

## **Advancing Interdisciplinary Research in Singing: AIRS**

Singing, like speaking, is a natural human expressive ability. Yet, unlike speaking, little scholarly inquiry has been directed to its social roots, its manifestations across cultures, or its structural relations. Linked to social, cultural, and biological development singing draws on many disciplines and submits to many forms of analysis and specific explorations. Recognizing a need for a comprehensive framework for such investigations, an international collaboration of over 50 scholars in the humanities and social sciences is motivated to Advance Interdisciplinary Research in Singing, its origins and implications. Together, the AIRS collaborators will integrate new multidisciplinary knowledge about singing from the perspectives of psychology, music, linguistics, sociology, anthropology, and education, assisted by computer science and audio engineering. Our conceptual framework identifies six intelligences underlying singing (music, linguistic, sensory motor, interpersonal, intrapersonal and ethical), and three biopsychosocial factors (individual, cultural group, and universal). The framework provides a foundation for addressing the following five research themes:

Theme 1: Acquisition of Singing - Determining through cross-cultural and longitudinal research, universal, culture specific, and idiosyncratic aspects of the development of singing

Theme 2: Singing and Speaking Comparisons - Defining the features that distinguish singing and speech acquisition so as to advance linguistics, developmental psycholinguistics, music, and education.

Theme 3: Singing Pedagogy and Educating through Singing - Assessing and improving instructional methods for teaching and learning songs and singing, and for teaching and learning content by incorporating singing into the curriculum of other disciplines.

Theme 4: Cultural Understanding through Singing - Examining the role of teaching songs of foreign cultures to children to promote lifelong cultural understanding of others and themselves. This entails acquiring information about the songs of various cultures.

Theme 5: Intergenerational Singing and Well-being through Singing - Determining how singing increases individual physical and psychological well-being and community well-being, with a special focus on intergenerational singing where elder members of a society teach children songs of their culture

An interactive web-based virtual research environment, already in development ([vre.upei.ca/AIRS](http://vre.upei.ca/AIRS)) will support the research team, enabling discussion forums and information sharing across Canada and throughout the world. The site will host a one-of-a-kind comprehensive digital library database of singing that will accelerate progress on each research theme. The concept of such a research database has a successful precedent in language research, where the CHILDES repository of transcribed spontaneous speech has supported over 2000 publications in developmental linguistics since 1984 (MacWhinney, 2000). The AIRS database will represent singing of individuals and groups of many ages, ethnicities, skills and geographies. The proposed database will be housed in UPEI's recently acquired IBM digital library of the CFI Infrastructure project entitled "Institute for Interdisciplinary Research in Culture, Multimedia, Technology and Cognition". Internet access to the AIRS database will enable multidisciplinary teams of experts and students to address the five related research themes.

*Impact:* AIRS will revolutionize research in singing resulting in growth of basic knowledge and advances on practical issues that will benefit the human condition. Access to the vast new AIRS data repository of singing will advance basic theoretical knowledge by: (1) identifying universals and particulars of singing development and (2) defining the distinctions between singing and speaking and between song and speech. The initiative will also produce: (3) pedagogy protocols for teaching singing in general, teaching songs of foreign cultures and using singing to teach other knowledge while providing benefit of the arts; (4) improved intercultural understanding within communities and across nations, and (5) guidelines for intergenerational singing, aimed at enhancing quality of life for older adults, inspiring children and benefiting general health for all who sing. The research program will heighten the value of singing as an effective source of well-being for individuals, communities, and

societies. The digital multimedia resources will furnish cultural contexts for education and enhancing learning in general through singing. Through broad and varied means of dissemination of the AIRS findings the research will benefit universal education, language training, peaceful co-existence, intergenerational understanding, personal well-being, societal cohesion, and the preservation of cultural diversity. Over 40 students will receive training opportunities through involvement in all intellectual aspects of the work and through participation in videoconferences, workshops, and annual meetings.

### **Advancing Interdisciplinary Research in Singing: AIRS**

*Frère Jacques. Frère Jacques.* A children's song, sung in over 50 languages throughout the world, reminds us that singing, like speaking, is a natural ability of almost every individual (Dalla Bella, Giguère, & Peretz, 2007; Welch, 2005). Moreover, it is said that a child sings before she can talk (Stadler Elmer, 2003; Vihman, 1996). Although much scholarly attention has been directed to speech acquisition, surprisingly little attention has been directed to the acquisition of singing.

Singing enters our lives in many ways. What is a birthday party without the singing of *Happy Birthday*? Educational television programs such as *Sesame Street* or *Blues Clues* move seamlessly from speech to song. From lullabies and play songs, to popular songs of our youth, to liturgical songs, anthems, and jingles, singing forms part of our culture and identity. Songs have special value today in the face of globalization that threatens the preservation of song styles through acculturation.

Research from music education, health education and the psychology of music suggests that the act of singing can contribute to individual well-being, both physically and psychologically (Bailey & Davidson, 2005; Clift & Hancox, 2001; Thurman & Welch, 2000). Social psychology further suggests that children's learning of songs of a minority culture improves attitudes to the minority culture (Chen-Hafteck, 2007a,b; Sousa, Neto & Mullet, 2005). Such evidence shows that singing significantly improves the human condition. Effective application of singing to personal, social, political, or educational issues requires more knowledge than we now have and consolidation and synthesis of what is known. Needed is an integrative foundation encompassing many disciplines in a multicultural context. To this end, AIRS, an international collaboration of scholars in the humanities and social sciences, is committed to Advancing Interdisciplinary Research in Singing (AIRS). We submit this letter of intent to apply for a SSHRC MCRI grant, so as to actualize our groundbreaking work described in the following.

#### **Objectives of AIRS**

The following five objectives address critical theoretical and practical issues in research on singing in a new way, aiming to advance basic knowledge and improve the human condition.

**Objective 1.** to identify universals and particulars of the development of singing within cultural contexts;

**outcome:** commonalities identified in singing behaviours and development that transcend local cultures such as emergence of musical scales, melodic contours, and mean length of phrases

**Objective 2.** to distinguish the characteristics of singing and speaking;

**outcome:** insights gained by addressing, from the perspective of singing, traditional linguistics and psycholinguistics issues on the nature of language acquisition, e.g., characterizing prosodic (melodic contour) content of the early babbling stage cross-culturally

**Objective 3.** to develop pedagogical tools for singing based on findings under Objectives 1 and 2, and to develop methods for benefiting education in general through the introducing of the art of singing;

**outcome:** increased quality of singing instruction, learning, and education in general

**Objective 4.** to test the hypothesis that learning non-native songs promotes intercultural understanding;

**outcome:** a database of authentic culturally laden songs and methods for promoting peace and intercultural understanding within multicultural nations such as Canada and between nations.

**Objective 5.** to determine the role of singing on individual and community well-being to develop with a specific focus on developing and monitoring techniques for intergenerational singing activities

**outcome:** improved intergenerational awareness and understanding, preservation of songs of elders and improved personal and societal well-being within Canada and beyond

#### **Framework**

Each of the five objectives leads to a research theme to be explored along two axes. The first axis arises from a synthesis of Welch's (2005) review of singing as communication and Gardner's (1999) theory of multiple intelligences. At first singing would seem to fall squarely in the domain of musical intelligence. However, sensory motor, linguistic, interpersonal, and intrapersonal factors are all important (Welch, 2005). We also add the factor of moral intelligence, which applies to issues of how singing, as a powerful force, is used, or could or should be used to benefit society. The second axis is the biopsychosocial dimension that differentiates individual, cultural-group, and universal influences on human development (Leoung, 2007; Kluckhohn & Murray, 1950). Together, the three axes (5 themes, 3 biopsychosocial factors and 6 intelligences) create a three-dimensional framework for situating the AIRS research. Guided by this framework, AIRS will revolutionize research in singing with the outcome of filling the now relatively empty cells of this framework with new knowledge. While the study of singing may appear as an esoteric exercise, it has much to do with increasing knowledge about intelligence and biopsychosocial factors governing behaviour, and provides a fresh perspective on human development.

### **Creation of the AIRS multimedia database for analysing singing and accessing songs**

A comprehensive digital database for singing will support the work. The idea resembles a precedent, called CHILDES, that revolutionized understanding of language acquisition research, as reflected by over 2000 research publications (Berko & Thompson, 2002; MacWhinney, 2000). Brian MacWhinney and Katherine Snow launched the CHILDES database in 1984 to support research in child language. MacWhinney has maintained CHILDES at Carnegie Mellon University supported by the MacArthur Foundation and NSF offering universal access to child language corpora, analysis tools, and a coding system for entering corpora into the database in a format that other researchers could readily access and use in their own work. For example, the existing corpora can be used to examine how simultaneous exposure to two languages influences children's syntactic development. Without CHILDES, the researcher would need to spend hours or years recording, transcribing, and coding utterances.

In reviewing the development of children's sensitivity to tonality (key of a piece of music), Cohen (2000) noted the value of several studies that recorded and analysed children's singing (e.g., Dowling, 1984; Papoušek & Papoušek, 1981). She concluded that a shared database for singing, similar to CHILDES would advance research on this topic. Recent availability of high quality digital sound recording, digital library technology, and low-cost digital storage make such a proposal realistic today not only for audio but also for video records. Through a CFI infrastructure grant (Institute for Interdisciplinary Research in Culture, Multimedia, Technology and Cognition - CMTC), the University of Prince Edward Island (partnering with Université de Moncton and University of New Brunswick) possesses a new IBM digital library, offering a home for the AIRS database. Anyone with access to the Internet can view the prototype now on the AIRS web-site, <http://vre.upei.ca/airs>. University Librarian **Mark Leggott**, an expert in digital libraries, has created a UPEI team for implementing the CMTC digital library. CMTC, under the leadership of **Annabel Cohen**, a scholar in the field of music cognition, and initiator of the AIRS project, welcomes the AIRS digital library team of experts who will work with Leggott's team: **Ichiro Fujinaga** (music digital libraries, McGill), **George Tzanatakis** (voice synthesis and querying, U. Victoria), **Mira Sundahara Rajan** (Canada Research Chair in Intellectual Property Law, UBC), **David Huron** (creator of the *Humdrum Toolkit*, 1995 Ohio State U.) and **Brian MacWhinney** (inventor of CHILDES, Carnegie Mellon U.).

The proposed collection of annotated audio and audiovisual records of singing, aims to stimulate a level of productivity comparable to that of CHILDES. To explain in general how the AIRS database will be used, first note that the research of some of the AIRS collaborators entails patient, painstaking recording of the data of singing behaviours under research-specific conditions. These researchers will import the acquired recordings into the database and create detailed metadata (textual descriptions) for each record, allowing searching the new corpus. The rich data are amenable to many techniques of analysis, such as those created by AIRS researchers Dalla Bella, Stadler Elmer, Palmer, and Sundberg. Anyone (permissions granted) will be able to search, analyse or otherwise use the singing data. Through

searches of the descriptive metadata, the singing records can be accessed in unlimited combinations to address a variety of questions such as, is *doh me sol* found in the singing of four-year olds in Canada, Japan, and Estonia? Under what circumstances do infants or others move to a musical beat when alone and in social contexts? How effective is teaching of Zimbabwean culture with or without recordings of Zimbabwean singing? Results of research and annotations of items in the database will be kept with the database, so that other researchers may build upon them. Until now data on singing has been collected and analysed by one researcher or group, and then stored away (e.g., Sagi et Vitanyi, 1988). Now such data can be shared, reanalysed, and repurposed for years to come. More specific details of how the AIRS digital archive will support each Research Theme is found in the section below describing activities to be conducted under the five inter-related themes of the research, including opportunities for training.

### **Activities to be Conducted Under Each of the Research Themes**

**Theme 1. To understand the development of singing.** Laurel Trainor (2005), Director of the McMaster Institute for Music and the Mind (MiMM), has suggested that there are different critical periods for acquisition of different aspects of musical skill. This applies to singing which involves many skills. Are there universal patterns across cultures for changes in vocal pitch range, song duration, emergence of discrete notes, distance between adjacent tones, frequency ratios of the pitches of two-note pairs, pitch direction patterns, glides (glissando), turn-taking, facial expression, coordinated bodily motion, song structure, use of lyrics, game playing etc? Past research only begins to separate the role of individual, cultural group, and common universal forces influencing these different aspects of singing development (cf., Stevens & Byron, in press), and has scarcely considered the intelligences involved.

To address these gaps in knowledge and to test the hypothesis that there are different sensitive periods for different aspects of singing development, **Laurel Trainor** and **Steven Brown** (moving to MiMM from Simon Fraser in July) will lead an international team of researchers experienced in analysing singing (e.g., **Stefanie Stadler Elmer, Maija Frederikson, Sandra Trehub, Mayumi Adachi, Leslie Phillmore, Annabel Cohen**). Longitudinal studies over the grant period of 7 years will aim to determine trajectories of change in singing at different ages and cultures. These studies will be co-ordinated across institutions and locales in order to separate effects of the individual, the cultural group, and the universal (common) influences. A standardized protocol will be developed to optimally guide data collection across nationalities and cultures worldwide. The researchers will carry out microanalysis of songs produced, and macroanalysis of social interactions associated with playsongs and lullabies. The video corpora of singing will also allow **Frank Russo** and **Petra Hauf** (Canada Research Chair in Culture and Human Development at St. Francis Xavier) to explore motor development (including facial response) during perception and production of singing across ages and cultures. **Graham Welch** will also help extend the study of singing to acquisition and maintenance across the entire lifespan.

Digital archive. Researchers will deposit, store, share, annotate and analyse recordings of singing from infancy to senior years derived from cross-cultural longitudinal and cross-sectional experiments. For example, a 10-stage protocol for the collection of singing data at regular intervals (posted on the AIRS web-site) is currently being piloted for children and young adults. The recorded singing will be stored in the AIRS database for use by any of the researchers. Videorecorded social interactions collected during ordinary singing and song learning will enable comparisons of cross-cultural practices involving music and child development. These records will assist in determining the role of play in singing acquisition. The shared database will greatly facilitate the scope of the proposed work.

Training. Graduate students from psychology and music will be full partners in the project. They will gain the sense of contributing to a large and important project. They will collect data from infants and children singing under both controlled and spontaneous conditions (e.g., data collected at monthly intervals over 12-24 months). They will learn recording techniques, how to deposit data into the AIRS database, create transcriptions (e.g., notation, phonetics, pitch tracking), create metadata, and analyse the data. They will learn to use pitch analysis techniques of Boersma and Weenink (2005), Stadler Elmer and Elmer (2000), and Della Bella et al. (2007) to address such issues as the nature of the pitch content and duration of sung phrases at various ages.

**Theme 2. To compare development of singing and speaking.** The vocal apparatus for simple forms of song are in place early in childhood (Welch, 2005). If a child sings before he speaks, when and how does the transition from song to speech take place? What characterizes the bifurcation of general vocalization into the categories of song and speech? The ability to acquire a native accent falls off dramatically after puberty. Curiously, it is just after puberty that voice training begins. Speech comprehension tends to precede speech production. Does a similar precedence of comprehension over production apply to singing? Such questions about order of acquisition and interrelations among levels

of competence in song and speech acquisition will be the object of attention of Theme 2.

Recent research documents the impact of specific linguistic experience on hearing musical rhythm (Patel & Daniele, 2003; Sadakata, 2006). Palmer & Kelly (1993) earlier explored the role of musical and linguistic knowledge on song production. Chen-Hafteck has examined the role of experience with tonal versus non-tonal languages. McGill psychologist and Canada Research Chair **Caroline Palmer** is world renowned for drawing attention to the performance aspects of music as opposed to the perceptual aspects. She has pioneered the search for commonalities between speech and music. She and Frank Russo will co-lead a team of psycholinguists and linguists (**Cichocki, Forrester, Lempert**), and psychologists (**Della Bella, Lantz, Sinclair, Stewart**) in systematic comparisons between the development of singing and speaking, across age and culture, so as to define the commonalities and boundaries between song and speech. Canada Research Chair in Neurocognition of Music, **Isabelle Peretz**, the eminent **Johan Sundberg**, author of the *Science of the Singing Voice* (1997), and **Bradley Vines** who is conducting research on the application of singing (melodic intonation therapy) for language-impaired stroke patients will complement the team.

Digital archive. Team members will record music and speech at particular ages across cultures. These records will be archived in the digital archive along with searchable metadata. Access to these records will enable characterization of the commonalities of speech and music (e.g., of prosody – rhythm and intonation-- and effects of acculturation), and to determine influences of a linguistic environment on singing acquisition, or a singing environment on speech acquisition. Computer scientist, **Sid Ahmed Selouani** will use the AIRS database to extend his computer algorithms for distinguishing music and speech. New quantitative tools developed in Palmer's lab will be available to define the development of rhythmic and tempo sensitivities at particular ages.

Training. Students will probe similarities and differences between the acquisition of singing and that of spoken language. Some will travel to foreign sites and record singing and speaking in natural and laboratory contexts to be entered into AIRS or CHILDES. Others may compare data already encoded in these databases. The students will learn about both linguistic (or psycholinguistic) and musical analysis of audiovisual recordings. They will also test hypotheses arising from the work of Palmer and her colleagues (Jungers, Palmer & Speer, 2002; Large & Palmer, 2002) on entrainment to rhythm and tempo within a piece and in singing conversations between caregiver and child, for example.

**Theme 3. Developing best practices for teaching of and with song.** Traditionally music education in the western world has focused on performing the classical musical canon and training a talented élite. Another view, (e.g., conference on Music and Social Justice, Columbia University, 2006), is that music education should reach children in more meaningful ways. The team led by **Andrea Rose**, a 3M Award winning teacher herself, will review current music pedagogy (with **Harold Abeles** of Columbia Teacher's College, **Beatriz Ilari** of Brazil, **Helga Gudmundsdottir** of Iceland, and **Jaani Ross** of Estonia) and vocal pedagogy (with vocalist/educators **Jane Ginsborg** and **Sung-Ha Shinbouey** of UPEI). They will also consider implications for singing education from the Theme 1 findings on song acquisition and from recently codified principles of multimedia education (e.g., Mayer, 2005). They will then develop and test strategies for teaching songs that exploit audiovisual resources stored in the AIRS database and video conferencing facilities. Recognizing that the arts facilitate learning (Burton, Horowitz, & Abeles, 2000; J. E. Cohen, 2006; Eisner, 2005; Smithrim & Uptis, 2005)), singing as an art provides students the learning advantages of the arts. **Rena Uptis** (Education, Queen's) has co-lead a multi-year national program of the Royal Conservatory of Music on Arts in the School. **Martha Gabriel** (Education, UPEI) has explored techniques for teaching curricula through song. With their graduate students they will test strategies for introducing educational benefits of art through singing.

Digital archive. The research relies on the availability of audiovisual recordings of songs of foreign cultures. The researchers will collect and use these records. Audiovisual cultural context recorded along with songs is needed to provide the optimal context teaching of the song in its appropriate cultural context, enabling the teaching of the culture along with the song. The digital archive

will also serve to preserve the cultural heritage of indigenous songs.

Training. Students will collect songs of various cultures from either performances or natural contexts. Opportunities will be provided to participate in cultural exchanges supervised by faculty at foreign sites. Students will review the literature on singing pedagogy and information on song acquisition (some derived from Theme 1) and subsequently develop methods for teaching songs and on information on song acquisition. They will develop multimedia tools to establish the cultural context for the teaching of songs of a particular culture. For example, they may use video to show the song being taught in its native context. They will also study principles of multimedia learning (Mayer, 2005) in order to develop new principles of multimedia use appropriate to learning songs. They will test these new pedagogical principles by comparing the benefits to learning of different approaches, those which adhere to a theoretical pedagogical principle and those that violate it. They will also learn about digital rights management and 21<sup>st</sup> copyright issues surrounding use of intellectual cultural property.

**Theme 4. Promotion of inter-cultural understanding through singing. AIRS for peace.**

There are two components to this theme. The one is the collection of and representation of songs of various cultures performed in their authentic style. The second is the determination of the ability to transmit cultural understanding through the teaching of these songs.

With high mobility of people around the world and the culturally diversified population in many countries, cross-cultural interactions are increasingly evident. Moreover, now, when our lives are constantly disturbed by wars and terrorism, it is crucial for educators around the world to promote among our children intercultural understanding. To live together in peace, requires understanding and appreciating each others' cultural background. In many cultures, traditional folk songs and children songs transmit cultural knowledge and values to the new generation. Through singing these songs with an understanding of their cultural context, children may experience an unfamiliar culture, and thus, can possibly increase their understanding and respect for that culture. Two AIRS researchers (Félix Neto and Lily Chen-Hafteck) have independently shown that children who learn songs of a minority culture improve attitudes toward that foreign culture as compared to children who did not learn the songs. Specifically, Sousa, et al., (2005) studied the Cape Verde black culture in Portugal, and Chen-Hafteck (2007) studied students in New York exposed to Chinese music. In the Portuguese study, the singing intervention influenced only older children. In the US study, students who shared a class with members of the minority culture improved their attitude more than did those who had less contact with the minority culture. These complex findings raise questions to be addressed regarding sensitive periods and environment for the effectiveness of singing interventions in the development of cultural understanding.

This theme also directs attention to music from island societies, repositories of much of the world's minority languages and (by extension) much of the world's minority song styles. It will do so with the support of the unique Canada Research Chair in Island Studies, Theme 4 Team Leader, **Godfrey Baldacchino** at UPEI and his extensive international networks including ethnomusicologists. A special focus on the Islands of Oceania arises through sociologist **Jean Mitchell** (Vanuatu Islands where singing is central to everyday life), music educator **Joan Russell** (Fijian Islands), music scholar **David Huron** (Micronesia), ethnomusicologist **Kati Sezgo** (Hawaii) and cognitive music psychologist **Kate Stevens** (Australian Aboriginal). **Neto** and **Chen-Hafteck** will develop and test guidelines for effectively teaching cultural understanding through music. They will be joined by **Patricia Shehan Campbell** (1998, 2004) (University of Washington, a vocalist, ethnomusicologist and renowned music-educator), **Larry O'Farrell** (UNESCO Chair of Culture and the Arts in Education at Queen's University), **Udo Krautwurst** (UPEI anthropologist with expertise from research in Namibia and studies of technology/ culture interactions), John Tivendell (social psychologist, U. de Moncton) and **Theresa Doyle**, a nationally awarded recording artist who has taught cultural songs around the world.

Digital Archive. Ethnomusicologists will develop a database of songs (sung by native adults and children) that can transmit cultural knowledge and values and demonstrate the life style of the people from those cultures. Researchers will then use the AIRS database to select songs and videos of cultural contexts. Educators will teach children about unfamiliar cultures through these songs. Social

psychologists will test whether teaching these songs changes children's attitude towards people from those cultures. An associated benefit is preserving the cultural heritage represented by these songs. Examples in the AIRS digital library of singing performed in its own cultural environment, by its respective cultural bearers, eliminates the dilemma of educators having to teach, or anyone having to listen to, songs from different cultures sung by non-natives (O'Flynn, 2005). The digital archive will also facilitate comparison of song styles across cultures to identify universals in song and music.

**Training.** Students in social psychology, sociology of music, ethnomusicology and Island Studies will apply pedagogical tools (developed through Theme 3) in experiments in which children of majority cultures learn songs of a minority culture (using methodologies of Neto and Chen-Hafteck). They will consider and evaluate the applications of this teaching to development of inter-cultural understanding. They will also gain cultural experience by working in foreign sites hosted at the universities of AIRS' collaborators, where they may engage in song collection and studies of attitude change.

**Theme 5. Singing, intergenerational understanding and well-being.** Singing is a fundamental human emotional activity, which, although personal, can lead to group action and cohesion. Unlike speaking, singing is not a skill regarded as critical by society, at least in the western world. Theme 5 explores benefits of singing for aspects of well-being. There are two foci. The first focus is the benefit of intergenerational singing. Music is important to people who are elderly (Cohen, Bailey & Nilsson, 2002), and it is the older members of a culture who often know best the songs of the culture. Pioneering research on intergenerational learning of art by University of Western Ontario's **Rachel Heydon** (2005; Heydon & Daly, in press) predicts several benefits of intergenerational singing, such as providing meaningful experiences for persons who are elderly, giving value to their knowledge, and providing social interaction with children. Children also benefit; intergenerational singing can reduce their stereotypes about older people, for the long term. The second focus of Theme 5 is more general, and aims to develop an understanding of physical and psychological well-being promoted by singing (cf., Bailey & Davidson, 2005; Thurman, & Welch, 2000; Wiens, Janzen, & Murray,).

Heydon will lead the research of Theme 5 assisted by **Carol Beynon**, also in the Faculty of Education at Western and director of the internationally renowned Amabile Boy's Choir. Critically acclaimed musician and UBC Professor, **Rena Sharon** is committed to understanding the role of music and well-being, and has established the Vancouver International Song Institute (VISI) to provide a context for in depth study of the value of art song. The broad issue of music and well-being will be led by **Sharon** assisted by **Betty Bailey** who demonstrated benefits of singing in cross-cultural studies of choirs and other groups, including the homeless (Bailey & Davidson, 2002, 2003, 2005). The team is augmented by Cambridge University's **Ian Cross** (1999), author of an article entitled "Is Music the Most Important Thing We Ever Did?", and UPEI's choral educator **June Countryman**.

Heydon's guidelines for intergenerational art education will serve as a model for intergenerational music (and singing) education. The team will develop guidelines of how to establish intergenerational singing and song-sharing within different cultures such as in First Nations communities (a group with whom Heydon is working). The Theme 5 group will also explore the value of children teaching elders their songs to determine the symmetries and asymmetries of intergenerational learning of singing. The team will also collect interviews and carry out qualitative analysis of the self-assessed value of singing. A literature review of the physiological benefits of singing will be compiled, and studies of physiological effects of singing (on stress, emotion, feeling of well-being) will be carried out.

**Digital Archive.** Music educators and psychologists will record and analyse videotaped interactions between elders and children in the teaching of songs so as to test guidelines for establishing intergenerational singing activities for all cultures. Participation of seniors in recording songs of their heritage will also preserve that heritage. Recordings of intergenerational choirs will be stored and will provide additional data for analysis and demonstration. Recordings of interviews and testimonials describing the value of singing will also be included, as will examples of therapeutic uses of singing.



**Training.** Students involved in the intergenerational study will learn skills of interaction with persons of the extreme ends of the lifespan. They will engage in qualitative analysis, and in developing and administering questionnaires. They may encode interactions between elders and children in singing, and learn how to transcribe their recordings for sharing among researchers in cross-cultural contexts. Other students will focus on the benefits of singing for groups and individuals. They will also develop, administer, and analyse life-satisfaction or well-being questionnaires. They will learn techniques of semi-structured interviews and qualitative analysis. Some students who begin singing lessons or join a choir for the first time may engage in a protocol analysis (introspection) and keep detailed logs of their experience. Other students will track well-being of persons taking voice lessons or attending choir in controlled studies offering comparisons with those who do not sing.

#### **Nature and Breadth of the Collaboration.**

The AIRS collaboration of over 50 scholars represents Canada and 14 other countries across five continents. Building on many existing collaborations, AIRS scholars represent the fields of music (education, ethnomusicology, choral, technology), psychology (developmental, educational, cognitive, social), education (music, arts, drama), sociology/anthropology, linguistics, audio engineering and intellectual property law. Canadians represent Eastern Canada (Moncton, UNB, UPEI, Dalhousie, St. Francis Xavier Memorial,), Central Canada (Western, McMaster, Ryerson, Toronto, Queen's, McGill) and Western Canada (Victoria, UBC, Banff Centre). Eminent scholars include five Canada Research Chairs, a UNESCO Chair, a Chair Emeritus in Musical Acoustics, a Chair in Music Education at the University of Washington, three directors or associate directors of music/mind research institutes, and world authorities on singing.

The Director of AIRS is **Annabel Cohen**, a Professor of Psychology specializing in music cognition. She has initiated and led multidisciplinary, multi-institutional projects of comparable scope, relevant to this proposal. The CMTC (CFI \$1.49M) project aims to determine the best role of media in education in a cultural context. The related Arts-Netlantic (Canadian Heritage \$1.3M) project created a research network in New Brunswick and PEI of artists, humanists, and scientists to examine the opportunities of new media for artists and audiences. Cohen is an accomplished classical singer, a performing singer-songwriter, creator of a musical, and is completing a book *Foundations of Music Cognition* under contract with Cambridge University Press. She has organized a national and international meeting, published conference proceedings and is the new editor of the journal *Psychomusicology*. Cohen's work for AIRS will benefit from the excellent support of UPEI's Music Department (including vocal artist/educator Sung-Ha Shin-Bouey), the interdisciplinary CMTC research group, and her own grant-funded Research and Training Laboratory in Music Cognition.

The Research Theme leaders represent a cross-section of international experts in social sciences and humanities, who stand for the best research in Canada and the world as leaders in singing, musical behavior, education, and culture. They include: **Laurel Trainor**, Director of the McMaster Institute for Music and Mind; **Caroline Palmer**, Canada Research Chair in Cognitive Neuropsychology of Performance and Professor, McGill University; **Andrea Rose**, 3M Award winner in Music Education, Memorial University Artistic Director of FESTIVAL 500: Sharing the Voices International Choral Festival and Co-Director of The Phenomenon of Singing International Symposium; **Godfrey Baldacchino**, Canada Research Chair in Island Studies, UPEI; **Rachel Heydon**, Faculty of Education and pioneer in intergenerational learning in the arts. Others include senior scholars **Harold Abeles**, **Pat Shehan Campbell**, **Graham Welch**, **Johan Sundberg**, and **Sandra Trehub**, who have shaped their respective disciplines of music education, voice sciences, and infant auditory/music development. Others are promising junior scholars establishing niches in singing research (e.g., **Adachi**, **Chen-Hafteck**, **Ginsborg**, **Mang**, **Russo**). In addition to the majority of Canadian scholars, are those from the US, Brazil, England, Portugal, Switzerland, Sweden, Austria, Poland, Finland, Estonia, Iceland, Japan, Hong Kong, and Australia, including **Ian Cross** (Cambridge, UK, music-evolutionary theory), **David Huron** (Ohio State University, music acculturation, music databases), **Stefanie Stadler Elmer** (University of Zurich, analysis of children's singing), **Maija Fredrikson** (University of Oula, children's

singing), **Jane Ginsborg** (Royal Northern College of Music, vocal education and performance), **Mike Forrester** (Kent, UK an experienced CHILDES-user welcoming this initiative specialized for his music research).

The governing structure will entail an **AIRS Policy Executive** representing the 5 themes, 4 geographical regions, digital library, and students. Chaired by the Director, with the Project Manager *ex officio*, it will approve policy and advise on database design and use. A smaller **AIRS Operations Executive Subcommittee** will develop policies and manage daily issues. Meetings will take place by videoconference over the Internet, using free Access-Grid software, hosted by UPEI which has the hardware to manage the conference. As a precedent, the CMTC Arts-Netlantic project ran biweekly videoconferenced meetings across institutions in a similar way. An **Advisory Board of Directors** will represent stakeholders from academic institutions, government, NGO's, and industry. They will advise and will monitor progress toward the AIRS objectives as reported at the annual conference, attended by videoconference if not in person. The **Project Manager** with knowledge of music, research methods, and project management skills will track day to day activities, see that goals are clear, communications are effective, meetings take place, and will assist the Director and team in meeting milestones.

**Partnerships with public/private sectors.** Themes 1 and 2 require access to infants and children, through partnerships with maternity wards, daycares, schools, and institutions that offer musical extracurricular activities. Theme 3 and 4 requires access to schools and to institutions offering music instruction and depends on relations between AIRS and cultural associations and communities. Theme 5 requires the cooperation of homes and organizations for senior citizens, intergenerational choirs, preschools or public schools, persons taking voice lessons, and special groups for whom music may offer benefit. AIRS will share findings with these groups. In addition, AIRS' findings should interest government ministries of education, health, heritage, immigration, external relations, and tourism; educators in general, music educators in particular, the entertainment industry, and NGO's that focus on ageism (e.g., Canadian Association of Retired Persons), the culture of peace (UNICEF), and mental health (Canadian Psychological Association, American Psychological Association). New theories arising from the project will relate to associations of music psychology, psycholinguistics, linguistics, education, sociology of music, health psychology. and digital libraries.

**Roles for students.** Over 50% of the SSHRC MCRI support will go to support students. It should be clear from the previous description of student involvement outlined for each of the five research themes that AIRS will provide extraordinary opportunities for students. They will serve important roles on all aspects of the project. They will learn about digital libraries, behavioral research, music, and culture in an exciting multidisciplinary and international environment. They will participate in meetings and workshops. Through years 2 through 5 there will be at any time the equivalent of 6 undergraduates, 6 masters students, 6 Ph. D. students and 2 postdoctoral fellows working on the project. (Equivalent refers to the possibility of partial funding going to more than one student). Students in music technology, computer science and psychology will assist the development of both the digital library and software for automatic analysis or querying of the database. Other graduate students and undergraduate assistants will code metadata. An apprenticeship system with more senior students mentoring more junior students will leave the most senior students and post-docs, working closely with faculty, taking responsibility for research under a given theme. The access to rich data accumulating at different research sites, and involvement in a multi-institutional and multi-national project make this an outstanding learning experience.

AIRS will host workshops annually for training on the use of the database, and on protocols for collection, ingesting, transcription, and querying data. AIRS researchers working on the same theme and on the same geographical region will meet twice a year, with one full AIRS group meeting a year and smaller workshops. Students will be full participants and will have exposure to scholars who would normally not be available to them. The students will be expected to present their work, archive an annual written report of their experiences with the AIRS project, indicating their annual accomplishments, learning, and next year's goals.

Training opportunities through interaction with AIRS scholars include advanced statistics and ethics (**Bradley Frankland**), audio engineering (**Theresa Leonard**), audio digital libraries (**Fujinaga**), voice synthesis and voice querying of databases (**Tzanetakis**); lieder (**Sharon**); voice performance (**Ginsborg, Shin-bouey, Doyle**), motion capture (**Russo, Hauf**), pitch analysis of children's singing (**Stadler Elmer**); acoustic analysis of singing (**Sundberg**), infant directed singing (**Trehub**); infant song memory and rhythmic behaviour (**Trainor**); entrainment analysis (**Palmer**), CHILDES (**Forrester, MacWhinney**), linguistics (**Cichocki**), managing digital rights (**Sundara Rajan**), birdsong (**Phillmore**).

### **Preliminary strategies for dissemination of the research results**

1. Publications. Researchers will publish articles in leading journals. Each theme team will aim to produce at least 3 articles per year, and through arrangements with journal editorial boards, special issues devoted to AIRS will be published, a different journal for each year of the grant reaching different audiences. Four journal editors on the AIRS team have already agreed to devote an issue of their journal to AIRS. At least one edited book by the team will summarize results from the 5 themes
2. AIRS project website (<http://vre.upei.ca/airs>) for discussion forums, shared bibliography, news of interest to researchers and public; collaborative document development; gateway to the AIRS database.
3. AIRS database including raw acoustic and video experimental data of singing, transcripts of the singing (various formats), archive of song recordings representing cultures, continents, ages, styles, and transcripts of songs; research paper repository, audiovideo cultural repository, tools for storage, access, analysis, intellectual property, metadata protocols, protocols for accessing data.
4. Conferences An annual AIRS international meeting will be held in Canada for presentation and discussion of AIRS research results. The venue will change to accommodate researchers of different regions. Videoconferencing will enable participation for non-travelers. Meetings may piggy-back other academic conferences or singing events, (e.g., biennial Phenomenon of Singing Conference, Memorial University, co-coordinator, Andrea Rose; the Vancouver International Voice Institute- VISI, Artistic Director, Rena Sharon;, The Banff Centre, Theresa Leonard). Each year will focus on a different AIRS research theme with a recapitulation in the last year. AIRS researchers will also arrange events at other national meetings (this is already taking place).
5. Workshops. Smaller AIRS research workshops, disseminating results or demonstrating the database, will also take place. Conference proceedings will be available through the website, and on CD or DVD.
6. Videoconferences/ Workshops. The full team will meet by videoconference twice a year (once at the Annual Conference site). The 5 theme teams will meet by videoconference twice a year and the 4 geographic teams will meet twice a year, providing at least 6 opportunities for AIRS meetings annually.
7. Documentary on AIRS suited to television, and in conjunction with Discovery.CA or CBC
8. Public singing events. Public programs entailing singing and learning new songs, and presentation of the results of the AIRS research, or demonstration of the AIRS database .
9. Guidelines (book, DVD, or web resource) for teaching songs throughout the lifespan, songs of other cultures, and establishing intergenerational music programs including the use of multimedia
10. Audio recordings (CD) and video recordings (DVD's) for teaching purposes, compilations of illustrative songs, or illustrative materials for research or educational purposes.
11. Singing games for children as part of the AIRS database. Clicking over the map on a particular geographic location produces choices from a library of songs for that region, and opportunity to view videos of the culture of the region
12. An educational computer program in the AIRS database that would enable an instructor or parent to create a book or CD of selected songs and associated videos or pictures.
13. Children's interactive musical map of the world available on the AIRS web-site.
14. Development of intergenerational intercultural choirs or singing festivals
15. Adult summer workshop for singing in PEI focusing on well-being for individuals and communities

### **Concluding Remarks**

The AIRS collaboration will impact scholarship in many disciplines. It will impact individuals and societies, nationally and internationally. It will produce a lasting archival resource for research in singing and related fields, a resource that can continue to grow, while preserving ephemeral songs of cultural, historical and social scientific value. Seven years of research will fill the previously emptier cells of the three-dimensional framework leading to a comprehensive theory and understanding of the origins and applications of singing. The AIRS researchers, passionate about the project, are eager to develop the full proposal. We close with a reprise of our opening number, *Frère Jacques*. The lyrics coincide with the AIRS wake-up to the value of a major collaborative research initiative that will revolutionize scholarship in singing: *Morning bells are ringing! Sonnez les matines! Din, dan, don. Din, dan, don.*

## References

- Amabile Boys Ch Amabile Boys Choir: <http://www.amabile.com/boys/history.shtml>
- Bailey, B. A., & Davidson, J. W. (2002). Adaptive characteristics of group singing: Perceptions from members of a choir for homeless men. *Musicae Scientiae*, 6 (2), pp. 221-256.
- Bailey, B. A., & Davidson, J. W. (2003). Amateur group singing as a therapeutic instrument. *Nordic Journal of Music Therapy*, 12 (1), pp. 18 - 32.
- Bailey, B. A. & Davidson, J. W. (2005). Effects of group singing and performance for marginalised and middle class singers. *Psychology of Music*, 33 (3), pp. 271-305.
- Berko, J.B.G., & Thompson, R. B. (2002). Out of the baby book and into the computer: Child language research comes of age. [Review of B. MacWhinney (2000) *The CHILDES Project: tools for Analysing Talk, Vol.1 and Vol. 2.*, Mahweh, NJ: Erlbaum] *APA Review of Books*, 47, 391-394.
- Boersma, P., & David Weenink, D. (2005) Praat: doing phonetics by computer (Version 4.3.14) [Computer program].//[www.praat.org/](http://www.praat.org/)
- Burton, J., Horowitz, R., & Abeles, H. (2000). Learning in and through the arts. In *Champions of Change: The Impact of the Arts on Learning*. Washington: President's Commission on the Arts and Humanities.
- Campbell, P. S. (1998). *Songs in their heads*. New York: Oxford University Press.
- Campbell, P. S., (2004). *Teaching Music Globally*. One volume in the series, *Global Music: Experiencing Music, Expressing Culture*, In B. C. Wade P. Shehan Campbell, (Eds). New York: Oxford University Press.
- Chen-Hafteck, L. (2007a). Contextual analyses of children's responses to an integrated Chinese music and culture experience. *Music Education Research*, 9, 3, 337-353.
- Chen-Hafteck, L. (2007b). In search of a motivating multicultural music experience: lessons learned from the Sounds of Silk project. *International Journal of Music Education*, 25, 3, 223-233.
- Cohen, A. J. (2000) Development of tonality induction: Plasticity, exposure and training. *Music Perception*, 17, 437-459.
- Cohen, A. J., Bailey, B. A., & Nilsson, T. H. (2002). Music in the life of seniors. *Psychomusicology*, 18, 89-102.
- Cohen, J. E. (2006). Goals of university basic and secondary education. *Prospects*, 36, 247-269.
- Cross, I. (1999). Is music the most important thing we ever did? Music, development and evolution. In Suk Won Yi (Ed). *Music Mind and Science* (pp. 10-39). Seoul: Seoul University Press.
- Dalla Bella, S., Giguère, J-F. & Peretz, I. (2007) Singing proficiency in the general population. *Journal of The Acoustical Society of America*, 121, 1182-1189.
- Dowling, W. J. (1984). Development of musical schemata in children's spontaneous singing. In W. R. Crozier & A. J. Chapman (Eds.), *Cognitive processes in the perception of art* (pp. 145-163). Amsterdam: Elsevier Science.
- Eisner, E. (2005). Back to whole. *Educational leadership*, 63, 14-18.
- Gardner, H. (1999). *Intelligence Reframed. Multiple intelligences for the 21st century*. New York: Basic Books.
- Heydon, R. (2005). The De-pathologization of childhood, disability and aging in an intergenerational art class: Implications for educators. *Journal of Early Childhood Research*, 3, 243-268.
- Heydon, R. & Daly, B. (in press). What should I draw? I'll draw you! Intergenerational art for intergenerational learning opportunities and interaction. *Young Children*
- Huron, D. (1993). *The Humdrum Toolkit: Reference Manual*. Menlo Park, CA: Center for Computer Assisted Research in the Humanities. Also: <http://www.musiccog.ohio-state.edu/Humdrum/>

- Jungers, M. K., Palmer, C., & Speer, S. R. (2002). Time after time: The coordinating influence of tempo in music and speech. *Cognitive Processing*, 1, 21-35.
- Kluckhohn, C., & Murray, H. A. (1950). Personality formation: The determinants. In C. Kluckhohn & H. A. Murray (Eds.), *Personality in nature, society, and culture* (pp. 35-48). New York: Knopf.
- Large, E. W., & Palmer, C. (2002). Perceiving temporal regularity in music. *Cognitive Science*, 26, 1-37.
- Leong, F. T. L. (2007). Cultural accommodation as method and metaphor. *American Psychologist*, 62, 916-927.
- MacWhinney, B. (2000). *The CHILDES Project: Tools for Analysing Talk, Vol. 1: Transcription Format and Programs* (3<sup>rd</sup> ed). Mahweh, NJ: Erlbaum, *Vol. 2: The Database* (3<sup>rd</sup> ed.). Mahweh, NJ: Erlbaum.
- Mayer, R. E. (2005) (Ed.). *Cambridge Handbook of Multimedia Learning*. Cambridge, UK: Cambridge University Press.
- O'Flynn, J. (2005). Reappraising ideas of musicality in intercultural contexts of music education, *International Journal of Music Education*, 23, 191-203.
- Palmer, C., & Kelly, M.H. (1992). Linguistic prosody and musical meter in song. *Journal of Memory and Language*, 31, 525-542.
- Papoušek, M., & Papoušek, H. (1981). Musical elements in the infant's vocalization: Their significance for communication, cognition and creativity. In L. P. Lipsitt & C. K. Rovee-Collier (Eds.), *Advances in infancy research* (Vol. 1, pp. 163-224). Norwood, NJ: Ablex.
- Patel, A. D., & Daniele, J. R. (2003). An empirical comparison of rhythm in language and music. *Cognition*, 87:B35-B45.
- Sadakata, M. (2006). *Ritme & Rizumu: Studies in Music Cognition*. Doctoral Dissertation. Nijmegen Institute for Cognition and Information. University of Nijmegen.
- Sagi, M., & Vitanyi, I., (1988). Experimental research into musical generative ability. In J. A. Sloboda (Ed.). *Generative processes in music: The psychology of performance, improvisation and composition* (pp. 179-194). Oxford, UK: Oxford University Press.
- Smithrim, K., & Uptis, R. (2005). Learning through the arts: Lessons of engagement. *Canadian Journal of Education*, 289(1 & 2), 109-127.
- Sousa, M., Neto, F., & Mullet, E. (2005). Can music change ethnic attitudes among children? *Psychology of Music*, 33, 304-316.
- Stadler Elmer, S & Elmer, F. J. (2000). A new method for analysing and representing singing. *Psychology of Music*, 28, 23-42.
- Stevens, K. & Byron, T. (in press). Universals in music processing. In S. Hallam, I. Cross & G. Thaut (Eds.). *Oxford handbook of music psychology*.
- Sundberg, J. (1997). *The science of the singing voice*. DeKalb, Illinois: Northern Illinois University Press.
- Thurman, I., & Welch, G. F. (Eds.) (2000). *Bodymind and voice: Foundations of voice education*, Iowa: National Centre for Voice and Speech.
- Trainor, L. J. (2005). Are there critical periods for musical development? *Developmental Psychobiology*, 46, 262-278.
- Trainor, L. J. Austin, C. M., Desjardins, R. N. (2000). Is Infant-Directed Speech Prosody a Result of the Vocal Expression of Emotion? *Psychological Science* 11, 188-195.
- Vihman, M. M. (1996). *Phonological development*. Oxford, UK: Blackwell.
- W Welch, G. F. (2005). Singing as communication. In D. Miell, R. MacDonald, & D. J. Hargreaves, (Eds). *Musical communication*. (pp. 239-259). Oxford, UK: Oxford University

Press.

Wiens, H., Janzen, H.L., & Murray, J. B. (2002). Heal the voice-Heal the person: A pilot study on the effects of voice training. In *The Phenomenon of Singing III*, (eds A. rose & K. Adams), pp. 228-234. St. John's, NL: Memorial University Press.

Stakeholders

	<u>Theme 1</u> Discovering Universals	<u>Theme 2</u> Song vs. Speech	<u>Theme 3</u> Developing Pedagogy	<u>Theme 4</u> Cultural Under- standing	<u>Theme 5</u> Intergen. Singing Well-being
<b>AMPS:</b> Australian Music & Psychology Society <a href="http://www.uws.edu.au/marcs/amps/AMPS_home.htm">http://www.uws.edu.au/marcs/amps/AMPS_home.htm</a>	<b>X</b>	<b>X</b>	<b>X</b>		
<b>ESCOM:</b> European Society for the Cognitive Sciences of Music <a href="http://musicweb.hmt-hannover.de/escom">http://musicweb.hmt-hannover.de/escom</a>	<b>X</b>	<b>X</b>	<b>X</b>		
<b>JSMPC:</b> Japanese Society for Music Perception and Cognition <a href="http://www.soc.nii.ac.jp/jsmpc/index-e.html">http://www.soc.nii.ac.jp/jsmpc/index-e.html</a>	<b>X</b>	<b>X</b>	<b>X</b>		
<b>SMPC:</b> Society for Music Perception and Cognition <a href="http://www.smpc.org">www.smpc.org</a>	<b>X</b>	<b>X</b>	<b>X</b>		
<b>KSMPC:</b> Korean Society for Music Perception and Cognition <a href="http://www.ksmpc.org">http://www.ksmpc.org</a>	<b>X</b>	<b>X</b>	<b>X</b>		
<b>SACCOM:</b> Sociedad Argentina para las Ciencias Cognitivas de la Música - Argentine Society for the Cognitive Sciences of Music <a href="http://www.saccom.org.ar">http://www.saccom.org.ar</a>	<b>X</b>	<b>X</b>			
<b>ISME:</b> International Society of Music Educators	<b>X</b>		<b>X</b>		<b>X</b>
<b>MENC:</b> Music Educators National Conference	<b>X</b>		<b>X</b>		
Canadian Music Teacher's Association	<b>X</b>		<b>X</b>		<b>X</b>
Putamayo World Music <a href="http://www.Putamayo.com">www.Putamayo.com</a>				<b>X</b>	
Organization of Inuit, First Nations, Acadians				<b>X</b>	<b>X</b>
Peace Researchers				<b>X</b>	<b>X</b>
Society for Sociology of Music Education				<b>X</b>	<b>X</b>
Society for Arts in Medicine					<b>X</b>
International Federation of Choral Music <a href="http://www.ifcm.net/">http://www.ifcm.net/</a>			<b>X</b>	<b>X</b>	<b>X</b>
Digital Library Association	<b>X</b>	<b>X</b>		<b>X</b>	
Heritage Canada	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>



UNESCO Canada / International	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>