Advancing Interdisciplinary Research in Singing (AIRS): Development, Education and Well-Being

The human voice and mind together support two natural expressive abilities, speaking and singing. Each ability serves distinct though sometimes overlapping functions. The acquisition and nature of speech has been the focus of a vast research enterprise. In contrast, less scholarly inquiry has been directed to singing, to its acquisition, its perceptual-cognitive processes, social roots, and potential for cross-cultural communication. Linked to social, cultural, and biological development, the study of singing draws on many disciplines and submits to many forms of methodological exploration and analysis. Recognizing a need for a comprehensive framework, an international collaboration of over 70 scholars in the humanities and social sciences is motivated to Advance Interdisciplinary Research in Singing (AIRS). Together, the AIRS collaborators will integrate new multidisciplinary knowledge about singing from the perspectives of psychology, music, education, linguistics, sociology, anthropology, and folklore, assisted by computer science and audio engineering. This unique team of world experts working with students, community and non-academic partners will address three research themes:

**Theme 1: Development of Singing.** How is singing acquired naturally by children, and how is it acquired in comparison to acquiring speech? Cross-cultural, longitudinal studies will aim to reveal universal, culture-specific, and idiosyncratic aspects of the acquisition of singing from diverse perspectives including psychological, sociological, musical, linguistic, and educational, with implications for these and other disciplines.

**Theme 2: Singing and Education.** What are the most effective methods of teaching singing in different contexts and cultures? An international and cross-cultural effort coupled with the application of new teaching technologies will determine best practices, and their underlying theories as well as optimum repertoire choices to best reflect our globalized reality in a variety of contexts (solo/group; informal/formal settings; aural/notated traditions).

**Theme 3: Singing and Well-being.** How does singing contribute to happier, healthier individuals and societies? Well-being, broadly defined, includes three research foci: how singing promotes cultural and intergenerational understanding, and mental and physical health. Experiments will determine the role of teaching foreign songs to children to promote cultural understanding. Other studies will bring older and younger people together in activities associated with singing leading to guidelines for instituting such programs. Finally research will focus on individual and community benefits of singing, physical and psychological, as measured by standard indexes of health.

An interactive web-based virtual research environment (http://vre.upei.ca/airs) will support the team, enabling discussions and information sharing across Canada and beyond. The site hosts a one-of-a-kind digital library database of singing that will accelerate progress on each research theme. Such a database has a successful precedent in language acquisition research, where the CHILDES repository of transcribed spontaneous speech supported over 2000 publications in developmental linguistics since 1984 (MacWhinney, 2000). The AIRS database will represent singing of individuals and groups of many ages, skills, ethnicities, and geographies. The database, already operational in beta testing mode, is 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”.

**Impact:** With the support of the SSHRC-MCRI program, AIRS will revolutionize research in singing, identifying cultural universals and particulars of singing development, exploring the continuum between speech and song. It will also develop best practices for teaching singing across cultures and generations. As such, it will provide a means for enhancing quality of life through improving intercultural understanding, within communities and across nations, and improving intergenerational understanding. The research results, which will be disseminated through publications, handbooks, recordings, web resources, conferences, workshops, and university-community events, will have policy implications for communities, culture, heritage, international relations, youth, and seniors. Over 30 students will receive multi-year outstanding training opportunities with experts in top facilities.
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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, many children sing before they 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 shared culture and identity. Songs have special value today in the face of globalization that threatens the preservation of traditional styles.

Research from music education, health education and the psychology of music suggests that the act of singing can contribute to individual well-being, physically as well as psychological (Bailey & Davidson, 2005; Clift & Hancox, 2001; Thurman & Welch, 2000). Research from 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 implies that singing significantly improves the human condition. The realization of these benefits requires new knowledge and synthesis of existing knowledge. An integrative foundation encompassing many disciplines in a multicultural context could meet these needs. 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 proposal with the intent of actualizing our potentially groundbreaking work agenda.

Objectives of AIRS

AIRS aims to address theoretical and practical research issues in singing. The scope of the conceptual framework and research questions require the participation of scholars in the humanities and social sciences throughout the world who will bring together their intellectual, cultural, and technical resources to bear on the three broad research objectives of AIRS. Each objectives focuses on a question about Development, Education, and Well-being respectively. The questions appear deceptively simple but require an international multidisciplinary and long term research project to address universal, cultural, and individual influences at many points in the lifespan so as to provide the comprehensive and fundamental knowledge currently missing.

1. Development: How is singing acquired by every child, and how does this acquisition differ from that of the acquisition of speaking? The answers derived by cross-cultural multidisciplinary investigators, united by a common test battery, will clarify the role of the social, linguistic, musical and cultural factors in the development of singing.

2. Education: What are best practices for teaching singing, with what repertoires, how does singing benefit education in general, and how can singing facilitate teaching of other curricula? Answers will be derived through a focus on both pedagogy (informal as well as formal teaching settings, aural, notated and improvised practices; issues with boys’ changing voice) and repertoire (aural tradition, composed and popular repertoire). New multimedia and electronic teaching tools will also be explored. Results will include new fundamental knowledge that will furnish the basis for singing instruction in numerous contexts. The findings will enable informed decisions about (a) singing instruction in numerous contexts as a human phenomenon that promotes self-enhancement, emotional expression, group identification, communication, meaning-making, embodied knowing and cultural celebration (b) singing in schools, and (c) the application of singing to the teaching of other materials. Outcomes will include (a) the development of web-based tools for teaching singing in formal and informal settings and a better understanding of and specific song repertoire resources that reflect our global reality and the impact of commercial music (b) assessments of the benefits of singing in educational settings and (c) recommen-
3. Well-being: What is the role of singing on individual and community well-being in cross-cultural settings, in intergenerational settings, and in health contexts? The answers will arise through research that focuses on (a) the role of singing in improving cross-cultural understanding, (b) the development and assessment of intergenerational singing programs that pair co-located senior and youth facilities, and (c) assessment of the health benefits of singing interventions (e.g., increased lung capacity). The answers will guide the creation of singing protocols for promoting understanding across cultures and generations and to promoting health within individuals and social groups.

Framework

Although the study of singing may seem esoteric, it will increase knowledge about biopsychosocial factors governing behaviour, and provide a fresh perspective on human development. The three research themes—Development, Education, and Well-being—will be explored along a biopsychosocial dimension that differentiates individual, cultural-group, and universal influences on human development (Kluckhohn & Murray, 1950; Leoung, 2007).

![Figure 1](image)

Fig. 1. The AIRS Research Framework: Three inter-related themes to be investigated from the perspectives of unique individual influences, cultural influences, and universals common to all people.

Together, the three themes and three factors situate a vast context for AIRS research. Guided by this simple framework, AIRS will revolutionize research on singing. It will do so with the help of a digital library for storing audio and audiovisual records of singing and associated materials.

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

A comprehensive digital database for storing audio and audiovisual records of singing will support the work. The idea resembles a precedent, called CHILDES, that revolutionized the understanding of language acquisition research, as reflected by over 2000 research publications (Berko & Thompson, 2002; MacWhinney, 2000). AIRS collaborator Brian MacWhinney and Catherine Snow launched the CHILDES database in 1984 to support research in child language. MacWhinney has maintained CHILDES at Carnegie Mellon University with support from the MacArthur Foundation and NSF. CHILDES provides 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 corpora in the database can be used to examine how simultaneous exposure to two languages influences children's syntactic development. Without CHILDES, researchers addressing such questions would probably spend years recording, transcribing, and coding utterances.

Although the idea of a comparable database for singing was suggested some years ago by Cohen (2000; e.g., for sharing data on child singing collected by Dowling, 1984; Papousek & Papousek, 1981), its feasibility has increased markedly because of the availability of high quality digital
sound recording, digital library technology, and low-cost digital storage for audio and video records. Through a CFI (Canada Foundation for Innovation) infrastructure grant led by Cohen (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 an IBM digital library, that will provide 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 the AIRS project director, Annabel Cohen, welcomes the AIRS digital library team of experts: 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 (co-creator of CHILDES, Carnegie Mellon U.). They will work with Leggott’s team to create a world class digital library for singing research that aims to stimulate a level of research productivity comparable to that of CHILDES. To explain how the AIRS database will be used, note that the research of some of the AIRS collaborators entails patient, painstaking recording 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, which will facilitate searches of the new corpus. The rich data sets will be amenable to many techniques of analysis, such as those created by AIRS researchers Dalla Bella, Stadler Elmer, Palmer, and Sundberg. Anyone (with appropriate permissions) will be able to search, analyse or otherwise use the singing data. The starting level is at http://vre.upei.ca/airs/fedora/repository; followed by http://vre.upei.ca/airs/fedora/repository/vre:ntc-52/-/Development, and so on.

Through searches of the descriptive metadata, the singing records can be accessed in unlimited combinations to address a variety of questions regarding individual influences (e.g., what is the variability of compositional creativity of 5-year olds within a culture), cultural influences (e.g., what common features of creativity are found in compositions of one culture but not another), and universals (e.g., do the invented songs of 5-year olds have similar structure?). The database can support applied research to answer such questions as: How effective is the 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, allowing successive users to build on past research. Until now data on singing has been collected and analysed by one researcher or group (e.g., Kreutzer, 2001; Sagi & Vitanyi, 1988) and stored in a way that is inaccessible to others. The AIRS database will permit such data to be shared, and reanalysed for years to come. The digital archive is of course only one means of attaining the AIRS research goals. More specific details of activities to be conducted under the three themes are provided below. We emphasize that the focus of AIRS is not on the digital collection for its own sake. Instead, the digital library is considered the best means of achieving the research objectives.

Activities to be Conducted Under Each of the Research Themes

Theme 1. on Development of singing focuses on Acquisition of Singing (1.1) and Comparison of Singing and Speaking (1.2). 1.1. Acquisition. Laurel Trainor (2005), Director of the McMaster Institute for Music and the Mind (MiMM), has proposed that there are different sensitive or optimal periods for the acquisition of different aspects of musical skill. Singing entails many component skills such as the ability to represent a range of pitches, sing discrete pitches accurately and in time, create a melody, remember a melody, integrate tune and lyrics, and represent particular relations among pitches (e.g., doh me sol). Research is required to uncover commonalities and differences across cultures in the development of vocal pitch range, song duration, emergence of discrete notes, pitch and timing accuracy, coordinated bodily motion, song structure, and use of lyrics. Research has only begun to search for individual, cultural group, and common universal forces that influence singing development (cf., Stevens & Byron, in press).
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 at MiMM will lead an international team of researchers experienced in analysing singing (e.g., Stefanie Stadler Elmer, Maija Frederikson, Sandra Trehub, Mayumi Adachi, Leslie Phillmore, Christine Tsang, Annabel Cohen). Longitudinal studies over the 7-year grant period will aim to determine trajectories of change in singing across 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 has already been developed by Annabel Cohen in consultation with Stadler Elmer (Switzerland) and Simone Dalla Balla (Poland) to optimally guide data collection across nationalities and cultures worldwide. As shown in Table 1, an 11-item protocol for the collection of singing data taps a variety of singing abilities as well as conversation between experimenter and the child or adult participant so as to also tap language skills and personality/social aspects.

<p>| Table 1: 11-Item Protocol for Collection of Singing Data from Individual Children and Adults |
| Procedure involves 2 researchers (1 interacting and 1 audiovisual recording) for children and 1 researcher for adults |</p>
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<td>Opening Conversation</td>
<td>Vocal Range Determination</td>
<td>Minor third Name call back</td>
<td>Brother John Sing back</td>
<td>Sing favorite song</td>
<td>Sing back musical Elements e.g., triad interval, scale</td>
<td>Make Up ending of a given song</td>
<td>Free Composition to Choice Of picture</td>
<td>Sing back unfamiliar song</td>
<td>Brother John Sing from memory</td>
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The remaining items test the vocal range, as well as the ability to sing musical elements, a familiar simple song, a favourite song, an unfamiliar complex song, to continue a song, and to compose a song. As reported at the Neuromusicon conference in Montreal (Cohen, Armstrong, Lannan & Coady, 2008) and at the Conference on Music, Language and the Mind in Boston (Cohen, Coady & Lannan, 2008), the protocol has been successfully piloted for children of ages 3, 5, and 7 years of age as well as young adults (with and without voice training). Each participant was tested at monthly intervals for 5 months. With only 10% attrition, it was clear that the children enjoyed the experience and co-operated throughout. The recorded singing was then stored in the AIRS database for use by any of the AIRS researchers, as will be described later and can be seen and heard on the AIRS database. The researchers will carry out microanalyses of songs produced and macroanalyses of social interactions associated with playsongs and lullabies.

From the perspective of the AIRS project, the significance of this test battery cannot be underestimated. It provides a foundation for and linkage of at least 30 researchers within the AIRS collaboration. One of the first steps of Team 1 will be to assess and fine tune the current battery. This current battery is specific to western culture and is consequently biased to reflect aspects relevant to western culture. Two additional types of batteries will therefore be developed. One will mirror the current battery using materials specific to non-western cultures. This will be carried out by AIRS researchers in consultation with relevant stakeholders in Canada (e.g., Assembly of First Nations), Brazil, China, and South Africa. The second type of battery will be a combination mixed-culture battery that includes elements from the western and non-western batteries. Consistent with age-related changes in brain brain plasticity, younger children may perform better than older children on the battery from an unfamiliar culture. These three batteries: the western, non-western, and mixed-culture will be used in different cultural settings in different countries (by the AIRS researchers in Team 1) so as to determine the individual, cultural, and universal influences on singing acquisition. The AIRS team includes experts on the analysis of singing, Johan Sundberg, Sten Ternstrom, Coralie Vincent—a previous student visitor to Annabel Cohen’s lab and technical support person for Arts-Netlantic and now
providing technical support to the Institute for Phonetics and Phonology at CNRS, Paris--Georges Tzanatakis, Stefanie Stadler Elmer, and Simone Dalla Bella.

The test battery is brief so as to accommodate children's attention limitations, but each item represents one aspect of a particular singing skill or ability. More extensive research will be conducted on particular components of the battery, and individual researchers will take responsibility for in depth analyses of specific components of the battery.

Components #4, #5, #8 and #9 entail singing a song with lyrics. Singing lyrics represents an enormous feat of coordination. In order to determine how such coordination comes about, Mayumi Adachi has observed pre-school children's difficulty in singing back a song without lyrics (la, la, la). This suggests that learning the song entails a holistic approach, integrating the melody and lyrics as a single acoustic stream. Adachi will extend her research in this area by asking children to sing a simple song, first with the lyrics and then without. Children's sung data will be analysed by (1) by evaluating each song based on specific criteria, and (2) by having musicians (or expert singers) judge which version sounds more accurate in terms of pitch and/or rhythm. The results of this study shed light on the process of learning a song in childhood, both its words and music.

A similar problem however arises for Component #9 in which a child is asked to create a song based on one of four pictures. Most children respond by producing both lyrics and a melody. In the future, some children will be asked to compose a song without words, some to use words, and some to compose one song with words and one without. These results will indicate whether the words or the melody have the privileged status in the composition process (e.g., the child composes the tune around the words, or vice versa). Cross-cultural data will indicate the universal, culture-specific, and idiosyncratic aspects of composing a song for different age groups. Stefanie Stadler Elmer, who has devoted her career to the study of children's singing and has developed a special tool for analysis of children's song, will focus on this aspect. From her location in Switzerland, she will be able to consider the impact of biculturalism, bilingualism and trilingualism. During the course of the project she will visit Canada and share her expertise with students and faculty.

There is the possibility of monitoring the singing output of infants in their natural home environment. One means of doing this is to have mothers complete a checklist whenever they hear their infant spontaneously sing, a project that Mayumi Adachi has started in Japan. These checklist diaries will be completed by mothers in several countries in order to determine the frequency and characteristics of this behavior.

Elements of the current AIRS battery overlap with a simpler battery that has been developed for a research program, called Sing Up, in the UK testing approximately 2000 children. Sing-Up is a recent £40 M initiative of the UK government to make every public school a singing school, one in which children have the daily opportunity to sing and in which every school has a teacher specializing in singing (Welch, 2008). Heading the Research arm of this program is Graham Welch. As leader of the team that is conducting research to evaluate the program, he has instituted a short battery that overlaps with items #1 (normal speaking range) #2 vocal range and #3 singing a familiar simple song. Welch has agreed to supervise Canadian students using the AIRS 11-item battery in Britain contributing a broader picture of the effect of the Sing-Up Intervention, and characterizing the singing abilities of British children in their various demographic settings. This work will benefit from and add to information already obtained about this population which has revealed improvement in singing competency with age matched by declining interest in singing (prior to the Sing-Up intervention).

Theme 1.2 Development of Singing vs 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 classical voice training typically begins in places like North America and Europe. 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. Sandra Trehub, Emerita Professor at the University of Toronto is world renowned for her work on music abilities of infants and in infant-directed singing. Although much attention had been directed to infant-directed speech, no-one before Trehub had considered the significance of infant-directed-singing. She has pioneered the search for commonalities between infant-directed speech and music. She and Frank Russo, a psychoacoustician of music at Ryerson University, 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 better understand the song/speech continuum.

Infant-directed singing. Mothers’s singing to infants is important in its own right for understanding this aspect of universal human behaviour. It is also important from the perspective of infants because of the exposure to song that it provides. The research network offers the opportunity to collect such data across cultures. Although mothers (and other caregivers) throughout the world sing to infants in the course of care (Trehub & Trainor, 1998), research to date has focused almost exclusively on Western mothers and infants. Moreover, descriptions have been limited largely to auditory features of infant-directed (ID) singing even though ID singing is a multimodal experience for singers and listeners. We propose to document the nature and context of ID singing across cultures. A large collection of audiovisual recordings of ID singing will make it possible to generate systematic descriptions of such singing. Among other things, we will be able to ascertain which features are culture-general, which are culture-specific, and which are person-specific. In addition, we will make comparisons with ID speech and determine the commonalities across ID music and speech within a culture and across cultures.

There are well-documented cross-cultural differences in values or ideals about infants (e.g., Tsai, 2007). Whereas Eastern cultures tend to idealize calm, contented infants, Western cultures tend to idealize infant activity and overt signs of positive emotion (smiling, laughing). These contrasting ideals are likely to be associated with different manners of singing, for example, more soothing in the case of Eastern mothers (e.g., lullabies) and more playful in the case of Western mothers (e.g., play songs). The way that mothers move, hold and touch infants as they sing may also be related to such ideals. In addition, maternal patterns of movement and touch are likely to have auditory consequences, which have not been explored to date. We propose to fill in these important gaps in knowledge so as to characterize (a) the relation between the song and speech environment of infants and (b) the development of infant babbling and its bifurcation into singing and speaking. Participating in these studies will be members of the Trehub laboratory, Maija Fredrikson (Finland), and Simone Falk, (Germany). The researchers will use the following protocol developed by Sandra Trehub for AIRS for the collection of ID singing and speaking

**Context:** ideally, a very quiet area to optimize recording quality.

**Equipment:** digital video-recorder and high-quality microphone. If singer provides consent for audio-recording only, use digital audio-recorder (and high-quality microphone).

**Infant-directed singing:** Mothers should sing one or more songs that they typically sing to their infant, doing so in their usual manner. It’s important for mothers to be physically comfortable and to hold infants in their usual way, even if that partly obscures the mother’s face. The video focus should be on the mother rather than the infant, the goal being is to capture information about the mother’s movement while singing, the way she holds and moves the infant, etc. For audio-recording sessions, researchers should keep written notes about mother-infant position. Once the equipment is arranged appropriately, the researcher can leave the immediate area to reduce the mother’s self-consciousness. It
should be emphasized that a limited number of researchers who are working directly on specific studies will have access to the materials and that those individuals will not know the identities of singers.

**Non-infant-directed singing:** While an assistant cares for the infant in a nearby room, mothers should sing a song that they sing informally in the shower or elsewhere. If they don’t usually do so, they should sing a song that they know and like (but not one that they usually sing to their infant). Audio-recording is recommended for this singing sample to minimize self-consciousness.

**Background information to be collected:** Maternal age, infant age, years of music lessons, extent of current or recent musical activities (e.g., music listening, music-making, attending concerts, dancing), rough frequency of singing to infants (e.g., many times daily, daily, weekly), usual context of singing to infants (e.g., play, sleep-time, while in cradle, crib or rocking chair, diaper-changing, feeding), and other relevant features (e.g., mother’s country of origin, urban vs. rural setting, country in which recording is taking place).

**Infant-directed speaking.** The same procedures should be carried out for speaking to the infant or to a non-infant. The inclusion of infant-directed speaking in the ID singing collection will contribute to research aimed at distinguishing early singing from speaking. The literature suggests that all children generate musical babbling and some types of spontaneous songs. While some children sing actively during early childhood, others decrease their spontaneous singing. These differences may stem from parental encouragement. The Adachi laboratory in Sapporo, Japan is testing the hypothesis that mothers’ interpretation of infants’ babbling as speech or singing influences maternal behaviour. For example, if the mother (typical primary caregiver in Japan) interprets the babbling as “speech,” she replies by speaking. If she interprets it as “singing,” she joins in the singing. One of the goals is to identify the features of infant babbling (e.g., pitch glides, rhythms) that foster these divergent interpretations. Another goal is to determine whether children of mothers who are inclined to make musical interpretations of babbling produce more spontaneous songs than those of mothers less inclined to do so.

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 and eye-movements during the perception and production of song and speech across ages and cultures. Hauf will use eye-movement technology to compare infants’ visual fixations during speech and singing, both infant-directed and non-infant-directed. The lips provide the critical visual information in the case of speech perception (e.g., Watkins, Strafella & Paus, 2003; Vatikiotis-Bateson, Eigsti, Uyano, Munhall, 1998), but the eyes may be equally important for the perception of singing (e.g., Thomson & Russo, 2007). Infants’ visual fixations on speaking and singing faces will shed light on the developing differentiation of speech and singing. Electromyography will also be used to assess the relative impact of singing vs speaking on infants. The capacity for a mother to regulate her infant’s affect depends on the coordination of emotion. Healthy infants show coordination with vocal and facial affective displays as early as 10 months (Ekman et al., 1979; Lelwica et al., 1983). Frank Russo’s lab will conduct studies involving simultaneous recording of facial electromyography and autonomic arousal. The intent will be to study the relative influence of singing vs. speaking on coordination of emotional states of mothers and their infants. Do infants mirror emotional expression more for singing than for speech?

**Statistical analysis of speech and singing.** A third research paradigm will focus on the analysis of infant babbling. Several AIRS researchers have recordings of babbling (Stadler Elmer, and Adachi), and more recordings will be collected in different cultural environments. Speech and music signals can be distinguished by their statistical properties or frequency of occurrence and co-occurrences of certain features (Patel, 2008). Tracking these statistics in babbling may make it possible to identify the typical developmental period for bifurcation of speaking and singing. Cross-cultural work is particularly important in this regard. Many cultures do not have the clearly delineated boundaries between speech and music that are found in Western cultures. For example, in ethnomusicologists often refer to the speech/song continuum in Africa.

**Melodic intonation therapy.** Adults who have lost the ability to speak as a result of stroke often retain the ability to sing, including songs with words. Singing presents a potential means of regaining
control over speaking. Dr. Gottfried Schlaug at Harvard Medical School is conducting a longitudinal study of melodic intonation therapy to assess the impact of singing on speech recovery. Dr. Schlaug has agreed to incorporate the AIRS battery at various time periods in the longitudinal study. This will enable AIRS to obtain specific information about the singing ability of his patients, changes over the course of therapy, and the overall impact on speech. The battery would be used also for the participants in the control groups. Students from Canada will be welcomed at Dr. Schlaug’s Harvard laboratory to learn about his behavioural and neuroimaging procedures and to contribute to the analysis of the singing data. Dr. Bradley Vines, who worked previously with Dr. Schlaug, will continue his collaboration, from his current position at UBC. Jennifer Nicole is also experienced with this technique as a music therapist and will assist in evaluating the evidence. Canada Research Chair in Neurocognition of Music, Isabelle Peretz, 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.

**Theme 2. Developing best practices for teaching of and with song.** The team led by Darryl Edwards, a professional tenor, and Head of Voice Studies, Faculty of Music, University of Toronto, and Andrea Rose, MUN, a 3M Award winning teacher and co-founder organizer of the biennial Phenomenon of Singing International event, will review current music pedagogy (with Harold Abeles Columbia Teacher’s College, Beatriz Ilari, Brazil, Helga Gudmundsdottir, Iceland, June Countryman, UPEI, Esther Mang, Hong Kong, and Jaan Ross of Estonia) and vocal pedagogy (with vocalist/educators Jane Ginsborg, Royal Northern College of Music, Steven Demorest, an expert in choral direction at the University of Washington, and Sung-ha Shin-Bouey, UPEI). They will also consider implications for singing education from the findings of Development Theme 1 on song acquisition and from recent principles of multimedia education based on cognitive psychology (e.g., Mayer, 2005). They will consider the vocal and choral pedagogies surrounding the issue of the male voice change, exploring the successes and challenges in keeping boys and young men singing. Is the feminization of singing a North American phenomenon? What can we learn from cultures in which male singing remains highly valued? They will then develop and test strategies for teaching songs that exploit audiovisual resources stored in the AIRS database and video conferencing facilities.

One goal of Theme 2 is to amass audiovisual recordings of traditional songs from various cultures, performed in their authentic style. This will provide an audiovisual digital resource for further investigation into methods for teaching singing of various global repertoires, methods of using songs to teach other content, and investigations into the relationship between singing and cultural understanding (Theme 3, below).

Patricia Campbell working at the interface of music education and ethnomusicology, has made educational audio recordings of compilations for use in classrooms. She believes however that audiovisual recordings would be very useful, and she is eager to engage in this aspect of the project with the help of her students at the University of Washington. UPEI students in education involved in the International Education program will also participate. As UNESCO Chair in Arts and Learning, Larry O’Farrell of Queen’s University has many connections to support the acquisition of songs from cultures throughout the world. Through his connections, he will pave the way for obtaining the materials needed. Collection will be accomplished by education students in the PEI international education program, by graduate students in folklore at Memorial University, by graduate students at the University of Western Ontario in the Faculty of Music working on Aboriginal music, by students at the University of Moncton working within the Acadian cultural framework, by students of Kate Tilleczek working with the Assembly of First Nations in Ontario, by other Canadian graduate students who will be hosted by Beatriz Ilari in Brazil, Jaan Ross in Estonia, Simone Dalla Bella in Poland, Caroline van Niekerk in Africa, Esther Mang in Hong Kong, and Kate Stevens in Australia. A protocol for recording the songs in their cultural context will be established, including level of permission for viewing (by researchers, educators, or general public). Issues to be addressed include:

1. What traditional songs (and from where in the world) do teachers value enough to include in their song repertoire for children/youth? Why these songs?
2. How do teachers teach these traditional songs (rote, note, rote-and-note, with/without movement and kinesthetic gestures, with/without vocal nuances) when compared to the transmission style and performance qualities of traditional singers of these songs?

3. What songs do children value--theirs, "ours" (adults, including teachers' selected songs), mediated/tech-oriented?

4. How do children pass on valued songs to others? Do they hear/preserve nuances of the songs from their grandparents, parents, teachers', community elders, pop artists, etc? Or do they flavor the songs with their own nuances?

For these and other songs, ethnomusicological method applied in musical ways is a reasonable way in to puzzling through these questions. Prior work within this realm has sought out in particular the songs of children's cultures ethnomusicologically, including Kathryn Marsh, Eve Harwood, Amanda Minks, Chee-Hoo Lum, and others. Their precedent provides a model for expansion by AIRS.

Having obtained traditional songs from various cultures, the focus turns to best practices for teaching these songs and for enhancing voice quality and musicality. Examples of successful teaching of songs, obtained by researchers based at UPEI, University of Toronto, Hong Kong Baptist University, Tallinn University in Estonia, among others, will also be audiovideo recorded, and the features of success will be analysed so as to build a model or models. As a live teacher may not always be available, effort will be made to develop means through multimedia for simulating some of the benefits of the live teacher when she or he is not available.

Psychological theories of multimedia learning aim to describe how the mind simultaneously processes information from various audio and visual sources. Principles then follow which can guide the choices for best use of multimedia teaching resources. The researchers will consider Mayer's (2005) cognitive theory of multimedia learning that entails dual channels for visual/pictorial and auditory/verbal processing. They will also consider Sweller's (2005) cognitive load theory suggesting that multimedia materials can be used to prime long term memory to overcome the limitations on learning new material imposed by working (short term) memory.

**Teaching through singing.** If singing is a human phenomenon that promotes self-enhancement, emotional expression, group identification, communication, meaning-making, embodied knowing and cultural celebration, then learning the alphabet through song seems trivial by comparison. Nevertheless, singing can be effectively applied to enhance education in other realms. Several researchers will explore the value of singing for teaching non-musical content, specifically, teaching vocabulary, pronunciation and grammar, culture and cultural understanding.

**Vocabulary through singing.** Singing typically entails melody and words. Mention has been made of the potential value of melodic intonation therapy for re-learning of the skills of speech. For children, songs may be useful as ways of introducing new vocabulary. Certainly this notion is consistent with educational programs such as *Sesame Street*. AIRS researcher Jennifer Sinclair will adapt her protocol (based on Anglin, 1993) for teaching vocabulary. The protocol provides a detailed method for determining in a private interview whether a child, as young as pre-school age, knows the meaning of a word. Adapting this to the music situation, children would be taught songs which contain words they are unlikely to know. Other children will similarly read stories including the words, while other children will watch a video containing the words in context. To show the effectiveness of singing, children will be tested on the meaning of these and other words.

**Culture through singing.** Martha Gabriel, a Professor of Education at UPEI, has collected songs of the Prince Edward Island culture which she uses in teacher education for a variety of subjects. Until now, her approach has been informal. The AIRS project allows her to formally test the success of her method in a study in which some schools in which her practice teachers will teach will receive the singing intervention, while others will not. She will test retention and enjoyment. In successive years, she will switch the schools at which control and tests occur so as to rule out the possibility that behaviour is based on community demographics rather than on the participation-in-singing variable.
Second language acquisition and singing. Thanks to the song Frère Jacques, most people know the meaning of “dormez vous” even if they know few other French words. The use of singing to teach foreign vocabulary, pronunciation, and grammar will be investigated. Regarding vocabulary, the protocol suggested by Sinclair above can be used.

Most adult learners of a second language (L2) speak with a foreign accent even after many years of immersion in the L2, and many older L2 learners are unable to attain near-native competence in the L2 grammar. However, a few individuals are able to master the L2 speech patterns and/or grammar (for a review, see Flege, Yeni-Kenshian, & Liu, 1999). Recent studies have indicated that musical ability predicts LQ phonological ability (Slevé & Miyake, 2006). Adults are better at extracting word boundaries from a continuous stream of syllable sequences (e.g., mimosigimisi) when the syllables are correlated with musical information (Schon & al., 2008). This result suggests that the motivating and structuring of music in song might be able to enhance L2 syntactical development.

Research on the relation between singing and L2 pronunciation (i.e., phonology), will be conducted in partnership with Extemporal, a Charlottetown-based R&D developer of on-line pronunciation training software. Extemporel will adapt its Chuala web-based software for the training of singing. Chuala can be used to test the benefit of singing training on the development of native accent. In the training stage, participants listen to a song in their L2 and then attempt to repeat the song of the model. Their responses are recorded using Extemporel software which allows participants to compare the model with their own production. In the test phase, they repeat the words of the song alone, without the melody. Their performance is compared to controls who are trained on a spoken version of the song presented without the melody. It is hypothesized that the focus on the sound for its own sake in song, and the extended duration of vowels, as well as exaggeration of consonants will facilitate accent as compared to those who have only spoken the words. In the above studies, an additional variable of interest will be the extent of prior singing or voice training. It is possible that a student of the voice will be able to direct his or her articulation more exactly and have greater articulatory control than someone lacking such training.

Regarding L2 syntactical development, two related lines of research linking singing and L2 acquisition have been proposed by Henrietta Lempert, whose research at the University of Toronto has focused on the syntactical development in preschoolers and more recently, in first-language Chinese learners of L2 English (e.g., Lempert, Rudchenko, & Marcelino, 2006). One proposal involves using an artificial language to explore whether presenting exemplars of the rules of the language as sung sequences enhances learning as compared to spoken sequences. Lempert has developed an artificial language that comes in two versions, a version with phrasal cues analogous to English articles (ie, hifto flengo) and a version with inflectional cues (hifto flengo puser). It has been difficult for learners to acquire the rules from spoken sequences of the language unless they are concurrently exposed to written sequences. Using a 2 (Dialect) x 2 (Presentation; Spoken vs. Sung) between-participants design, students working with Lempert will examine whether presenting the sentences in the form of song lyrics will enhance acquisition of the grammar as compared to spoken sequences, as would be expected if sung sequences are more memorable and available for off-line processing than spoken sequences. We will extend this work to studies examining whether singing facilitates learning grammatical forms such as number agreement and the distinctions between legal and illegal English passives (My sister is seemed very sad). The results of this line of research will have implications for developing new methodology for L2 teaching. However, its significance will only be born out by tests with a variety of L1s and L2s and variations of the music therein. The AIRS MCRI network of national and international colleagues with interests in psycholinguistics and music make such studies feasible, (e.g., UNB (Chicocki), Ryerson (Russo), Poland (Dalla Bella), Ross (Finland), and University of Western Sydney (Stevens)).

Theme 3. Singing and Well-being. Promotion of inter-cultural and intergenerational understanding and health through singing.

Theme 3 explores benefits of singing for aspects of well-being. Well-being here is broadly defined as both subjective well-being (feeling of happiness and life satisfaction) and objective measures such as health status. Subjective and objective well-being are related. In other words, happier people are
healthier people. Components of subjective well-being (satisfaction with one’s social life, health, or finances) and overall subjective well-being have been shown to be statistically related (Schimmack, 2008). In some sense then one can speak of a general construct of well-being. Researchers in Theme 3 are interested in how singing can reduce threats to well-being in the area of social relations and in the area of mental and physical health. Happiness is associated with positive social relations, and AIRS will focus on ways in which singing can promote positive social relations in two different contexts. The first (3.1) focuses on the promotion of cross-cultural understanding and the reduction of prejudice. The second (3.2) focuses on promotion of intergenerational understanding, and engaging the youngest and oldest generations. AIRS (3.3) will also look at health advantages of singing in specific situations of singing in choirs, rehabilitation in lung disease, and parent-infant bonding.

**Theme 3.1. Intercultural understanding.** Canada’s support for multiculturalism is consistent with the view that society benefits from thriving cultures. But with multiculturalism comes the problem for minority cultures of gaining social acceptance from majority cultures. A few provocative, social psychological, empirical studies of singing (Sousa & Neto, 2005; Chen-Hafteck, 2007a), suggest that singing, when used appropriately, may provide an economical means for promoting the peaceful co-existence of different cultural groups. It is important to find out if singing really can breed cultural tolerance and understanding, and how this outcome can be achieved. The MCRI provides the opportunity to examine this important question using diverse methods and in diverse cultural settings.

Three different research approaches will be taken. The first builds on the idea of the use of songs among children for the development of an appreciation of the cultural background belonging to others, and so possibly the use of songs as a tool to peace and conviviality. Through the singing of songs that have an affinity with a particular cultural and historical context, children may experience an unfamiliar culture, or one that has been liable to stereotypization. AIRS co-investigators Félix Neto and Lily Chen-Hafteck, using different methodologies, have shown that children who learn the songs of a minority culture significantly improve attitudes towards that foreign culture as compared to a control group. Specifically, Sousa et al. (2005) studied the changing attitudes to Cape Verde amongst Portuguese children after the latter had been exposed to, and performed, Cape Verdean songs. A rigorous teaching protocol was instituted over a 4 month period, and the attitudes of children were tested both before and after 18 singing classes. The children’s attitudes to the minority culture improved in comparison to a control group of children who did not have exposure to the songs of the minority culture. The work will be carried out again in Portugal and in Newfoundland where cultural minorities may readily be found (e.g., along with a program for teaching Mi’kmaq culture, Tulk, 2008). Once the method has been validated, it will be transferred also to the heart of Toronto, at Ryerson University.

Chen-Hafteck (2007) on the other hand studied students in New York exposed to Chinese music. In contrast to Sousa et al’s (2005) experimental design, she carried out focus groups and qualitative methodology. The goal of the present research will be to continue to develop and use these methods across a variety of cultural settings to determine how singing in childhood can improve cultural understanding. The MCRI provides an extraordinary opportunity in terms of the access to researchers in different cultural settings, and multi-year time span. Whereas the prior work of Neto and of Chen-Hafteck was conducted within a year, the current plan is to carry out a longitudinal study to determine the extent to which singing interventions can have a longterm impact on attitudes and to determine the duration needed for an effective singing program. For example, in the Neto study, only older children were influenced by the intervention. Chen-Hafteck’s work will be carried out in five different sites contrasting vastly in geography and culture, but sharing issues of prejudice or stereotypicization. The specific sites are in Toronto; New Jersey, USA; Pretoria, Africa; China, and Brazil. At each site, AIRS researchers will carry out Chen-Hafteck’s qualitative research protocol. As a preliminary to this study, the songs of minority and majority cultures will be audiovideo-recorded by persons associated with the Education theme. Neto and Chen-Hafteck will both develop and test teaching of cultural understanding
through music and song. Udo Krautwurst, who has conducted research in Nigeria, will be involved in this project.

Associated with this work is a study by Tal-chen Rabinowitch under the supervision of Cambridge University's Ian Cross on the role of singing and musical activities on school children’s sense of empathy. Once the protocol has been established, and the longitudinal study is off the ground, a preliminary model of how cultural understanding arises through singing will be put forward.

The second approach to well-being and cultural understanding through singing will resort to a more qualitative methodology to explore singing from societies that are being differently challenged by modernity. In this context, we will pay special attention to islands as depositories of indigenous and minority cultures (inclusive of languages and songs) and how various island cultures react to the threats of modernity.

Minority cultures and languages - especially those embraced by small populations in peripheral, often island or otherwise remote or secluded regions - represent a considerable proportion of eco-cultural diversity; a feature that is paralleled by the considerable biological endemism in such locales (MacArthur and Wilson, 1967; Baldacchino, 2004). In much the same way as their flora and fauna, that diversity is today under severe threat of extinction (Quammen, 1996; Crystal, 2000). And yet, there is also some evidence of a cultural resurgence: the survival of the traditional Faroese Ballad and its dance is one specific example of a renaissance of local island culture and nationalism (Clark, 2004). Research focusing on song could provide useful and timely insight as to why some cultures thus survive while others atrophy.

Two AIRS coinvestigators (Jean Mitchell and Kati Szego) have been conducting ethnographic studies among distinct island communities that explore some of the complex relations between the local and the global. Mitchell (2004) has studied and filmed the reactions of unemployed youth in the Pacific island nation of Vanuatu to such conceptualizations of modernity as ‘time’. She is keen to extend this critical commentary to music and song, particularly because singing and music are embedded into the daily activities of the Vanuatu inhabitants. Szego (2003) has explored the meaning-making strategies of those who would not typically understand the lyrics they apprehend or sing. Nuances of the appreciation of Hawaiian culture by mainland-US singers who would not typically understand the meaning of the lyrics of the songs that they may be singing and enjoying. Her Hawaiian research suggests that appreciation of song culture does not depend on linguistic comprehension. However, knowing the general message of the lyrics allows non-fluent listeners and singers to imbue foreign-language songs with certain kinds of meaning. This is a lesson equally important to our Education theme.

One aspect of the importance of this work is the fact that so many ‘host-guest’ encounters (as where tourists or immigrant communities are involved) occur through the ‘safe’ medium of song and other cultural and artistic celebrations (e.g. Smith, 1977; Smith & Brent, 2001). And yet, to what extent are these stylized, highly mediated events which exoticize the ‘other’, while only providing samples of ‘staged authenticity’ (e.g. MacCannell, 1999). AIRS- Theme 3 leader, Godfrey Baldacchino (Canada Research Chair in Island Studies at UPEI) is exploring these dynamics with respect to the welcoming and settlement experiences of the immigrant community on (largely mono-ethnic) Prince Edward Island, and also thanks to his affiliation to the Atlantic Metropolis Centre. David Huron who has carried out fieldwork in Micronesia, has collected empirical data related to globalization, and is developing empirical methods for quantifying the degree to which a musical culture has been westernized. This approach will be helpful in the comparison of cultural influences. Joan Russell’s research on Island cultures and singing is also relevant.

The final approach focuses on the dynamics of cross-cultural choirs bringing their origins, maintenance, and benefits to members and community. The Holland College multicultural choir in Charlottetown, and the Common Thread song circle in Toronto will be the focus of exploration, in qualitative research. Such choirs are uncommon and anecdotal information suggests their great value. Therefore, the AIRS Theme 3 members focusing on cultural understanding will also focus on the
mechanics of such choirs and the benefits, with a goal of promoting their establishment, assuming the benefits are shown. Assisting with this goal are 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), and Theresa Doyle, a nationally awarded recording artist who has taught cultural songs around the world.

**Theme 3.2. Singing and intergenerational understanding.** The elders of a culture often best know the songs of the culture and are consequently well-suited to transmit the cultural heritage to the youngest generation. Pioneering research on intergenerational (IG) learning by The University of Western Ontario Faculty of Education’s Rachel Heydon predicts several benefits of IG singing, such as providing opportunity for the sharing of cultural information and IG understanding, giving value to the knowledge and abilities of both generations, increasing communication abilities, and providing pleasure, all which can contribute to well-being.

Heydon will lead the research of Theme 3.2 assisted by a core of researchers all at the University of Western Ontario: Carol Beynon, also in the Faculty of Education and director of the internationally renowned Amabile Boy’s Choir and psychologist Susan O’Neill from the Faculty of Music. Heydon’s guidelines for IG art education will serve as a model for inquiries into IG singing. The team will investigate the learning and interactional opportunities in IG singing that can contribute to well-being, then develop guidelines for establishing singing and song-sharing within different cultures such as in First Nations communities (a group with whom Heydon is working).

Presently, there is good understanding of the need for and benefits of IG learning in general. IG programs respond to several social challenges being experienced by OECD countries. The proportion of elders in Canada, for instance, “is projected to increase by more than 10 percentage points on average over the next four decades” (Spiezia, 2002, p. 109), and a growing number of Canadian elders are living in retirement homes or, for those requiring a higher level of support, nursing homes where there are problems of isolation and depression among many elders (Kastner, 2004). Work-force changes also mean that there is a need for out-of-home care for children during a critical period in their lives (McCain & Mustard, 1999). These changes come at a time when adjustments to the family, such as divorce and geographic dispersal, have weakened IG contact. IG programs address these issues by building on community capacity. For instance, elders are used as resources. Overall they are becoming more educated (LaPorte, 2000), healthier (Thompson & Wilson, 2001), and recognized as having valuable knowledge to pass on (Illinois Intergenerational Initiative, 1997). Thus, while improving their own learning, elders are enlisted as nurturers of children (Henkin & Kingson, 1999). Children can also draw out, motivate, help with idea formation, and give a sense of purpose to the elders with whom they were learning (Heydon, 2007; Heydon & Iannacci, 2008). Several other benefits of IG programs have been identified, including: the establishment of a “sense of continuity” in fractured lives, an “increase in self-esteem and usefulness”, the “opportunity for ... lifelong learning at every stage of development”, and the growth of “understanding” between generations that can help to “diminish fears” each generation may have of the other (Brummel 1989, p. 124). Such understanding also breeds acceptance that “ageing is a normal and natural part of the life cycle” (Kaplan, Duerr, Whitesell, Merchant, Davis & Larkin, 2003, p. 5), and there is the possibility that participants’ understandings of disability are positively affected (Heydon, 2005). With the benefits of IG learning seemingly confirmed (Kuehne & Kaplan 2001), research has turned to understanding how to build long-term, high-quality programs and to ensuring that programming “build[s] on respective strengths” (Kaplan et al. 2003, p. 7) and avoids mere busy-work.

Heydon’s investigation into IG curricula has determined that the arts are a prime way of the generations with each other to enhance communication and the sharing of cultural knowledge (e.g., Heydon & Daly, 2008). This research has also established IG art programs where there were none
before, created a protocol for running such programs so that they may be set-up in new locales, and provided the base for a forthcoming *Handbook of Intergenerational Art Programs* to support the curricular-knowledge needed to run such programs.

Likewise, IG singing programs do exist and have the potential to enhance participants' well-being. The *Interlink Intergenerational Choir*, for instance, is promoted by the Canadian Mental Health Association (Frego, 1995) and *Songfest* is an IG choir whose aim is simply to bring people of different ages together so that relationships can be built (Freund, 2003). There has been no known systematic study of these programs, however. Findings from some systematic research into IG singing include positive outcomes for both generations in the areas of “goodness, positiveness, vitality, and maturity” (Bowers, 1998); positively affected attitudes of the audience of IG choirs (Darrow, Johnson, Ollenerberger, & Miller, 2001); positively affected attitudes of teens and elders who participate in IG choirs (Darrow, Johnson, & Ollenerberger, 1994); the bridging of age gaps (Wilder, 1985). As IG studies are still just emerging and there is a dearth of IG singing studies much of the literature is dated and little looks in depth or across time at how IG singing affects communication learning opportunities which could enhance well-being. Theme 3.2 of AIRS will rigorously address these gaps.

Specifically, using the methodology developed by Heydon in her studies of IG art programs and capitalizing on Beynon’s choir expertise and O’Neill’s music psychology background, theme 3.2 will conduct a multiphase inquiry. Phase 1 will examine the forms of IG singing programs that are in existence. This will involve a review of the literature, directories, and telephone inquiries to identify extent programs. A sample of these programs, selected for their diversity in terms of structure, participants (e.g., culture, language, age, gender, and the like), and locales will then be selected for a naturalistic inquiry focusing on four main questions:

1) What learning opportunities are created by these programs?
2) What songs are sung in these programs and how are they sung?
3) What interactional opportunities between participants are created by these programs?
4) How do the above contribute to the participants' well-being?

Building on Phase 1, Phase 2 will develop a protocol for IG singing programs and establish a pilot of in London, Ontario with Grand Ave Children’s Centre where Heydon’s IG art program has been implemented for two years. The protocol will then be refined through field testing in Seattle, Washington where Heydon has been working for the last five years with Providence Mount St. Vincent long term care facility IG teacher, Bridget Daly. Phase 3 will see the writing of a *Handbook of Intergenerational Singing* and the testing of the book in several cross-cultural sites including Prince Edward Island and Britain where already there exist 30 seniors’ choirs, and a charitable organization that supports them, associated with the Sidney de Haan Centre for Health and Music.

As per Heydon’s proven methodology, ethnographic data collected through this process will include field notes, participant and facilitator interviews, focus groups, videorecordings of programs, videorecordings of performances, and audio recordings of programs and performances. The videos would be made available only to the designated researchers, unless other permission were granted, and the entire project would be subject to the Canadian Tri-Council Ethical guidelines, which Heydon and her team have previously adhered to. The development of a protocol for carrying out a program of Intergenerational Singing Activities aims to enhance both the lives of elders and children, forward knowledge of the effects of such programs, and identify key structures that lead to optimum positive effects of such programs.

**Theme 3.3 Singing and Health.** Theme 3.3 aims to develop an understanding of physical and psychological well-being promoted by singing (cf., Bailey & Davidson, 2005; Thurman, & Welch, 2000; Wiens, Janzen, & Murray, 2002). Jennifer Nicole, a uniquely trained health researcher, at the University of Saskatchewan, will lead this research theme. A musician and former member of various choirs, she is also an accredited music therapist and a registered psychologist and is experienced with empirical methodology, particularly qualitative inquiry. She currently leads a national research project "Meeting
Youth in Music” which aims to increase partnering between music therapists and schools in order to increase the chance of student’s completion of high school, a protective factor for health (Kortering, et al., 2002). Schools with and without pilot music programs, which include singing and songwriting, will be compared for retention rate. This work dovetails with AIRS focus on Singing and Health. Nicole will head a grounded theory inquiry of singing and health in order to generate an explanatory model of choir singing as health promoting behavior. Grounded theory (Charmaz, 2006) involves identifying constructs and building theory via repeated cycles of data collection and analysis. One model that will be explored is that proposed by Betty Bailey, a researcher with the Department of Education in Prince Edward Island. Bailey, a former honours student of Annabel Cohen, who, in her graduate studies in the Music Psychology program at Sheffield University, demonstrated benefits of singing in cross-cultural studies of choirs and other groups, including the homeless (Bailey & Davidson, 2002, 2003, 2005). The team will be augmented by collaborator Chris Blanchard, a Canada Research Chair in Cardiovascular Disease and Physical Activity at Dalhousie University, and also a former honours student of Annabel Cohen. His strength is the design of health research protocols and associated data analysis, and he will advise on designs and provide comparisons with other health interventions. The methodology and preliminary data collection will take place first in Saskatchewan with community-run choirs and facility-run choirs of adults in residential care. Subsequently, the inquiry will extend to choirs in Prince Edward Island, as well as to the UK, in particular, choral groups for seniors (Silver Song Clubs, cf Bungay & Skingley, 2008) developed across South East England by the charitable company Sing For Your Life, a director of which is AIRS Co-investigator Stephen Clift. Clift with Grenville Hancock have co-directed the Sydney De Haan Research Centre for Arts and Health at Canterbury Christ Church University. They have explored the role of music in health for over eight years (Clift & Hancock, 2001, 2006; Clift, Hancock, Staricoff & Whitmore, 2008; Clift, Hancock, Morrison, Hess, Stewart & Kreutz, 2008). The team will build on studies completed already by the Sidney De Haan Centre both through a cross-national survey of over 1100 singers in 21 choirs in England, Germany, and Australia and through its systematic review of all published research on singing, wellbeing and health. These studies however have not been carried out in Canada or less westernized environments, and the AIRS project provides such an opportunity. Also from the UK, Cambridge University’s Ian Cross (1999) author of an article entitled “Is Music the Most Important Thing We Ever Did?” adds further to the team, bringing an evolutionary perspective.

Bradley Vines, a musician, neuroscientist, and post-doctoral fellow in the Department of Psychiatry at UBC is responsible for a program of bi-weekly visits by professional performers to a hospital in Kamloops. As part of the AIRS initiative, Vines will compare responses of patients to performances in which the audience is passive as opposed to being invited to actively engage and sing along. A complementary study investigating the relative benefits of active versus passive singing engagement will be carried out on the East Coast in conjunction with AIRS Partner musical theatre company “Young at Heart” which annually presents a musical theatre production to over 20 seniors homes in Prince Edward Island. Comparisons will be made through audience surveys as well as through analysis of videotapes of audience responses.

Janice Richman Eisenstat, a physician specializing in lung disease in Winnipeg has implemented a program for chronic lung patients that incorporates approximately one-half hour of singing, as instructed by a music therapist. Richman Eisenstat reasoned that breathing exercises required by the lung patients could be accomplished through singing as effectively as without. Patients reported enjoying the class exercises. Now a maintenance pulmonary rehabilitation program will be developed at the Wellness Institute, Seven Oaks General Hospital and the Reh-fit Centre. This will involve a music therapist at weekly sessions. A program of individual home practice will be instituted by provision of a CD of the exercises. User-friendly recording equipment provided by Roland Canada will enable 9 patients to practice with CD’s and as well create their own recordings. The record of singing over a period of time could be of interest from both a medical and a music-psychological standpoint.
The persistence of infant directed singing across cultures and historical periods attests to its efficacy as a care-giving tool. There has been some documentation of the consequences of such singing for infants, for example, its effect on infant arousal (Shenfield, Trehub, & Nakata, 2003) and attention (Nakata & Trehub, 2004; Trainor, 1996). To date, however, there has been no attempt to document its contribution to maternal well-being. Through the leadership of Sandra Trehub, AIRS plans to determine whether aspects of maternal singing (e.g., frequency of occurrence, specific features) are related to aspects of maternal well-being. Such links, if established, would provide encouragement for public health initiatives in this domain.

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. Sharon also welcomes AIRS researchers in this section to participate in a regional AIRS workshop in conjunction with the VISI summer program.

Digital archive

The vast network of researchers focusing on three main themes and sub-themes will be integrated through their joint development and use of the AIRS digital archive. Examples of its specific use for each theme are detailed below.

Theme 1. Development. The Research for Theme 1 relies on audiovisual recordings of the singing ability battery, infant- and non-infant directed singing and speech, and babbling. Team members will record singing 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 the laboratory of Caroline Palmer at McGill, Canada Research Chair in the Cognitive Neuropsychology of Performance will be available to define the development of rhythmic and tempo sensitivities at particular ages. World renowned specialists in the analysis of singing (Sundberg, Ternstrom, Heinrich) will provide various techniques for assessing the singing data.

For the research of Theme 2 (Education), audiovisual cultural context recorded along with songs is needed to provide the optimal context for 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. As has been earlier described, students working with faculty will collect audiovisual recordings from Canadian cultures (First Nations, Acadian), Brazil, South Africa, China, Australia, Poland, and Estonia) so as to 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. 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.

A second important function of the digital library for Theme 2 is the provision of audiovisual examples of model teaching of singing within the studio and classroom as well as in less formal settings. Specific contributors to this aspect at Darryl Edwards (head of Voice, University of Toronto), Esther Mang (early childhood educator, Hong Kong), Sung-ha Shin-Bouey (choir director, UPEI), Carol Beynon (choir director, U Western Ontario), Steven Demorest (male glee club development, Seattle), Jaan Ross (Estonia).

For the research of Theme 3 (Well-being) social psychologists will test whether teaching songs in the digital archive change children’s attitude towards people from those cultures. An associated benefit is
preserving the cultural heritage represented by these songs. 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 and cross-cultural and workplace choirs (e.g., partner Veterans Affairs) 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.

Nature and Breadth of the Collaboration.

The AIRS collaboration of over 70 scholars represents Canada and 18 other countries across six continents. Building on many existing collaborations, AIRS scholars represent the fields of music (education, ethnomusicology, choral, technology), psychology (developmental, educational, cognitive, social, neuroscientific), education (music, arts, drama), sociology/anthropology, linguistics, nursing, medicine, 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, Manitoba, Saskatchewan). Eminent scholars include eight Canada Research Chairs, a UNESCO Chair, 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 two previous 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 national and international meetings, published conference proceedings and is the new editor of the journal Psychomusicology. With specific regard to the AIRS project, this summer she organized meetings of AIRS researchers in 7 centers (University of Western Ontario; Ryerson University, Queen's University, Montreal, Halifax, Paris, and Sapporo), presented papers on the AIRS project at an invited session of the Acoustical Society of America/European Acoustical Society, and at the Conference on Music, Language, and the Mind, presented posters on AIRS at two other meetings, organized the 1st regional AIRS university-community workshop in Charlottetown, and the 1st Expert AIRS Workshop in Sapporo Japan. As well, she organized a series of 6 consecutive teleconferences involving 30% of the team on July 31st. Cohen's work for AIRS has benefited from the excellent support of UPEI's Music Department (including vocal artist/educator Sung-Ha Shin-Bouey), the interdisciplinary CMTC research group, the progressive Library technical team, 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: eminent Laurel Trainor, Founder and Director of the McMaster Institute for Music and the Mind working with Steven Brown, who has conducted neuroimaging studies of singing and tone deafness; 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, and Kate Tilleczek, Canada Research Chair in Child and Youth Transitions who has been studying child and youth cultures in the intersection between
health, education, and well-being. Others include senior scholars Graham Welch, Harold Abeles, Pat Shehan Campbell, 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, Louie). In addition to the majority of Canadian scholars, are those from the
US, Brazil, England, Portugal, France, Switzerland, Sweden, Austria, Poland, Finland, Estonia,
Iceland, Japan, Hong Kong, Australia, South Africa, and China, 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 Sidney De Haan Research Centre,
represented by Steven Clift, is the world leader in the study of music and health and offers
opportunities for support and training of researchers and students in relation to the role of music and singing in
the fields of public health and health promotion.

Governance

The AIRS governance and leadership structure entails an overseeing, arms length Advisory Board
of Directors, an Executive Management Board, and 5 Sub-Committees (3 Research Themes,
Students, and Partner/stakeholder). An Intermediary Digital Library/Technical Team receives input
from all sub-committees and reports to and receives advise from the Executive Management Committee.
The Advisory Board members are eminent in fields represented of AIRS, Music (Voice), Education,
Psychology, Multidisciplinary: Dr. Hilary Apfelstadt, an eminent vocal educator at Ohio State
University, Dr. Philip Smith (Psychology, UPEI, former Dean of Arts, musician, associated with the
Confederation Children's Choir, health researcher, 3M scholar), Stephen Mithen (Dean of Science,
Reading University, Author of The Singing Neanderthals, cognitive archeologist, Fellow of the British
Academy). The Advisory Board meets by teleconference mid-year, and in person at the annual meeting.
The Board selects a chair, oversees activities of the Project Director, approves the AIRS strategic plan,
receives an annual and mid-term report from, advises the Executive in regard to attainment of the AIRS
objectives, and approves financial and other reports prior to submission, approves new memberships.

The Executive Management Team develops collaboration policies and procedures consistent with
the MCRI, manages daily issues, advises on database design and use, is guided by and develops
milestones directed toward achieving AIRS objectives. It is responsible for reviewing research
proposals, monitoring progress of the research toward the AIRS objectives, monitoring performance of
and providing feedback to and receiving feedback from AIRS collaborators, and encouraging
participatory governance of the research network. Chaired by the Project Director, membership includes
the Project Manager, the theme Leaders (i.e., Development, Education, Well-Being), a student
representative, Digital Library representative, a Partner representative and one other investigator chosen
to reflect the multi-sectoral, multidisciplinary, orientation of the collaboration. Two members of the
board will be from the host institution and membership will reflect geographical distribution of AIRS.
Monthly 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.

Students will be represented on all committees (e.g., Theme Teams) and will also have their own
committee so as to address issues specific to students, e.g., a student newsletter, student caucus.

Subcommittee Theme Teams will meet three times a year (including once at the annual meeting).
Partners and stakeholders will be represented in the Theme Teams, but will also have a special
Committee to address issues specific to them. A liaison role between the Partner and Stakeholders will
be carried out as part of the role of a post-doctoral fellow at the host location. As well, adding another
level of integration and providing experience for students, each partner or stakeholder will be connected
with one student who will report to the Partner/Stakeholder Liaison.
The **Scientific Director** will be responsible for the scientific and strategic direction of the Collaboration including acting as Chair of the Executive Management Committee, providing overall scientific direction, coordination and management of the Collaboration, providing information to and receiving advice from the Advisory Board, administering scientific programs and budgets for the Collaboration, recommending members to the Advisory Board, recruiting the Collaboration manager, and liaising with SSHRC.

**Collaboration Manager** is responsible for the general management of the AIRS Collaboration, is subject to annual performance review by the Advisory Board, serves on the Management Committee as voting and on Board as non-voting member, is responsible for all management issues such as supervision of administrative personnel, communications, overseeing of preparation of financial and other report, receives advice from the liaison with partners and stakeholders, overseeing organization of general meetings, overseeing preparation of annual reports, overseeing preparation of supporting documents, meeting agendas, minutes for Research Committee and Board meetings.

**Partnerships with public/private sectors.** Partnerships with the public and private sector are contributing to the activity of AIRS in a variety of ways and include **Veteran’s Affairs Canada** (consultation, student supervision, access to audiovisual archives), **Canadian Commission for UNESCO** (joint workshop), **Roland Canada** (recording equipment), **Extemporal** (e-language training software), the **PEI Music Association**, the **PEI Culture Sector Council** (survey on health benefits of singing and the arts). Organizations have agreed to participate as stakeholders, receiving information about AIRS progress and providing a real-world context for the research through consultation, presentations at meetings, and other informal exchanges over the course of the grant. Some examples include the **Canadian Psychological Association Section on Health Psychology, Acoustical Society of America, Canadian Association of Choral Directors, Canadian Association of Music Therapists, the Canadian Association of Registered Music Teachers, and the Bach Choir of Sheffield.**

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 (UNESCO), 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 MRCS support will go to students from undergraduates to postdoctoral fellows. Student involvement for each of the three research themes will provide extraordinary opportunities for students. Students will receive training on behavioral research, music, and culture in an exciting multidisciplinary and international environment. 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 the database. Other graduate students and undergraduate assistants will code metadata. The following faculty have agreed to host and mentor visiting students: Laurel Trainor (McMaster), Sandra Trehub (Toronto), Isabelle Peretz (BRAMS, Montreal), Graham Welch (University of London), Steven Clift (Sydney de Haan), Stefanie Stadler Elmer (Zurich), Jaan Ross (Estonia), Esther Mang (Hong Kong) among others. Space for a group of visiting students will be provided at the UPEI CMTC research laboratory. Graduate students will also be asked to each liaise with one or more stakeholders or partners, sharing in some of the responsibility of connecting with the non-academic sector, and as well serving the operation of the AIRS collaboration in yet another way. AIRS will host workshops annually for training on the use of the database, and on protocols for collaboration.
Plans for Dissemination of the Research Results

1. **Publications** Each theme team will aim to produce at least 4 articles per year, and through arrangements with journal editorial boards, special issues devoted to AIRS will be published, a different journal for each year for different audiences. *Psychomusicology* has received submissions now for its special issue on singing (Cohen/Trehub co-editors) including papers from the 1st AIRS International Expert Workshop on Singing held in Sapporo, August 2008. Other journals which have agreed are *Arts & Health: an International Journal of Policy and Practice; Canadian Journal of Music Therapy; Journal of Technology in Music Learning*. The Project Director has been invited by editor Lola Cuddy to propose a special issue for the journal *Music Perception* for 2010. A similar invitation has been extended for a book publication of the 2nd AIRS International Workshop to take place at the ICMP 2011 (Seattle). (Publisher Ashgate Press, UK, Editor of this ESCOM Series, Graham Welch).

2. **AIRS project website** (http://vre.upei.ca/airs) is a virtual research environment running on DRUPAL. It provides discussion forums, shared bibliography, news for researchers and public; collaborative document development; and a gateway to the AIRS database. To visit anonymously now use user id: *guest* and password: *guest*.

3. **AIRS database (digital library)** (http://vre.upei.ca/airs/node/142) including raw acoustic and video experimental data of singing, transcripts of singing (various formats), archive of song recordings representing cultures, continents, ages, styles, and transcripts of songs; research paper repository, audio/video cultural repository, tools for storage, access, analysis, intellectual property, metadata protocols, protocols for accessing data. Similar in function to CHILDES for language research, it will revolutionize scholarship in singing as well as potentially support singing activities worldwide.

4. **Conferences** Public research meetings on Interdisciplinary Research in Singing are planned for years 3, 5, and 7 for presentation and discussion of AIRS research results, and to which both researchers and persons in government worldwide will be invited to attend and participate. The venue will change from PEI in Year 5 to accommodate researchers in Central and Western Canada. Videoconferencing will support non-travelers.

5. **Workshops** Smaller AIRS research workshops, disseminating results or demonstrating the database, will also take place. A prototype of such a workshop took place this summer in Charlottetown, at UPEI and attended by approximately 75 persons over the day. The PEI Lieutenant Governor, herself a choir director, opened the event. The program used the Development, Education, and Well-being (DEW) organization and integrated live amateur and professional choir (DEW) organization and integrated live amateur and professional performance with presentations by academics from three Atlantic provinces, a music therapist, and voice teachers. The next ICMP meeting is in Seattle in 2011 (home of AIRS co-investigator Patricia Campbell), and arrangements have been made with conference chair and AIRS collaborator Steven Demorest, a choral specialist, for the Second AIRS Expert Workshop to take place as a Pre-Convention event.

6. **Videoconferences** The full team will meet by videoconference twice a year (once at the Annual Conference or workshop site). Each of the 7 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 for every AIRS member 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** (Handbooks, 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. **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

11. **Children's interactive musical map** of the world available on the AIRS web-site.

12. **Development of intergenerational intercultural choirs or singing festivals**
Concluding Remarks

Consistent with the objectives of the MCRI program, the outcome of the AIRS research will be the creation of a leading edge international, interdisciplinary research collaboration on singing that will advance knowledge in the humanities and social sciences and encourage wide-ranging discussion and debate on critical issues significant to Canadian scholarship and society, specifically those associated with human development, education, cross-cultural and intergenerational understanding and the health of all citizens, young and old. The collaboration will have developed active partnerships with the public sector (such as Veterans Affairs, with discussions under way with Canadian Heritage, Atlantic Canada Opportunities Agency) and the private sector (e.g., small technology companies such as Extemporel, home care and child care facilities). Stakeholders, such as choirs, schools, music teacher associations, will have been integrated into the activities of AIRS studies, meetings, and workshops.

A foundation for continued progress in this area will have been provided through the education of 30 graduate students and postdoctoral fellows in the AIRS interdisciplinary international research collaboration, providing access to the best minds and relevant techniques and technologies. Answers to the key questions about the development of singing, the best practices for singing, and benefits to well-being of singing will be disseminated innovatively through an engaging web-site, a variety of journal outlets, at least one scholarly book and handbooks for development of intergenerational and cross-cultural singing activities, annual workshops, three international conferences. The impact of the AIRS research on Canadian scholarship and society will arise by reaching both traditional and new audiences including Canadian and international scholars, policy makers, stakeholders and the general public.

Finally, the project will involve over 20 postsecondary institutions in long-term commitments to the development of this unique, large-scale research initiative on singing.
References

Amabile Boys Choir:  http://www.amabile.com/boys/history.shtml


Heydon, R. & Daly, B. (in press). What should I draw? I'll draw you! Intergenerational art for intergenerational learning opportunities and interaction. *Young Children*


4. Budget Justification (Funds Requested from SSHRC)

The budget is bell-shaped across the 7 years of the grant period, allowing for a start-up time, peak activity in years 3 – 5, and extensive dissemination activities in the last 2 years.

**Personnel.** The years of peak activity will support stipends for 6 undergraduates, 6 master’s and 6 doctoral students. Given that most of the investigators have funding from other sources, it is likely that some students will receive partial support from the MCRI and partial support from other sources (e.g., BRAMS, McMaster, UPEI, St. Francis Xavier), possibly doubling the number of students receiving support from the grant per year. Canadian students and faculty will be given priority, but to benefit the entire AIRS network, students will be encouraged to visit at least one research site abroad so as to gain cross-cultural experience as well as share the resources across the research network. Canadian faculty will welcome students from abroad funded by their home university. In regard to the distribution, i.e., equal numbers of undergraduates, masters, and doctoral students, it is felt that providing students with financial resources early on will make them competitive in seeking funds from other sources.

**Non-student salaries and benefits/Stipends.** Throughout all years of the program, there is funding of at least one postdoctoral/research associate position, with a second in years 3 and 4. The continuous position is to be held at UPEI, to assist with the research effort at the host institution. As well, a portion of this postdoctoral position will focus on connecting with stakeholders and partners, as we understand from discussions with our SSHRC program officer this is a practice that has worked for other MCRI projects. The remaining postdoctoral/research associate position will be provided to the student and supervisor whose work will most advance the goals of AIRS, as determined by an application adjudicated by committee.

**Other:** the remaining “other” position will support a project manager responsible for keeping the broadly based team on track in the attainment of milestones. This position is supported at a level commensurate with a new Ph. D. who has come from an intensive research environment. The independence, originality, and competence, associated with the Ph. D. is essential for the management of this complex program of research.

**RTS requested (SSHRC portion).** There faculty have requested release time in order to devote themselves to research on AIRS. The matching funds agreement indicates the university support for their faculty member and the project. The project leader will take the full allotment with the emphasis on the early years. Frank Russo is also asking for a release for most of the years (all but the sabbatical year) due to his many commitments and heavy responsibilities he holds for AIRS (theme 1).

**Travel and subsistence costs:** Applicant/Team members: Canadian travel. Due to the importance of personal interaction of members of the research team in the first year, $20000 is provided with $10000 in each successive year. The higher amount in the first year ensures that as many researchers as possible come to the opening meeting, in Prince Edward Island, back to back with the Phenomenon of Singing (at St. John’s) in early July. Travel may be used for faculty researchers to visit other sites. Foreign travel. For travel from abroad, approximately $2000 per advisory board member must be budgeted, leaving in the first year $6000 to distribute across non-Canadian collaborators who will travel to the first annual and kick-off meeting. Funds can be distributed across members so that a number are partially funded.

**Travel and subsistence costs:** Students Canadian travel ($10000). This category of funding can in principle support travel within Canada, and be undertaken by students in Canadian universities. Thus, it could enable a student to move to take up a short-term research internship at another Canadian university. Students will be encouraged to attend the annual meeting through the use of this fund. Funding will be based on merit (e.g., presenters will be favoured). The travel budget here is reduced in the penultimate year as the project winds down, however, the travel budget is resurrected for the final
year so that as many students as possible can attend the final consolidating AIRS meeting. **Foreign travel** ($10000). Also supported: Canadian students taking up internships abroad, students from abroad attending the AIRS annual meeting, and rarely travel to a meeting other than AIRS for the purpose of presenting research conducted in association with AIRS, or to acquire essential information needed in order to progress on the research.

**Other expenses**

**Professional/Technical services.** These services are required primarily in the early years to customize the digital library structure for the various singing collections. While the UPEI library staff has been generous with support and will continue to be, a dedicated part-time support person is needed for a maximum of 15 hours per week in Year 2, with declining amounts in subsequent years; at $30/hr x 12 hr/wk x 50 wk/yr = $18000 (Yr 2), with Year 1 = $12,000 (8 hr/wk), and $12,000, $8000, $6000, $3000, $2000. The latter years indicate the primary role of maintenance rather than development. This person is will also support the audiovisual computer and recording facilities in the AIRS research space at UPEI for the AIRS researchers and will support the researchers in regard to use of the digital library, ingestion of data, and development of metadata. A person with a background in both library science and music technology would be ideal. For security, the entire system must be mirrored. McGill will mirror the system and requests $5000 per year for technical support in return for in-kind use of server and other expertise.

Funds will be available to team members for technical support, if not available to them otherwise, to assist at their home site with a video transfer, implementation of an analysis program, setting up camera and microphones at appropriate levels, etc. AIRS will take advantage of new technological developments, and access to a support person on one's campus or via an AIRS help line will be required, though the specific tasks to be carried cannot be predicted.

**Supplies.** The supply budget will cover essential costs of paper and printing of questionnaires, toys or rewards to children participating in the study, video tapes, CD and DVD's. For example, for Heydon’s intergenerational study, the total cost of video tapes for a one year study is $600. Fluctuation in the supply budget reflects periods of data collection (peaks) and analysis (troughs). Miscellaneous supplies to run the collaboration include paper, printer cartridges, storage boxes, file folders, amounting to up to $1000/year.

**Non-disposable equipment. Computer Hardware.** This budget category will be used to provide additional memory for the digital library, laptops for field studies, for example, for collaborators without external funding as may be found in Micronesia, or South Africa where valuable data of singing can be collected. While researchers will likely have their own computers, accessories such as web-cams for connecting with AIRS researchers will be supported. A server at both UPEI and McGill is required for backup (total $8000).

**Other:** Video-recorders, for acquiring data on singing, will be loaned to groups or individuals for studies (~$1250 for sufficient quality and camera bag). For recordings of songs for teaching purposes, relatively high quality microphones will be ordered (~$200 each). The exact number will depend on demand and budget. Singing is being targeted in electronic and computer entertainment such as Karaoke and the Nintendo wii. Researchers will need access to this equipment in order to relate to current trends and developments. The cost of a wii is now approximately $300 and voice accessories would be approximately $100. We would budget for 2 systems a year. Karaoke recordings and machines may take up to $500 of the budget. Some remaining funds would be reserved for new developments.

**Web-site and on-line publishing.** The maintenance of the web-site and assistance with three web publications - a student network, a public site for AIRS, and an AIRS virtual research environment will need support, at $30/hr x 5 hours/week x 50 wk/year = $7500/yr, with $300 remaining for miscellaneous expenses, such as computer software packages or upgrades.
Networking and Operating. To take full advantage of the collaboration, communications will be all important. With UPEI as host of an Access-Grid videoconferencing unit (through a CFI grant), an unlimited number of participants can join conference at no cost to them. The equipment at the host site requires an operator standing by. For 3 hours of video conference/month, requires 4 technician hours x 50 months x $30/hr = $6000.00. If another site hosts a video conference, funds from this source will be available for that purpose. Teleconferences are also suitable for communications. A day of such teleconferences was recently held involving 25 AIRS researchers over a 12 hour period, in 6 different groups. The cost of a teleconference is $0.40/min or $24/hr. We can predict 6 hr of teleconference across the network per month = $1728/year. Conferences and workshops. Every year AIRS will hold one regional workshop. International conferences will be held in Year 3, 5, and 7. From running a workshop this summer, costs which include an invited speaker from away, coffee breaks and lunch, and interwoven singing performances are ~$3000.

Funds from other sources (Numbers are total unless otherwise stated)

University of Prince Edward Island, in addition to the RTS support will provide secretarial support $30,000; The Robertson Library Digital Library Team $20,000; accounting ($35,000). Staff, Office of Res. Develop. ($7,000); Tech support Computer and AV Services ($17500); Tech support Psychology, $35,000; The VP R&D will provide $50,000 in support of research operating costs. UPEI will provide in-kind access to 1800 sq ft equipped multimedia research laboratory, for up to 4 visiting students (or 10 short-term) and host home for AIRS ($84,000), digital library ($84,000) and videoconferencing ($8400) More space is provided by Chairs in Island Studies (Baldacchino), Youth Transitions (Tilleczek), and the Cohen Auditory Perception laboratory ($36000). Conferences/ workshops space and equipment (10500) + advertising (web and university newsletters ($3500).

The Confederation Centre of the Arts, $2000/year includes space, expertise, performers, announcements and publicity in print and web-site, for 6 years $12,000. Extempore R&D software developer for language training, will dedicate a technical person at 10% of his time to the project over 6 years (over 6 years $30,000). Veterans Affairs Canada, $35,000 in-kind for student supervision, archive resource sharing, consultation, and meeting attendance. PEI Culture Sector Council, $8500 to share study of health benefits of singing and the arts in PEI. Grand Avenue Children’s Centre, in London, has committed $714/year for space and remains to confirm additional in-kind support of $500/year salary for intergenerational singing program. Alzheimer’s PEI will provide an in-kind contribution of $10,000 per year) through the provision of the time of Executive Director Corinne Henrickson Eldershaw, music therapist Peter Mutch working together on the benefits of singing in dementia and Alzheimer’s disease. UNESCO (pending) support of a symposium held in conjunction with the Phenomena of Singing Biennial Conference at Memorial University, in 2009. $5,000 to bring in a speaker and a performer, advertise, and support the event with a reception. PEI Music Association $2,500 total; ECMA East Coast Music Association program time at annual ECMA festival ($2,500/yr). Apple Canada is also providing support of laptops (pending). Plus 3 other sources as per partner letters.