Addressing the multifaceted nature of music education: An activity theory research perspective

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Abstract

This article explores the potential benefits from an application of activity theory to music education research. In particular, the intention is to understand more clearly those possible, potential and actual interrelationships between the constituent elements that comprise the complex reality of the process of music education. Illustrations are provided from an example case study of new, unpublished research into the nature and impact of the introduction of female choristers into an all-male UK cathedral choir.

Introduction

One of the continued challenges in our attempts to encourage an ecological validity in music education research is to ensure that the selected research methodology takes account of a multifaceted reality, even if the research's prime focus may be on one particular aspect of that reality. In an educational setting, the 'reality' is likely to embrace, for example, the individual biographies and neuropsychobiological dispositions of the participants (such as the learner, the learner's peers, the teacher, the teacher's peers), the nature of the pedagogical process, the actual/intended musical behaviours, as well as the contexts for learning, including various historical and socio-cultural perspectives. Reality will also encompass the interrelationships between the constituent elements.

At different times in the recent past, the present author has attempted to address the challenges presented by this complexity. Firstly, it has been suggested that the *manifestation of observed musical behaviour* at any given age and time – that is, what we might perceive in our role as a teacher – is located at an interface between at least three generative elements, namely (i) the overall nature and individuality of the participant's neuropsychobiological developmental history, (ii) the socio-cultural context for the (observed) behaviour and (iii) the musical task, including whatever counts as appropriate musical form and structure within the socio-cultural context (cf. Welch, 1998; 2000a, 2002). Secondly, a 'Russian Dolls-type model' has been proposed as one way of conceptualising the *integration* of various influences that shape early childhood musical development over time (cf. Hargreaves & North, 1997; BERA, 2001; Welch & Adams, 2003; Welch & Hallam, 2004; Welch, 2005; Welch, 2006). Musical behaviours are seen as stemming initially from the learner's basic neuropsychobiological design (the hard-wired integration of nervous, psychological

and biological processes) and subsequently shaped by enculturation, the emergence of generative (creative) skill development and the particular influences of schooling, social groups and the wider community (Welch, 2006).

One common, underlying assumption in these two conceptualisations is that diverse musical behaviours and their development do not occur in a vacuum. They are perceived as products of an individually sensitive, complex interaction between biological, developmental and environmental factors over time. In practice, notwithstanding any inherent limitations, the two approaches have been fruitful in (a) providing research lenses for making sense of existing literatures, and (b) the design of new studies.

Nevertheless, in order to seek the best possible match between specific ontological and epistemological concerns and the selected research approach (cf. Denzin & Lincoln, 1998; Flyvbjerg, 2001; Guba, 1990; Robson, 2002), the quest for the 'most appropriate methodology' to be applied in a particular music education research study is ongoing. In part, this 'matching' process has been underpinned by an increasing interest in recent years in how best to foster links and mutual understanding across foundational disciplines.

The move towards multi- and interdisciplinary foci has also been exampled in the social psychology/micro sociology of music (e.g., Hargreaves & North, 1997; Small, 1998), embracing studies on such topics as musical identity (MacDonald, Hargreaves, & Miell, 2002), musical communication (Miell, MacDonald, & Hargreaves, 2005), emotion (Juslin & Sloboda, 2001), musical practice (Davidson, 2004), listening (Clarke, 2005) and informal music learning (Green, 2002), as well as interconnections under an 'arts education' umbrella (Bresler, 2007). In the wider world of research, the concept of 'consilience' (a 'jumping together' – Wilson, 1998) has emerged as one means of encouraging a more holistic, 'unity of knowledge', perspective in which the historical 'epistemological discontinuity' between the natural sciences, humanities and social sciences might be addressed (Damasio, et al., 2001; Wilson, 2001). Such an approach is evidenced, for example, in studies of music, mind and culture that have begun to explore the possible biological foundations of complex socio-musical behaviours (cf. see contributions in Avanzini, Faienza, Minciacchi, Lopez, & Majno, 2003; Avanzini, Koelsch, Lopez, & Majno, 2005; Peretz & Zatorre, 2003; Zatorre & Peretz, 2001).

Given these developments, it would seem essential that contemporary music education research should continue to include methodological approaches that offer a multifaceted, holistic perspective. The combination of diverse knowledge bases, for example, is seen as integral to the successful classroom practice of music educators: an effective music teacher needs to be knowledgeable and skilled in diverse musics, how music is learnt and how best to manage the environment for music learning (Welch, 2000b). One recent (non-music specific) example of the multifaceted nature of teaching and learning is a review of over eighty large UK-Government funded research studies across the educational system. This reports the emergence of ten 'holistic' features that are commonly evidenced in the complex nature of effective teaching and learning (James, 2006).[i]

Consequently, in order to ensure that we continue to be sensitive to, and formally take account of, the diverse features of the multifaceted reality in which musical learning takes place, we need to adopt a sufficiently holistic perspective that also affords insight into how any contributing elements might be related. In this regard, a variety of theoretical approaches are available that attempt to demonstrate a sense of how elements might be linked, such as 'system theory' (cf. Von Bertalanffy, 1976) and 'ecological systems theory' (cf. Bronfenbrenner, 1979). The first of these (as adapted by Wiener) was particularly useful to the current author in providing an initial theoretical starting point for an ongoing line of research into why some children and adults have difficulties in singing 'in-tune' and how appropriate meaningful 'feedback' might be used to promote skilled singing development, such as with the applied use of new technologies (e.g., Welch, 1985; Welch, Howard, Himonides, & Brereton, 2005).

One particular approach that offers the possibility of shedding insight into the process by which certain constituent socio-cultural factors can shape musical behaviour and development is 'activity theory', sometimes known as 'cultural historic activity theory' (e.g., Daniels, 2004).

Activity theory

The tradition of exploring the process by which individual learning is mediated by cultural artefacts and membership of groups within a wider community appears to have stemmed principally from the work of Luria, Vygotsky and Leont'ev in the early decades of the twentieth century (cf. Bannon, 1997; Cole, 1999). These Russian psychologists explored how learning and development were the product of inter- and intrapersonal behaviours that were shaped by cultural artefacts[ii] (e.g., literature), alongside tools (including psychological tools, e.g., language and other symbol systems), expectations, 'rules'/conventions and norms. Furthermore, the internalisation of artefacts was also seen to facilitate the agency of the individual, such that artefacts themselves were modified through personal use, enabling the possibility of consequent change within the culture. Thus there is an ongoing mediation process in how the individual interacts with the world around them (a principle that is evidenced in other theoretical approaches, such as Piaget's notion of individual conceptual development through 'accommodation' and 'assimilation').

A key concept is 'activity', which is defined as '…the engagement of a subject toward a certain goal or objective' (Ryder, 2005). 'Activity theory' may be considered as a set of 'basic principles which constitute a general conceptual system which can be used as a foundation for more specific theories' (Bannon, *op.cit.*). One widely cited model of an activity system is provided by Engeström (1999; 2001a – see Figure 1). In the upper part of the figure, Engeström presents a Vygotskian conception that the 'object' of an action by (or on) a 'subject' is culturally 'mediated' by some form of 'artefact'. This model is extended in the lower part of the figure to encompass Leont'ev's perspective of individual and group actions being embedded in a collective, interactive activity system in which 'rules', a sense of 'community' and

'division of labour' (division of effort) are also evidenced. In this model, the 'object' of the activity is perceived as a cultural entity (Engeström, 2001a) and the 'outcome' may or may not be the same as the intended 'object'.
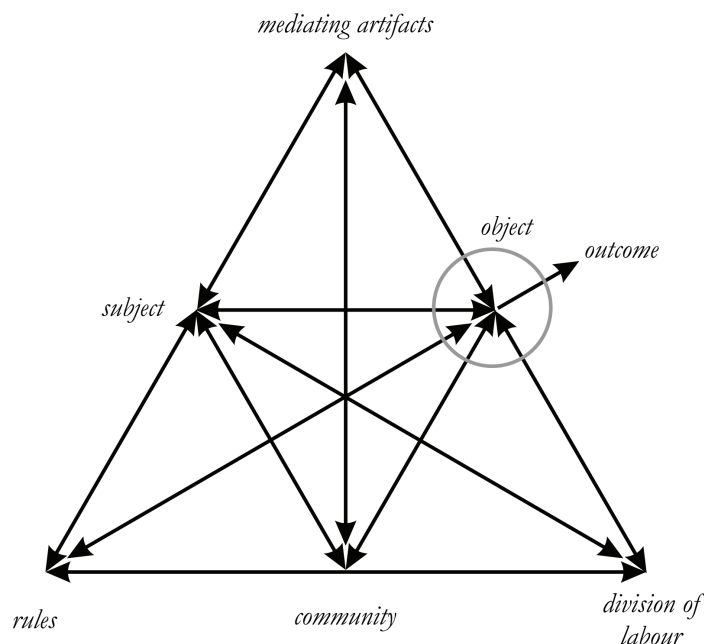

Figure 1: The structure of a human activity system (Engeström, 2001b, p. 136)[iii]

Furthermore, it is possible to conceive of various versions of this activity system being interfaced with each other – sometimes contradictorily – with regard to the intended 'object' and actual 'outcome'. Engeström (2001b, pp. 140, 145) provided an example of how organisational tensions in children's health care in Helsinki were made explicit through an analysis of (minimally) three interconnected activity systems, representing the local children's hospital, the primary care health center and the activity system of the child patient's family. The eventual outcome was a new, negotiated care agreement model for the improvement of healthcare for children.

Engeström (2001a) articulates five basic principles for activity theory as follows:

- The prime unit of analysis is '… a collective, artefact-mediated and object-oriented activity system, seen in its network relations to other activity systems' (*op.cit.* p.6). The activity system is the set of relationships between elements (see Figure 1: Engeström, 2001b).

- Activity systems are 'multi-voiced' (2001a, p. 7), embracing multiple viewpoints, traditions and interests. 'Participants carry their own diverse histories and the activity system itself carries multiple layers and strands of history engraved in its artefacts, rules and conventions' (*ibid*).

- Activity systems take shape and are transformed over lengthy periods of time, suggesting a concept of 'historicity' (*ibid*). History embraces both 'the local

history of the [particular] activity and its objects', as well as the wider 'history of the theoretical ideas and tools that shape the activity' (*ibid*).

- Change and development arise from 'contradictions' that are 'historically accumulating structural tensions within and between activity systems' (*ibid*).

- Activity systems are subject to 'expansive transformations'. These are the product of the 'aggravation' of contradictions, such as when individuals 'question and deviate from established norms' which 'escalates into collaborative envisioning' (*ibid*) towards an alternative collective viewpoint.

Engeström (2001a) applies these five principles in seeking answers to four questions that he regards as central to the design of any theory of learning: 1. Who are the subjects of learning, how are they defined and located? 2. Why do they learn, what makes them make the effort? 3. What do they learn, what are the contents and outcomes of learning? 4. How do they learn, what are the key actions of processes of learning?

Whilst it is possible to conceive of answers to such questions in any particular educational context without drawing on activity theory per se, Engeström (and others) believes that the theory provides a framework by which a more holistic and environmentally sensitive conceptualisation of learning is possible. Support for such an approach may be found in other relatively recent, educationally sensitive conceptualisations, such as 'situated learning' (Lave & Wenger, 1991) and 'communities of practice' (Wenger, 1998) in which the social location of individual action and understanding is central.

Activity theory has been applied to a wide range of studies into 'cultural practices and practice-bound cognition' (Engeström & Miettinen, 1999, p. 8), such as human computer interaction (HCI) (e.g., understanding web-based activity, the process of software design), workplace learning, markets, healthcare, childhood play and certain categories of education, but appears to be relatively under-represented in the field of music education (with a few exceptions, such as Barrett, 2005). Whilst this may be surprising (given its acceptance and use elsewhere), perhaps there has been a tendency in music education research to be located within a particular foundational disciplinary focus (history, psychology, philosophy or sociology). Nevertheless, activity theory offers the researcher an opportunity to adopt a multi-faceted (multi-lens) approach that may be closer to the realities of music (education) practice in the community, home, private studio or classroom.

Activity theory and music education: A case study

One use of an activity system is that it allows the investigator to combine both macro and micro perspectives.

> The analyst constructs the activity system as if looking at it from above. At the same time, the analyst must select a member (or better yet, multiple different members) of the local activity, through whose eyes and interpretations the activity is constructed. This dialectic between the systemic and subjective-partisan views brings the researcher into a dialogical relationship with the local activity under investigation. (Engeström & Miettinen, 1999, p. 10)

Unpublished data from an ongoing research project are presented in the following text in order to illustrate the potential application and usefulness of activity theory to music education research.

The author is researching the introduction, impact and development of female choristers in UK cathedrals (cf. Welch, 2000a; 2004; Welch & Howard, 2002). Male choristers have been in cathedrals since their inception in 597AD at Canterbury. In comparison, female choristers were first recruited into the cathedral choir at Salisbury in 1991. Although Bradford and Leicester had used female choristers at earlier dates (and Edinburgh has had a mixed choir since 1978), Salisbury was the first old cathedral foundation to admit girls on the same basis as boys. The impact of this initiative was seen in the growing establishment of female choristers in other cathedrals across England in the succeeding period. This past year (2006) has seen a majority of cathedrals having choristers of both sexes for the first time (Welch, in preparation).

In order to understand this phenomenon more clearly bi-annual research visits have been made since 1999 by the author to one of these innovative cathedrals at Wells located in the West of England where female choristers were introduced in 1993. Male choristers had been in existence since 1354. The purpose of the research visits (in part supported by an Arts and Humanities Research Board grant, 2002-2003[iv]) has been twofold: (a) to record the speaking and singing of female choristers individually and collectively in order to generate unique longitudinal data sets, and (b) to investigate the nature of the impact of female choristers on the previously all-male cathedral culture as a case study.

The prime elements of the research methodology have been qualitative, embracing observation, semi-structured interviews, analysis of printed materials (such as music and service schedules) and field notes, as well as quantitative, including different sets of acoustic recordings of individual and collective singing behaviours in (i) the interview setting (a vacant practice room in Wells Cathedral School), (ii) rehearsal spaces (the Cathedral Undercroft, Cloister and Nave), and (iii) performance at Evensong.[v] To date (December, 2006), there have been 14 site visits, 258 recordings of 55 individual choristers (some recorded regularly over a period of up to 6 years), observations at 14 rehearsals and an equivalent number of evening sung services, as well as over 25 hours of semi-structured interviews. Opportunity has been taken during each visit to speak to individuals and small groups of female choristers, as well as to significant adults, such as the cathedral's Organist and Master of the Choristers (with a change in 2004) and adult male singers from the choir (the 'Vicars Choral'), plus others with special responsibility for the general welfare of the choristers (such as the Head and Deputy of the Wells Cathedral Music School where the choristers receive their specialist education).

The semi-structured interview data and observational field notes were transcribed into Microsoft Word and analysed using Atlas.ti 5.0 (a specialist qualitative analysis tool produced by ATLAS.ti Scientific Software Development GmbH). The analyses generated thirty-nine different elements that were identified as having a reported impact on chorister development.[vi] These cluster under four main

umbrella categories: 'individual' – a sense of self and its development; 'group' – the collective voice, with key roles being seen to be played by senior choristers; 'environment' – the vocal sounds being shaped by the expectations of the religious rituals and buildings; and 'relationships' – the sense of being part of a community of practice; and fifteen sub-categories. Although the data analyses are ongoing, a picture is beginning to emerge in which the female choristers may be seen both as part of an established tradition, but also as having a 'transformational' impact on it. The customary tripartite relationship in music (Small, 1999) between the physical setting, people (performers and listeners) and musical soundscape constrains the variety of possible musical outcomes, but this relationship has also been modified through the introduction of choristers who are female. In the same way that cultural expectations overlay and shape the collective vocal behaviours of male choristers, such that different vocal stylistics have been observed from different cathedral choirs in different locations at different times (Day, 2000), so the changing gender makeup of the formerly all-male choir has brought a modification of cultural and musical expectations.

The application of activity theory to this growing and complex data set has been useful in beginning to make sense of (a) the interrelated elements that combine to enable female novices to be inducted into an established all-male music culture and (b) the transformative impact of this innovation on both the participants and the culture itself. The generic model of a human activity system (Engeström, 1999; 2001b: Figure 1) has been adapted (see Figure 2) to illustrate the key components of the dialectic development of the novice cathedral chorister into an accomplished performer that also results in cultural transformation as the culture adapts to unforeseen pressures.

mediating artifacts:
rehearsal practices (Undercroft, Nave)
nature & structure of cathedral services
artefacts & discourse of sacred music
acoustic environment
choral sound of senior choristers

object:
perpetuation of the
choral tradition through the
creation and induction of
female choristers

outcome:
cultural tradition
and transformation

subject:
novice female chorister

*division of
labour:*
hierarchical roles within choir
(musical & non-musical)
performance practices (group,
solo, sides - Decani, Cantoris),
boys, girls, men
Organist & Deputy roles

rules:
rules for membership of choir,
sung performances, cathedral worship
regulated pattern of the extended day
(practice, school, rehearsal, performance)

community:
cathedral communities
(within the cathedral & across
cathedrals - clerical, musical,
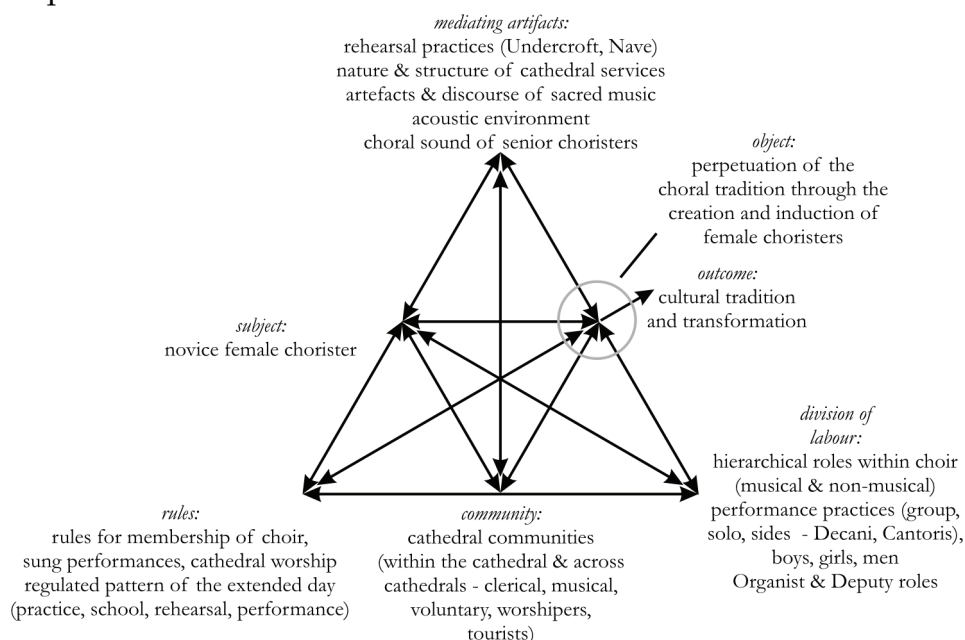voluntary, worshipers,
tourists)

Figure 2: An example of the activity system that frames the development of the novice (female) cathedral chorister

As an example, the participant female choristers represent overlapping annual populations because there is always some change of chorister personnel at the end of each summer term. When the female chorister choir was created at Wells (1993), senior female choristers were originally required to retire from the choir at age fourteen, the same age as their male counterparts. Customarily, new, younger female singers ('probationers'), usually aged between 8 and 10 years, replace those who leave. However, a temporary shortfall in female chorister recruitment one year led to a membership rule change by which female choristers could opt to stay on to the age of 16, but without holding 'office' in the choir (such as Head Chorister). This, in turn, had the effect of changing the overall range of vocal timbres available from the female choristers and allowed the (then) Master of Choristers to choose (and compose) new repertoire that exploited the opportunities afforded by this 'changed colour palette' (his words). Further outcomes (positive and negative) were that the more junior members of the choir had highly experienced, mature voiced, senior colleagues that they 'idolised' as powerful performers and role models, but meant that some also felt that their own individual contributions were overpowered. With the appointment of the new 'Master' in 2004, this policy continues to be under review.

One 'outcome' of the dominant culture is the way that it 'shapes' the individual chorister's singing towards an accepted acoustic product. However, this singing style is only one of several that the choristers can employ. For example, as part of the research process, individual choristers have been recorded singing examples of the different vocal genres that are part of their daily lives, both within and without the cathedral and school settings. These examples range from the sacred music of the cathedral, individual pieces being studied in school (usually classical, but also some from popular music theatre) and their 'own' music that they listen to at home or when relaxing with their peers. Each musical style has its own performance 'rules', established cultural 'artefacts' and implied musical identity. For example, the 'cathedral' musical genre is particularly formalised by historic ritual, with the focus on a collective 'choral' sound that is shaped by the distinctive acoustic environments that characterise the cathedral settings for practice (early morning), rehearsal (just before the sacred worship) and performance, with some opportunity for individual solos.
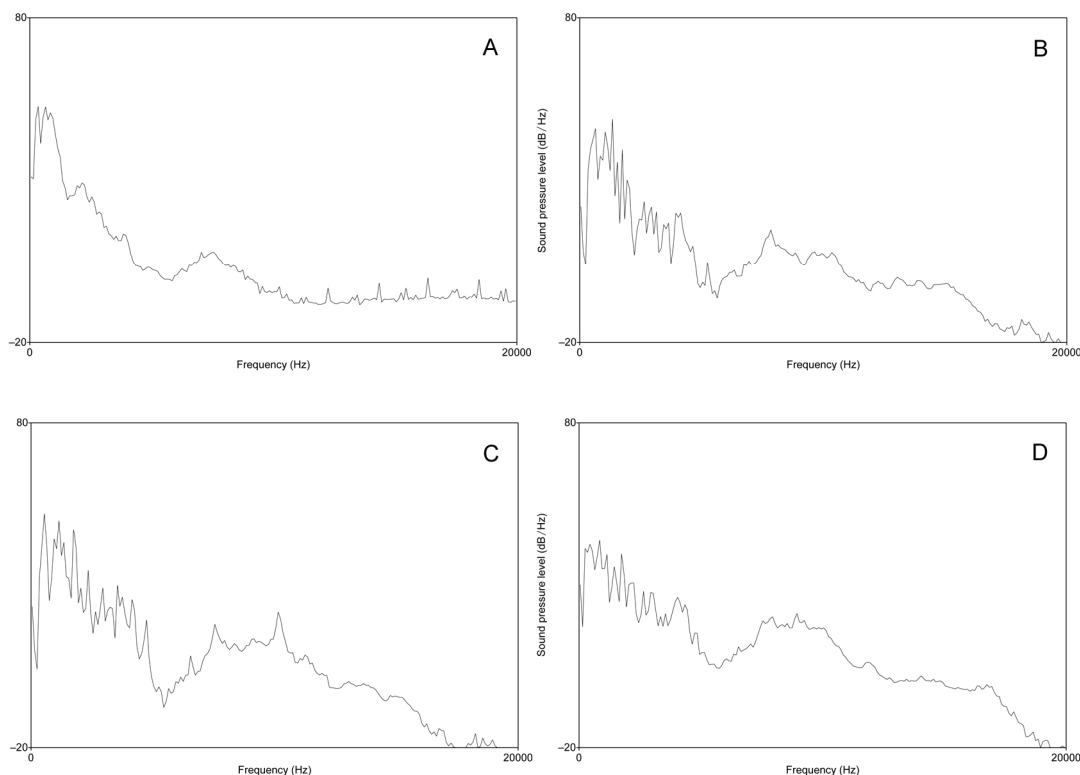
Figure 3: A = untrained young female voice as comparison. Long-term average spectra of a female chorister singing three examples from primarily two contrasting musical genres (B, C, D). B = carol, as sung in a cathedral style as part of a collective (the 'choir') ('This is the truth sent from above'); C = solo religious art song ('Ave Maria' Schubert); D = popular song (Maroon 5).[vii]

An example acoustic comparison of these diverse female child singing behaviours (Figure 3), using the medium of long-term average spectra (LTAS), reveals how the formal and informal learning process modifies an 'untrained' acoustic output (A) into the customary choral sound (B: traditional carol), which is related to other singing in a Western classical style (C: Schubert), but acoustically different from the stylistic requirements of the sung products that characterise the chorister's non-choral activity system (D: copying a popular song by Maroon 5).

One unintended outcome ('contradiction') for some successful individual 14-year-old female choristers is that the vocal mastery gained through choir membership, allied to a powerful emotional engagement with their own, non-sacred (popular) vocal music, has been sufficient for them to leave the choir to pursue their own musical interests, such as forming a rock group, learning music theatre repertoire, or 'just starting a new phase in my life'.

With regard to the five 'basic principles for activity theory' (Engeström, 2001a) as applied to this case study of female chorister development, there is evidence that:

i. The musical culture and choral tradition are subject to ongoing sustenance each day through the combination of elements embraced by the theorised

activity system (Figure 2). Nevertheless, at the level of the group and individual, as well as the wider choral tradition, change is evident because there are social, cultural and musical processes embedded in the daily ritual. These processes generate opportunities for diversity and transformation – such as in musical repertoire, choral behaviour, individual voice development, role play, leadership, apprenticeship and in what counts as 'ideal' in sacred choral performance;

ii. 'Multi-voicedness' is evident in the multiple viewpoints that are evidenced, both within the choral community (e.g., with Wells girls often reporting that they see themselves as 'different' from the boys, in behaviour, maturity, and – at time – vocal sounds), as well as between different cathedral choirs. A recent survey, for example, of why certain cathedrals had introduced female choristers reported diverse explanations at the local level (Stewart, 2006). Some Directors of Music suggested that it was a result of difficulties in male chorister recruitment; others said that female recruitment provided an opportunity to reduce the pressure on their boys, whilst many felt that they needed to address issues of equal opportunity.

iii. There is evidence of 'historicity' in that the introduction of female choristers in 1993 after a period of over 600 years of a male-only tradition had a profound effect on the local community, being strongly welcomed by all the parents of girls in the choir (past and present) and school, promoted as a sign of being in tune with society's equal opportunities policy, and generating a formalised review of what features of the existing chorister tradition needed to be incorporated to ensure that the expected musical culture continued; when interviewed in 1999 having just finished their choir membership, the first female choristers at Wells reported that they had a sense of being pioneers, not least because they all joined as a group, whereas the current senior choristers had entered an established choir a few at a time, with senior role models available to ease their induction into the choral tradition;

iv. Change and development are evidenced in how the cathedral and school authorities and choir members have needed to address certain emergent 'contradictions' since 1993 (such as in seeking additional female chorister recruitment from another local school; changing the ceiling of the choir leaving age; adapting to changes in senior personnel – with concurrent changes in rehearsal and performance expectations; establishing appropriate financial support for female choristers; and in ensuring that the school and cathedral organisation systems interrelate effectively); other 'contradictions' that have emerged from the introduction of choristers across the cathedral sector include dealing with the effects of boys singing less regularly, embracing concerns that this may mean insufficient performance practice and that the boys are slower in learning new repertoire, as well as less opportunity for boys to be expert in the complete Psalm repertoire and less preparedness on the part of boys to take part in radio broadcasts and recordings.

v. Overall, the principle that 'activity systems are subject to expansive transformations' as a result of 'collaborative envisioning towards an alternative collective viewpoint' is evidenced in the relatively rapid change across the cathedral sector over the past 15 years. The majority of cathedrals now have both female and male choristers and the all-male cathedral is a minority.

Summary

Whilst it has been possible only to indicate the potential of activity theory for music education research, its application to the study of female chorister development suggests that there is much that can be gained by exploring the theory's key principles (the activity system as a unit of analysis, multi-voicedness, historicity, contradictions, expansive cycles) to generate a wider understanding of the relationships and contributions between top-down and bottom-up perspectives in an educational process related to music.

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[i] The UK Government has supported the Economic and Social Research Council's Teaching and Learning Research Programme (TLRP) http://www.tlrp.org/ through an investment of over £37M in nine phases of funding since its inception in 1999. A review of common findings across over 80 initiatives (James, 2006) suggests that there are 10 holistic (generic) principles of effective teaching and learning emerging (see download: http://www.tlrp-archive.org/tlrp/upload/assets/1159958421_TLRP10principlesofLT.pdf).
The 10 holistic principles are:

- *Equips learners for life in its broadest sense.* Learning should aim to help individuals and groups to build the intellectual, personal and social resources that will enable them to participate as active citizens, contribute to economic development and to flourish as individuals in a diverse and changing society. This may mean expanding conceptions of worthwhile learning outcomes and taking seriously issues of equity and social justice for all. (Development is more than academic attainment and includes group as well as individual development.)
- *Engages with valued forms of knowledge.* Teaching and learning should engage learners with the big ideas, key processes, models of discourse and narratives of subjects so that they understand what constitutes
- quality and standards in particular domains. (Teachers need to posses both good understanding of the subjects that they teach and also of the best ways to teach these subjects.)
- *Recognises the importance of prior learning and experience.* Teaching and learning should take account of what the learner knows already in order to plan their next steps. This includes building on prior attainment, but also taking into account the personal and cultural experiences of different groups of learners. (Learners often need time and teachers need time to diagnose learning difficulties and to help others to improve.)
- *Requires the teacher to scaffold learning.* Teachers should provide activities and structures of intellectual, social and emotional support to help learners to move forward in their learning so that when these supports are removed the learning is secure.
- *Needs assessment to be congruent with learning.* Assessment should be designed and implemented with the goal of achieving maximum validity both in terms of learning outcomes and learning processes. It should help to advance learning as well as determine whether learning has occurred.
- *Promotes the active engagement of the learner.* A chief goal of teaching and learning should be the promotion of learner's independence and autonomy. This involves acquiring a repertoire of learning strategies and practices, developing learning dispositions, and having the will and confidence to become agents in their own learning.
- *Fosters both individual and social processes and outcomes.* Learners should be encouraged and helped to build relationships and communication with others for learning purposes, to assist the mutual construction of knowledge and enhance the achievements of individuals and groups. Consulting learners about their learning and giving them a voice is both an expectation and a right.
- *Recognises the significance of informal learning.* Informal learning, such as learning out of school, should be recognised as being at least as significant as formal learning and should be valued and used in formal processes.
- *Depends on teacher learning.* The need for teachers to learn continuously in order to develop their knowledge and skill, and adapt and develop their roles, especially through classroom enquiry, should be recognised and supported.

- *Demands consistent policy frameworks with support for teaching and learning as their primary focus.* Institutional and system-led policies need to recognise the fundamental importance of teaching and learning and be designed to create effective learning environments for all learners.

[ii] According to Cole (1999, p. 90), an artefact is 'a material object that has been modified by human beings as a means of regulating their interactions with the world and each other. Artefacts carry within them successful adaptations of an earlier time (in the life of the individual who made them or in earlier generations) and, in this sense, combine the ideal and the material, such that in coming to adopt the artefacts provided by their culture, human being simultaneously adopt the symbolic resources they embody.'

[iii] The circle indicates that 'object-oriented actions are always, explicitly or implicitly, characterised by ambiguity, surprise, interpretation, sense making and potential for change' (Engeström, 2001b, p. 134).

[iv] Arts and Humanities Research Board (AHRB) Small Grant: B/SG/AN8886/APN14717

[v] Two colleagues (Professor David Howard, University of York and, more recently, Evangelos Himonides, Institute of Education) have provided assistance with the voice recordings and with the (ongoing) acoustic analyses.

[vi] A more detailed report on this analysis and its application to activity theory is contained in: Welch, G. F. (in preparation). Culture and gender in a cathedral music context: An activity theory exploration. In M. S. Barrett (Ed.), *A Cultural Psychology of Music Education*. Oxford: Oxford University Press.

[vii] The long-term average spectrum (LTAS) is widely accepted as a powerful and effective tool for the assessment of voice characteristics. It provides an overview of the summative acoustic features of the voiced spectrum envelope for a given item of speech or song. Differences in the relative intensities of individual harmonics or clusters of harmonics (termed 'formants' in voice acoustics) are shown as variations in the size of the peaks in the spectrum envelope. The y axis indicates sound pressure levels in decibels, the x axis indicate frequency in Hz. The peaks in the spectrum (looking from left to right in each quadrant of the figure) are the outcomes of particular types of sung articulation adopted by the singer. See Sergeant, D. C., & Welch, G. F. (submitted). Age-related changes in Long-Term Average Spectra of children's voices. *Journal of Voice*.

About the author

Graham Welch holds the Institute of Education, University of London Established Chair of Music Education and is Head of the Institute's School of Arts and Humanities. He is elected Chair of the international Society for Education, Music and Psychology Research (*SEMPRE*) and a recent past Co-Chair of the Research Commission of the International Society for Music Education (*ISME*). He also holds Visiting Professorships at the Universities of Sydney (Australia), Limerick (Eire) and Roehampton (UK) and also at the Sibelius Academy (Finland). Publications number over 200 and embrace musical development and music education, teacher education, the psychology of music, singing and voice science and music in special education and disability.