

# Evolutionary psychology and the necessity for music education for all

Nicholas Bannan

*University of Western Australia*

## Abstract

The initial application of evolutionary theory to the universal practice of music-making in humans was at best marginal and at worst dismissive of non-Western musics. Darwin's biography defines an agenda for musicality in the emergence of human culture that is receiving considerable attention in several disciplines, presenting a robust case for the contribution which collective and individual musical experience makes to the education of the young, and to the lifelong capacity for musical participation.

Natural Selection conveys how the anatomical prerequisites for musicality may have evolved. These conferred a voice that is fundamentally musical in its capacity for the meaningful control of pitch, duration, volume and timbre. This can be attributed to upright posture and bipedal locomotion, their consequences for rhythmic co-ordination, and the independent role in music-making of the feet and hands. Sexual Selection illustrates the means by which musical response and participation pass from parent to child, allied to the clear difference in range between women's and men's voices, a further aspect of the musical landscape prefigured in Darwin's work.

This paper presents accumulating evidence in setting out an agenda for the proper role of music in schools. If music was, in Cross's words 'The most important thing we ever did' (1999), the communicative achievement that forms the basis for the subsequent development of language, then it should not remain a luxury available only to those students we select as gifted. Rather, it must take its place as the developmental basis for social organisation, mental integration, and rational thought.

**Keywords:** Evolution, musicality, singing, pedagogy, creativity

## Introduction

There is a perceptible mismatch between the provision of music education in many cultures today and the implications of recent research into the role and origins of music in the evolution of the human species. The provision of musical opportunities only to those evaluated early in life as more musical than others is inconsistent with research emerging in neurology, archaeology and anthropology. A new synthesis propounds that we all carry the capacity for musical engagement in our genes, responding prior to birth to its properties as the first interaction of nature and nurture on which our development as social beings depends (Parncutt, 2009; Bannan, 2003;

Blacking, 1973). This paper examines the role and practice of music in education from this evolutionary perspective, addressing the question posed by Ian Cross (1999): 'Is music the most important thing we ever did?'

Yet teachers still administer evaluations such as the Bentley Test (Mills, 1984) or discriminate between those who can already sing in tune and those assumed to be 'tone-deaf' (Ruddock, 2012). Education providers note teachers' compliance with such judgements and conclude that schools need make no further efforts to develop the musicality of all their students; and for that reason treat musical ability as a special talent endowed on only the few.

## Darwin's legacy and its impact

A frustrating aspect of the literature that has evaluated the impact of Darwin's life and work is the biased impression that he was himself unmusical, and thus unable to contribute to our understanding of the role and origins of music (Kivy, 1959). Such a conclusion is simply untrue (Bannan, 2017). He corresponded about music with friends while on his travels, including reminiscing about his enjoyment of Evensong while a student at Cambridge; and wrote convincingly about the musical experiences encountered in South America and the Pacific Islands (Tylor, 1871, pp. 152, 223). His key publication *The Descent of Man* can be read as a sequence of descriptions of the progression towards musical interaction spanning the abilities of species, from the worms and ants that his sons helped him to prove had no perception of music via the intervening species (such as singing spiders, birds and gibbons) to the role of vocal communication in mankind that Darwin cites as preceding the development of language (Bannan, 2017, 2014).

The influence of Darwin's evolutionary theory nevertheless stressed a role for music in Tylor's foundational publication in the field of Anthropology (1871); and the universalist position consistent with the idea of each of us possessing intrinsic musicality was fundamental to the perspective adopted in the Berlin School of Ethnomusicology (Hornbostel & Sachs, 1914). During the last thirty years, a series of key publications has re-interpreted Darwin's theory as central to understanding the nature of human culture (including language) emerging from animal origins (Wallin, 1991; Mithen, 2005; Morley, 2013; Tomlinson, 2015; Harvey, 2017).

## Music in Darwin's life

A touching depiction exists of the ageing Darwin listening to his wife Emma playing the piano in the music room at Down House that doubled as his study. She was a gifted pianist, a former student

of Chopin and Moscheles (Healey, 2001), and her capacity to provide the element of music in his life and that of their children was one of the reasons he listed (twice) in a note to himself on whom he should marry on returning from the *Beagle* voyage (Healey, 2001, p. 146). Their children did indeed sing, play and dance, and were involved in their father's experiments on the responses of infants to music, and, as his assistants, on the musicality of ants and worms. While his most eminent children, George and Francis, went on to academic careers in other fields, the impact of musical experience in their childhood left its mark on their later lives.

This brief account illustrates some of the prominent themes in subsequent research that has adopted a Darwinian perspective on the role of music. In observing evidence for 'the natural history of babies' in the behaviour of his infant son Willy (Keynes, 2002, p. 56), he carefully noted the child's first reactions to his mother's piano playing from the age of four months, and, six months later, Willy's expression of his disappointment whenever his mother stopped playing. The work of Woodward (1993), Trevarthen (1994), Trehub (2001) and Parncutt (2009) argues compellingly that such early experiences form the basis of social and communicative development on which lifelong abilities depend. Lullabies are universal (Nelson, 1997). Darwin followed his correspondent Humboldt (1836) in believing all human societies to have music, a position argued strongly on evolutionary grounds by Blacking (1973) in posing the question 'How musical is Man?'. The knowledge that Emma's piano playing was a comfort to Darwin in old age resonates with the growth of music therapy as a means of enriching the lives of patients with geriatric conditions such as Alzheimer's disease (Bannan & Montgomery-Smith, 2008).

## Darwin's models of evolution

Darwin's principal theories were those of Natural Selection (1859) and Sexual Selection (1871). The former accounts for the anatomy and psychology associated with our species – the

attainment of upright posture, with its effect on the positioning of our eyes and ears, the orientation of our vestibular system and the sense of balance required by bipedalism, the nature of the vocal tract and voluntary respiration, and the enlarged brain that finely times and tunes the interaction of these elements in the perception and production of meaningful sounds (Bannan, 2003; Morley, 2013). Interacting with these physical determinants is Darwin's view that sexual selection played a part in shaping communication: as with bird species, he saw song as having a role in mate attraction, selection and retention, and this being advanced in its development as a step towards the eventual achievement of language. Sexual selection thus accelerates the acquisition of those characteristics that favour survival through successful reproduction. Each human is capable of unique utterances generated within the medium of their vocalisation, whether it be music or speech: we are all endowed with creativity.

A synthesis of ideas about the biological bases of behaviour then followed in Darwin's book on the expression of the emotions (1872). The significance of this is that it can be taken to underpin pedagogical theory in harnessing emotion as a form of motivation in teaching and learning that is especially crucial to the social exchange on which musical behaviour depends. Indeed, the unique voice of each human individual is associated with the capacity to generate innovative statements in language. The same can remain true for musical engagement where it is sustained as a creative art rather than a rule-bound form of re-creation.

## The biomusicology agenda and evolutionary psychology

Wallin (1991) coined the term *biomusicology* in proposing a comprehensive theory on Darwinian lines for the origins, purpose and optimal practice of the medium of music. The physical attributes of the homo lineage diverged some eight million years ago from those of our last common

ancestor with the chimpanzee (Dawkins, 2005). Anatomically, we rose onto just two legs, became hairless, lost the facial musculature and dentition that combined fearsome weaponry with the ability to ingest tough fibres, and developed hands and tongues capable of extraordinary flexibility and precision (Morley, 2013). Mentally, we developed larger and more asymmetric brains capable of specialised processing in multiple domains (Gardner, 1983; Mithen, 1996). In particular, the harnessing (Changizi, 2011) of these new anatomical attributes to rhythmic and communicative employment exploited a relationship between auditory discrimination and vocal production that makes humans the equal of the avian species which are skilled in vocal mimicry, while conferring control of when and in what way to communicate that allows meaningful exchange capable of: aiding the recall of information; transmitting this to others; recruiting support; and playful enjoyment of the medium.

Infant humans, though, are vulnerable due to their helplessness at birth and dependence on the care and support of others. Interaction with carers takes place on musical lines (Parncutt, 2009; Trehub, 2001). Falk (2004) suggests that the mother's song may have provided the mechanism for nursing 'at a distance' that overcame separation anxiety in infants no longer able to cling to their mothers' fur. Music could have had a role parallel to that of the 'transferable object' (Winicott, 1971) – a security blanket or favourite toy that stands in for the caring adult. If so, it also took on perhaps the first element of the development of metaphorical thinking – one idea standing in for another – through which human culture exploits the multi-dimensional responses in parallel media of which we have become capable.

While humans at birth lack the physical strength, balance and knowledge of their environment to survive independently, their anatomical characteristics in fact represent the model that is in many respects retained into the adult form, in marked contrast to our nearest primate

relatives. Human evolution exemplifies *neoteny* – the retention in the adult of the proportions and appearance of the child (Gould, 1977). This would seem to derive from sexual selection; and represents for Chisholm (1999) a form of self-domestication in both form (anatomy) and function (psychology). Humans, for instance, retain a ‘play window’ lifelong, rather than this exhibiting only prior to sexual maturity. Quintessentially social animals, humans learn how to mediate relations within large groups through oral communication (Dunbar, 1998). Evidence that this remains a powerful cohesive force in coordinated activities such as group singing would appear to be universal (Dunbar et al., 2012; Blacking, 1973).

The capacity for song that these conditions made possible (Bannan, 2003) is evident in our voluntary respiration, which permits phonation for long durations after the briefest inhalation. Vocalisation is under emotional control, permitting fine adjustments in pitch, timbre and loudness that transcend the limitations of instinctive responses to stimuli. The flexibility of our respiratory tracts, tongues and lips permits phonation across several distinct registers and at least two octaves of range, as well as the control of timbre that confers the spectrum of vowel sounds required by language. We can sing for our own amusement; in duet with another; with multiple others in polyphony, or in coordinated unison. The uses to which singing can be put are many, providing for an activity which may involve considerable instances of daily participation.

## Singing and Language

While singing and language depend on the same physical attributes, they operate in quite different ways. Speech is conventionally ‘serial’ (Grice, 1969), akin to the exchanges that take place over a two-way radio in which ‘send’ alternates with ‘receive’. Song is, by comparison, most often experienced simultaneously. Crowds at football matches join in with songs and chants they have never ‘learned’. The response time for pitched material is rapid

and contagious. As a medium for communicating musical information, song is the portal to the aural imagination and memory.

Puzzlingly, then, a great deal that occurs in music education seems dedicated to employing the medium of words in preference to music itself. Theoretical concepts are translated into verbalisation and symbols as a means of conveying information ‘about’ music in the absence of real musical experience.

## Implications for Music in the curriculum

The agenda set by Wallin (1991) and investigated from the perspective of neuroscience by Harvey (2017) illustrates the potential of music education informed by evolutionary principles. Foremost amongst these would be (Bannan, 2019):

- assuming all students to be capable of musical participation, and applying with patience pedagogical strategies designed to elicit this
- maximising the extent to which *music itself is the medium of teaching*
- employing the voice as the fundamental template for representing and communicating musical experience, discrimination, and understanding on the part of both teacher and students
- retaining a role for dance and gesture in the experience and leadership of musical material
- harnessing creativity as a motivating and cognitively fluid component of musical engagement
- responding to the universal nature of music through accessing all kinds of repertoire drawing on cultures throughout the world
- presenting music created by students to audiences in a manner that parallels their artworks being displayed and their written work made available in school publications
- developing an examined curriculum that reflects these values.

## On the training and conduct of teachers

Music teaching informed by evolutionary psychology assumes a role for neoteny, balancing development towards adulthood with retaining the child's capacity for awe, wonder and free experimentation; recognising that music is a form of play, and that sustaining such motivation in students may harness creativity in contrast to dealing with theory and analysis that can become divorced from practice. Music teachers need themselves to retain this childlike capacity for playful and uninhibited vocal engagement: to be comfortable with their own capacity to sing, to lead singing in others, and to help develop the voices of students whose capacity to match pitch has yet to develop. Rather than viewing music as a predominantly re-creative art, they need to hold a fascination for the ideas that students bring with them, and for the development of these into musical works that may be as significant to students' understanding of the medium as are the existing repertoires of the past. This approach needs to be firmly articulated in teacher education.

Pedagogy on these lines can give rise to a vision of the lifelong participation in music of all citizens, rather than an approach amounting to music appreciation that prepares them to be consumers of the performances of the chosen few. It can form the basis for the employment of music in effective parenting (Street et al., 2003); and for music to remain a medium of supportive social exchange in the final years of life (Bannan & Montgomery-Smith, 2008).

Where music may once have been the principal medium of human communication that contributed to the survival of our distant ancestors, it remains available to us today as a means of celebrating the shared humanity that we, many generations later, have inherited from them. The place of music in schools could then reflect a universalist stance based on active participation, consistent with the foundational role that archaeology and anthropology have mapped for the origins and

purpose of music in the deep history of the human species.

## References

- Bannan, N. (2003). Reverse-engineering the human voice: Examining the adaptive prerequisites for song and language. In *Proceedings of the Fifth Triennial Conference of the European Society for the Cognitive Sciences of Music, CD-ROM*. Hanover: Hochschule für Musik und Theater.
- Bannan, N. (2014). Music, play and Darwin's children: Pedagogical reflections of and on the ontogeny/phylogeny relationship. *International Journal of Music Education*, 32(1), 98-118.
- Bannan, N. (2017). Darwin, music and evolution: New insights from family correspondence on The Descent of Man. *Musicae Scientiae*, 21(1), 3-25.
- Bannan, N. (2019). *Every child a composer*. Oxford: Peter Lang.
- Bannan, N. & Montgomery-Smith, C. (2008). Singing for the brain': Reflections on the human capacity for music arising from a pilot study of group singing with Alzheimer's Patients. *The Journal of the Royal Society for the Promotion of Health*, 128(2), 73-78.
- Blacking, J. (1973). *How musical is man?* Seattle, WA: University of Washington Press.
- Changizi, M. (2011). *Harnessed: How language and music mimicked nature and transformed ape to man*. Dallas: BenBella Books.
- Chisholm, J. S. (1999). *Death, hope and sex: Steps to an evolutionary ecology of mind and morality*. Cambridge, UK: Cambridge University Press.
- Cross, I. (1999). 'Is music the most important thing we ever did? Music, development and evolution'. In Y. Suk Won (ed), *Music, mind and science*, pp. 10-39. Seoul, S. Korea: Seoul National University Press.
- Dawkins, R. (2005). *The ancestor's tale: A pilgrimage to the dawn of evolution*. New York: Houghton Mifflin Harcourt.
- Darwin, C. (1859). *On The Origin of Species by means of natural selection*. London: John Murray.
- Darwin, C. (1871). *The descent of man, and selection in relation to sex*. London: John Murray.
- Darwin, C. (1872). *The expression of the emotions in man and animals*. London: John Murray.
- Dunbar, R. (1998). *Grooming, gossip, and the evolution of language*. Cambridge, MA: Harvard University Press.
- Dunbar, R., Kaskatis, K., MacDonald, I., & Barra, V. (2012). Performance of music elevates pain threshold and positive affect: Implications for the evolutionary function of music. *Evolutionary Psychology*, 10(4), 688-702.
- Falk, D. (2004). Prelinguistic evolution in early hominins: Whence motherese? *Behavioral and Brain Sciences*, 27(04), 491-503.
- Gardner, H. (1983). *Frames of mind: The theory of multiple intelligences*. New York: Basic Books.

- Gould, S. J. (1977). *Ontogeny and phylogeny*. Cambridge, MA: Harvard University Press.
- Grice, H. P. (1969). Utterer's meaning and intention. *The Philosophical Review*, 147-177.
- Harvey, A. (2017). *Music, evolution, and the harmony of souls*. Oxford, UK: Oxford University Press.
- Healey, E. (2001). *Emma Darwin: The inspirational wife of a genius*. London: Headline.
- Hornbostel, E. M. v. & Sachs, C. (1914). Systematik der Musikinstrumente. Ein Versuch. *Zeitschrift für Ethnologie*, 46(4-5), 553-590.
- Humboldt, W. v. (1836). Über die Verschiedenheit des Menschlichen Sprachbaues und ihren Einfluss auf die geistige Entwicklung des Menschengeschlechts [Linguistic variability and intellectual development], trans. G. C. Buck & F. Raven. London: Royal Academy of Sciences.
- Keynes, R. (2001). *Annie's box*. London: Fourth Estate.
- Kivy, P. (1959). Charles Darwin on music. *Journal of the American Musicological Society*, 42-48.
- Mills, J. I. (1984). The "Pitch" subtest of Bentley's measures of musical abilities: A test from the 1960s reconsidered in the 1980s. *Psychology of Music*, 12(2), 94-105.
- Mithen, S. (2005). *The singing neanderthals: The origins of music, language, mind, and body*. London: Weidenfeld & Nicolson.
- Mithen, S. (1996). *The Prehistory of the mind: a search for the origins of art, science and religion*. London: Thames and Hudson.
- Morley, I. (2013). *The prehistory of music: Evolutionary origins and archaeology of human musicality*. Oxford: Oxford University Press.
- Nelson, J. (1997). Lullabies as human adaptation: A cross-cultural analysis of children's bedtime songs. In D. Schneck & J. Schneck (eds), *Music in human adaptation*, pp. 61-78. Blacksburg, VA: Virginia Polytechnic Institute and State University.
- Parncutt, R. (2009). Prenatal and infant conditioning, the mother schema, and the origins of music and religion. *Musicæ Scientiæ*, 13(2 suppl), 119-150.
- Ruddock, E. (2012). "Sort of in your blood": Inherent musicality survives cultural judgement. *Research Studies in Music Education*, 34(2), 207-221.
- Street, A., Young, S., Tafuri, J. and Ilari, B. (2003). Mothers' attitudes to singing to their infants. In *Proceedings of the 5th ESCOM Conference*. Hanover University of Music and Drama, Germany.
- Tomlinson, G. (2015). *A million years of music: The emergence of human modernity*. Harvard: MIT Press.
- Trehub, S. E. (2001). Musical predispositions in infancy. *Annals of the New York Academy of Sciences*, 930(1), 1-16.
- Trevarthen, Colwyn. (1994). Infant semiosis. In W. Nöth (ed), *Origins of semiosis: Sign evolution in nature and culture* (Vol. 116), pp. 219-252. Berlin: Walter de Gruyter.
- Tylor, E. B. (1871). *Primitive culture: Researches into the development of mythology, philosophy, religion, art, and custom*. London: John Murray.
- Wallin, N. L. (1991). *Biomusicology: Neurophysiological, neuropsychological, and evolutionary perspectives on the origins and purposes of music*. New York: Pendragon Press.
- Winnicott, D. W. (1971). *Playing and reality*. London: Psychology Press.
- Woodward, S. (1993). The transmission of music into the human uterus and the response to music of the human fetus and neonate. Doctoral dissertation, University of Cape Town.

Nicholas Bannan came to Australia to teach at UWA in 2006 after working at the University of Reading and Oxford Brookes. As a schoolteacher, he had previously taught at Eton College and as Director of Music at Desborough School, Maidenhead, where his choir performed, recorded and broadcast regularly with London orchestras and entertainers. Having completed PhD on the role of music in human evolution, he has continued to research this field as well as to apply his findings to advocacy for the processes involved in lifelong music education, and especially the musical creativity of children. In 2019, he published the books *Every Child a Composer (Peter Lang)* and *First Instruments (Oxford University Press)*. He directs *The Winthrop Singers*, a UWA student choir that regularly performs works composed by its members.