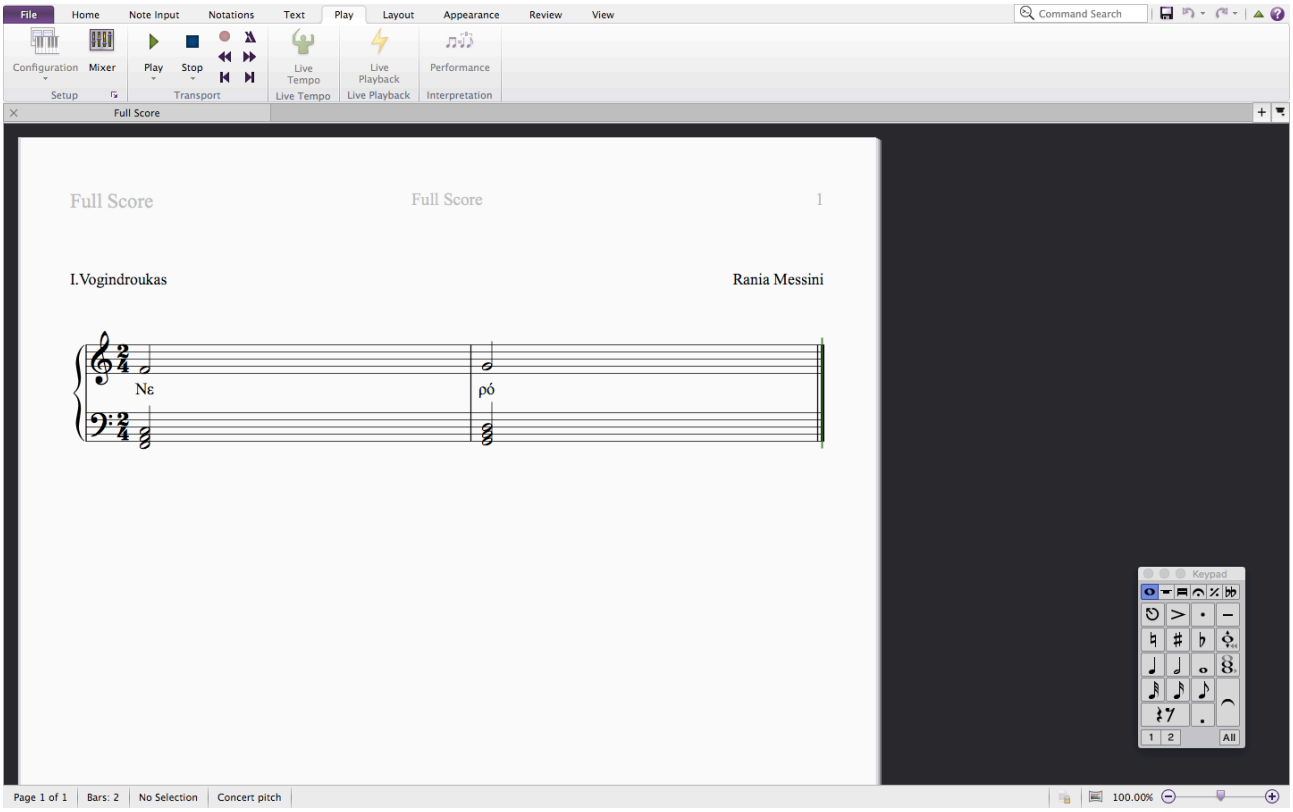
This Observation Record is to be completed only by Ourania MESSINI. Items 1-11 it use a Rating Scale wherein: 0=Not Applicable; 1=Not At All/ None; 2=Very Poor; 3=Poor; 4=Ok; 5=Good; 6=Very Good; 7=Excellent. Items 12 and 13 are to be completed by inserting pertinent descriptors/ key words and frequency. Item 14 is answered either 'Yes' or 'No'.

'Speak through Singing': Observation Record														
	Item 1	**Item 2**	**Item 3**	**Item 4**	**Item 5**	**Item 6**	**Item 7**	**Item 8**	**Item 9**	**Item 10**	**Item 11**	**Item 12**	**Item 13**	**Item 14**
CODE	Overall Engagement	Verbal Engagement	Nonverbal Engagement	Emotional Engagement	Cognitive Understanding	Embodied Knowledge	Receptive to Paralinguistic Content	Receptive to Extra-linguistic Content	Use of Paralinguistic Content	Use of Extra-linguistic Content	General Wellbeing	Errors: Substitute Word(s)/ Inappropriate Word(s).	Particularities/ Anomalies/ Significances	Reported to Uclan
1														
2														
3														
4														
5														
6														
7														
8														
9														
10														
11														
12														
13														
14														
15														

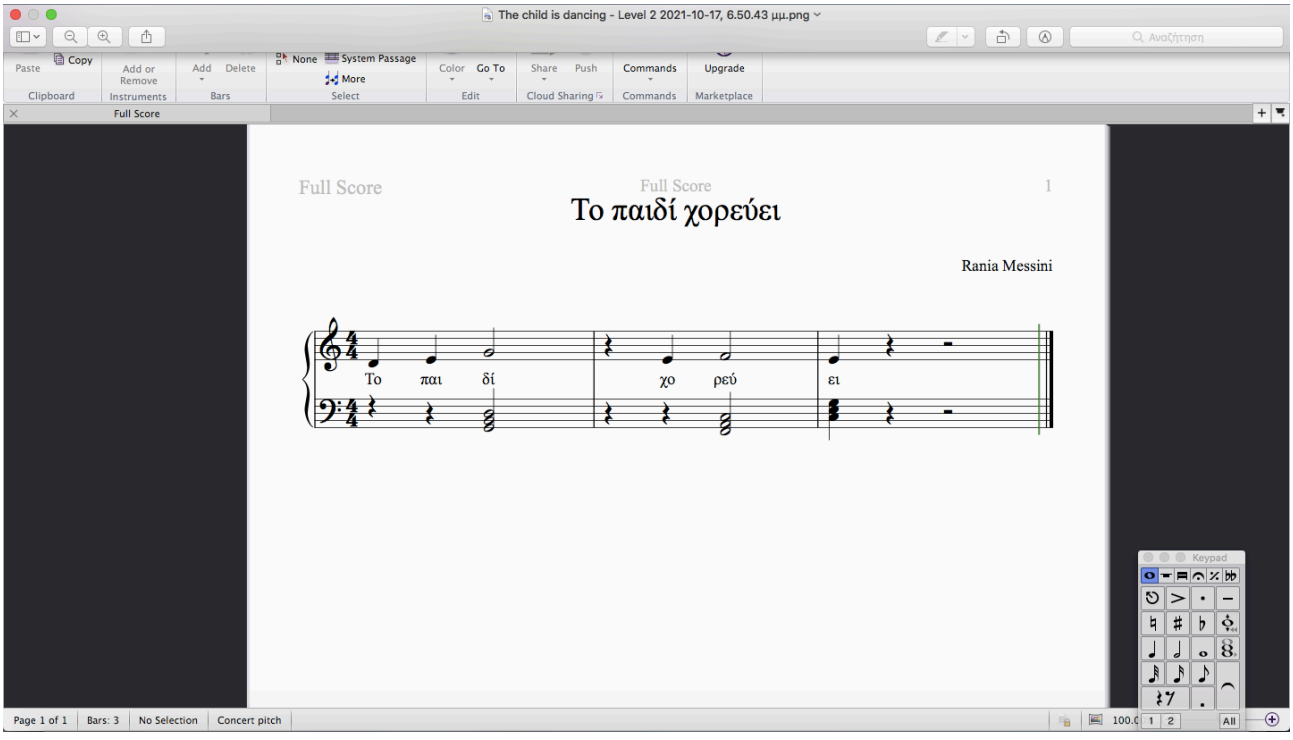
Enlarge at will before printing.

APPENDIX SEVEN: MUSICAL SCORES (SAMPLES 1-5)

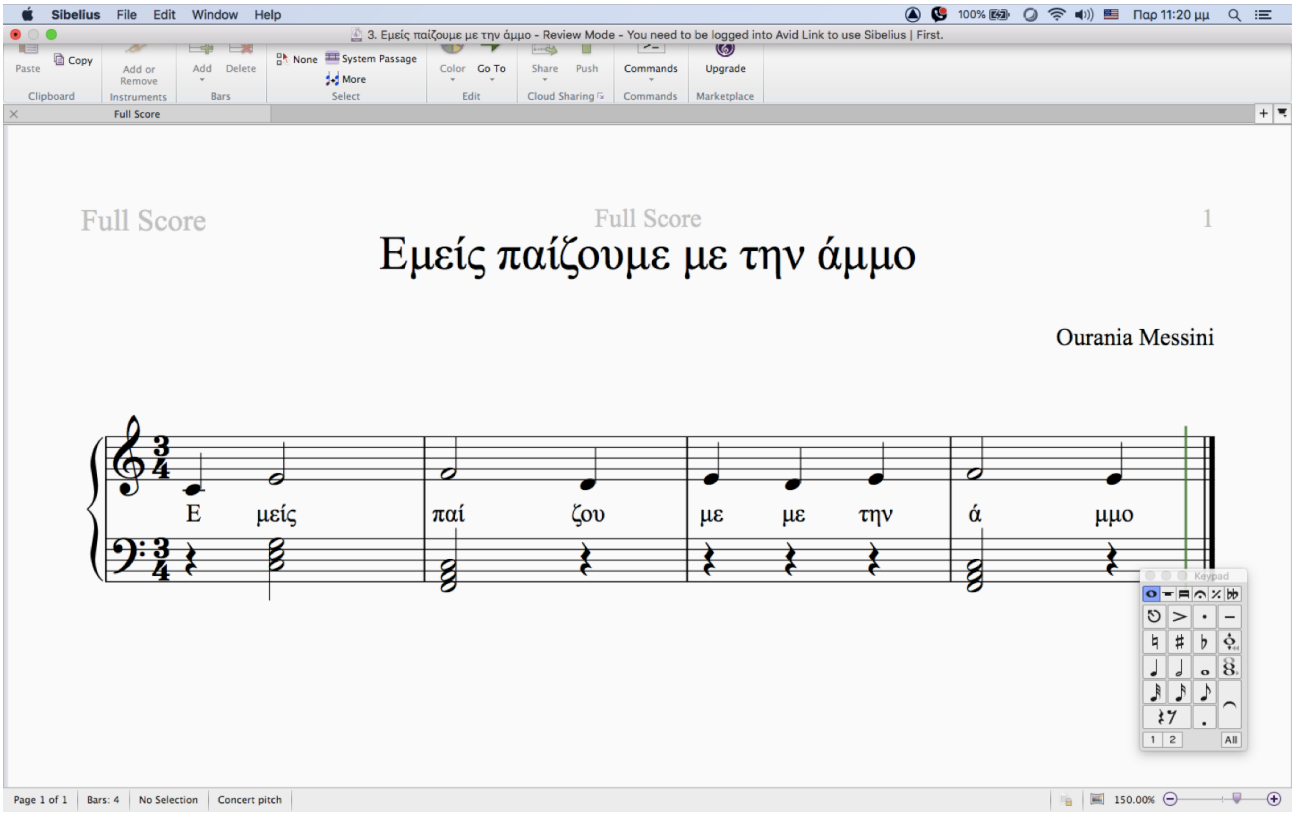
LEVEL 1



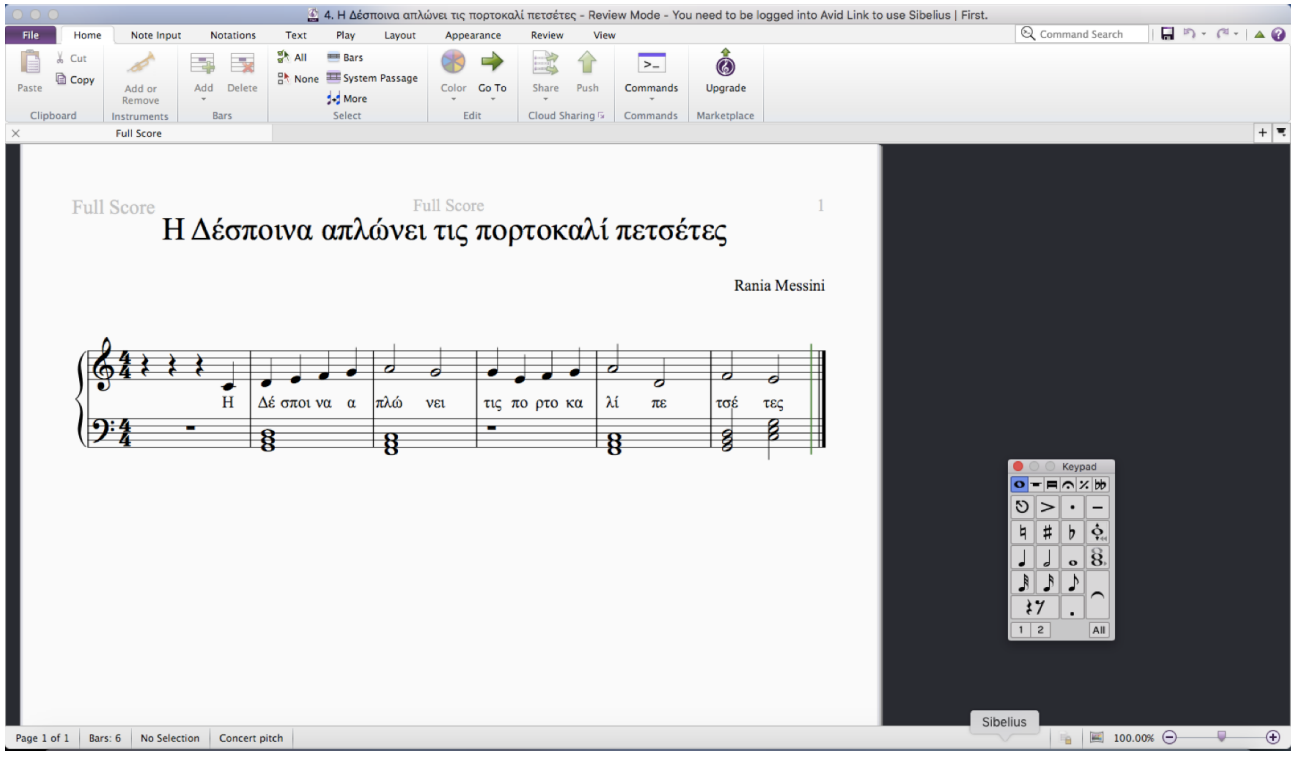
LEVEL 2



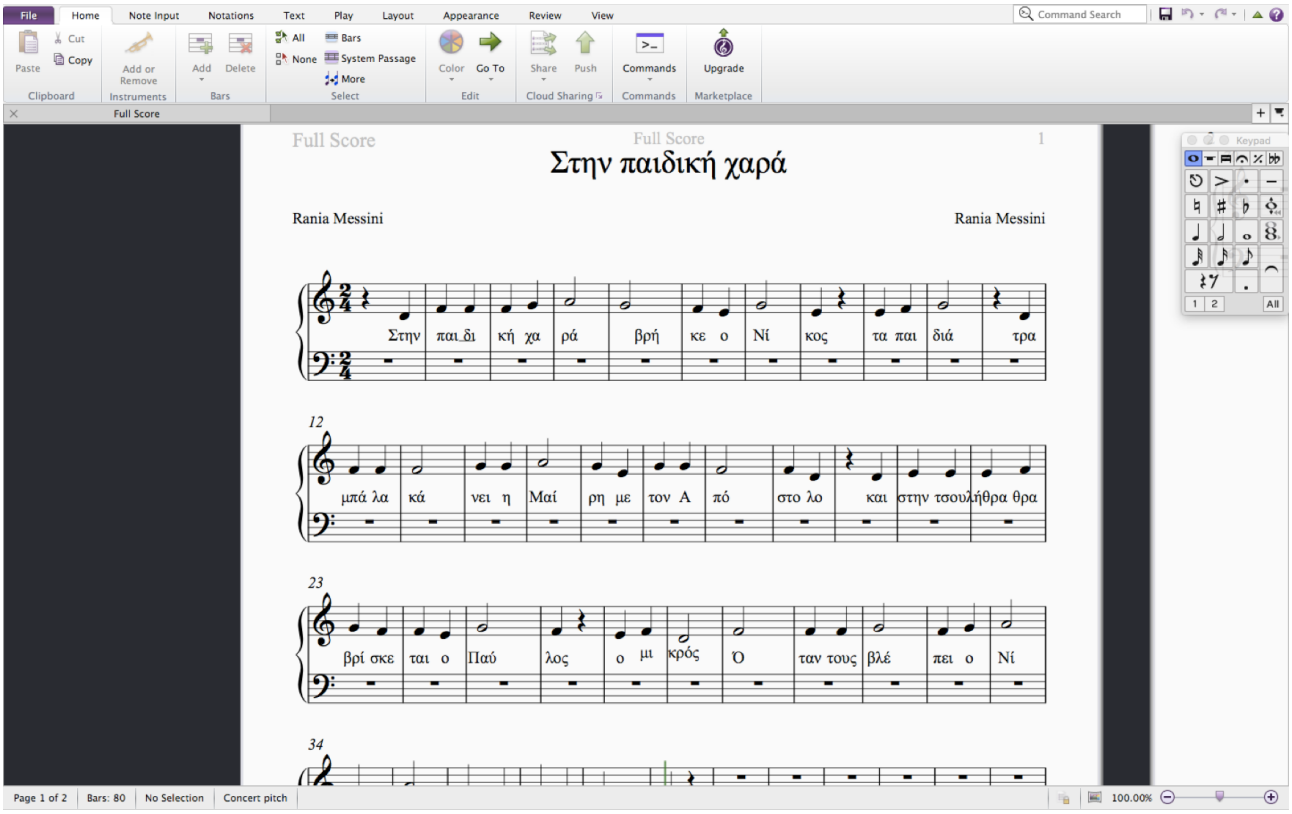
LEVEL 3

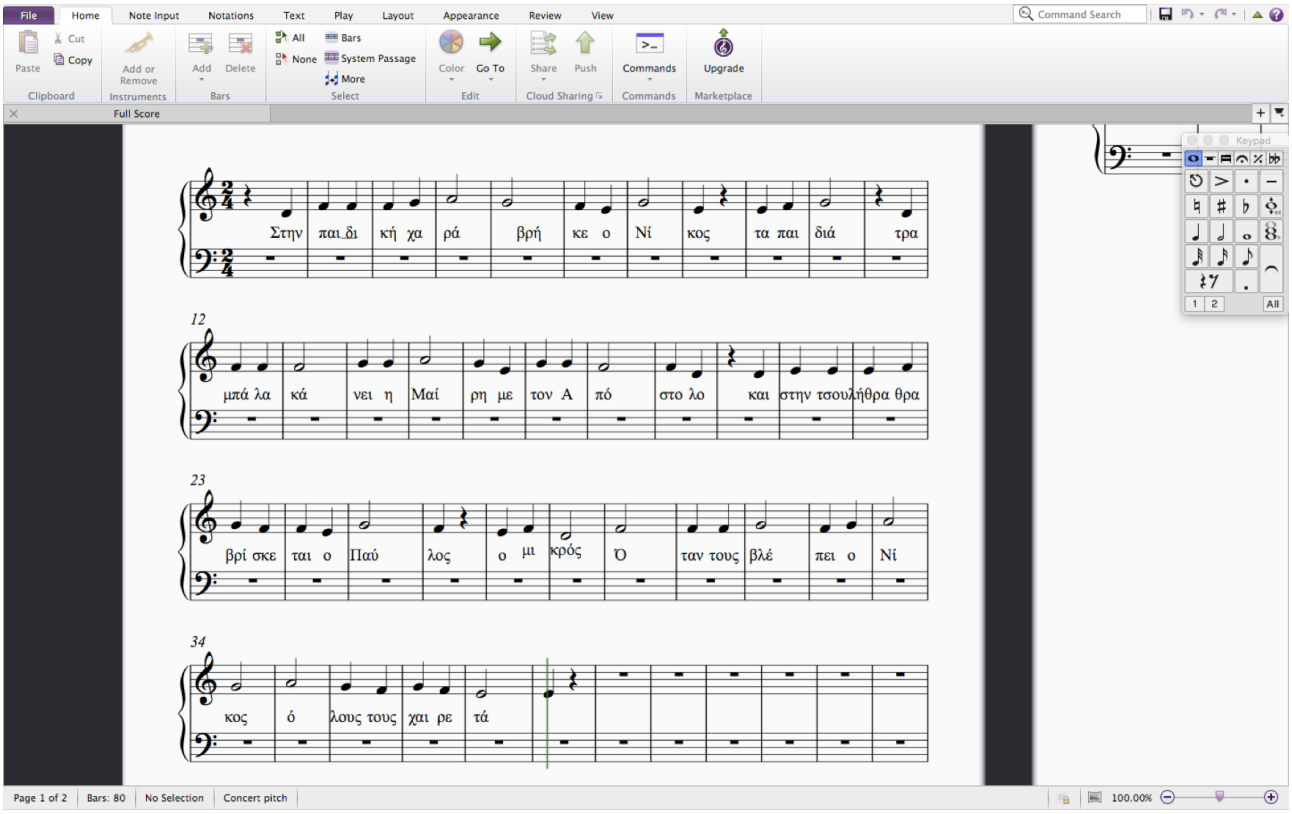


LEVEL 4



LEVEL 5


Full Score
Στην παιδική χαρά
Rania Messini
Rania Messini
Στην παι δι κή χα ρά βρή κε ο Νί κος τα παι διά τρα
12
μπά λα κά νει η Μαί ρη με τον Α πό στο λο και στην τσουλήθρα θρα
23
βρί σκε ται ο Παύ λος ο μι κρός Ό ταν τους βλέ πει ο Νί
34


Στην παι δι κή χα ρά βρή κε ο Νί κος τα παι διά τρα
12
μπά λα κά νει η Μαί ρη με τον Α πό στο λο και στην τσουλήθρα θρα
23
βρί σκε ται ο Παύ λος ο μι κρός Ό ταν τους βλέ πει ο Νί
34
κος ό λους τους χαι ρε τά