# THE SECULAR BELL

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## 1. Public Art in Post-Modern Contexts

As expressions of one another, individualism and secular society are forging new definitions of what constitutes a contemporary spirit of community. Even as artists who work in public-space art are briefed by commissioning panels to design works that enhance a community's identity and sense of self, our secular societies continue to fragment to pluralist conglomerations of competing interest groupings and individual claims of self-determinacy.

The history of art in the West celebrates the power of artists to express the passionate certainties shared with fellow members of their communities. This was possible when communities were founded in a shared and persuasive religious conviction. The various assaults upon this conviction, from the developing concepts of mercantile practices, Protestantism, the advances of technology and an ascending middle-class (as feudalism gave way to capitalism) found expression in the ideas of personal freedom and inalienable rights of the individual. Indicative of this fragmentation was Margaret Thatcher's famous claim that 'there is no such thing as society, there are only individuals'. How is it that Western society has come to so celebrate the individual or conversely, come to so doubt the feeling for the communal?

Commercial marketing systems reach out to persuade individuals and self-interest groups with little regard to the coherence of important social units that aggregate to the larger community. Individual consumers are informed and enticed independently of other social connections that may condition their personal identity. Western democracies are following a philosophy that makes the social and legal systems divisible to the individual. Our market economic systems are fundamentally structured around the Utilitarian idea of a free, choosing and selfish individual, who, in numbers, come together in the market place to trade the relative values of their individual desires.

In this context it is hardly surprising when artists are confused as to the purpose of their work. The market-place ideology has deeply infiltrated the social imagination of the place for artists. The cult of the individual is a profound adjunct to the marketing of cultural practices. Artists and their cultural production might simply constitute an artisan arm of the general model of economic production undertaken to satisfy social demand, except that cultural activity conditions the fundamental identity and imagination of the society in which it takes place. Cultural production can give great impetus to the directions in which a society might develop.

## 2. Sites of Experience

The Federation Bell Installation described in this paper attempts to create a communal gathering site that stimulates communal experience by modeling experiences found in religious sites. These 'sites of experience', in the form of temples and churches, have always been a fundamental part of the everyday living and ritual for communities that are bound by religious faith. In secular Western societies such cultural and ritual connections between people have increasingly become replaced by public entertainment from mass communication media, like the cinema and television, to the spectacular event experiences of public sport and theme or activity parks.

The Federation Bells Installation is an attempt to re-position our sensory experiences, to draw back the modernist optic dominance in favour of a multi-sensory, holistic response to cultural experience. The installation is an accessible public instrument for which anyone with access to the Internet can compose works, and, naturally, can be accessed as a sculptural installation full of sensory and sensual delight. The installation invites people to attend through multiple sensory modalities to the spatio-temporal and material presence of the bells overlaid with the visual and acoustic context of the site.

This experience is very sharable with others. Like the palpable experience found in a Buddhist temple, and the sensational experience to be had in a Cathedral (both of which make a feature of the sound of bells), the Federation Bells Installation invites people to gather and share an experience rooted in that which is magical and wondrous. In the experience of sacred places people recognize each other and themselves as profoundly part of a community with meanings and feelings beyond the polite accord.

Suzi Gablik [1] has written a polemic treatise called *The Re-enchantment of Art*. In this she argues that the Post-Modern has a deconstruction phase and a reconstruction phase, and that it is now time for the reconstructive vision in the arts to emerge. This vision should link the experience of art with the experiences of society and environment. Gablik writes, "There is a need for new forms emphasizing our essential interconnectedness rather than our separateness, forms evoking the feeling of belonging to a larger whole rather than expressing the isolated, alienated self.... Exalted individualism, for example, is hardly a creative response to the needs of the planet at this time, which demand complex and sensitive forms of interaction and linking."

And again [2], "The remythologizing of consciousness, then, is not a regressive plunge into the premodern world; we are all being drawn to "the multi-sensory phase of evolution", as the next step in the evolution of consciousness." (Gablik calls this 'reenchantment of art. She does not claim to have a "fully realized framework" for this notion. The issues she raises are her "attempt to think about a new connective, participatory aesthetics, and to speak for a value-based art that is able to transcend the modernist opposition between the aesthetic and the social." [3].

The Federation Bell Installation, as a 'site of experience', makes an important contribution to this "reenchantment" of cultural expression and cultural experience. It is a pathway to finding these "new forms emphasizing our essential interconnectedness rather than our separateness" and the key within them is to focus particularly on the 'experience' that cultural expression, the 'site of experience' offers.

By focusing on the experiencing of cultural exchange rather than on conceptual notions of culture, we can rejoin cultural experience to community experience.

What makes accessible cultural experience so valuable for a community is that experience, in its fullest sense, means participation, and participation in its fullest sense means collaboration. A society that fosters creativity in all its citizens through their participation and collaboration in creative experience has found the way to secular society's communalism and successful Public Art.

The claim that the central value of an artwork lies in the experience it offers people who visit it would seem utterly unremarkable to earlier communities and societies more bound by the authority of the communal experience. Once we in the First World privileged the 'I' before the 'We', and the 'Eye' before all other sensory perception, we entered a world where we lost confidence in the ancient and familiar understandings of place and identity [4]. Art become objects to be owned rather than used, and so cost and value become our unreliable guides.

Suzi Gablik calls for a new aesthetic theory and practice in the name of protecting our endangered ecology. She writes "I see the task of this book as encouraging the emergence of a more participatory, socially interactive framework for art, and supporting the transition from the art-for-art's sake assumptions of late Modernism, which kept art as a specialized pursuit devoid of practical aims and goals. " [5]. The collaborative projects as discussed here are answers to these calls for a more community responsible cultural experience.

Now is the time to recreate the pleasure parks of old, the Luna parks and the other places of physical experience that our contemporary societies are in danger of forgetting about. Rather than add another smart piazza cafe space into the urban social fabric, now is truly the time when we should create 'sites of experience' in which people can discover one another in joy and pleasure and engage in emotional exchange. Not places for the amusement and entertainment of the masses, like computer games arcades or casinos, but places in which wonderment and beauty and community sharing and engagement is encouraged. Rush has suggested that participation will be fundamental to this shift from the graphic perception to the sensual when he wrote, "Interactivity is a new form of visual experience. In fact, it is a new form of experiencing art that extends beyond the visual to the tactile." [6]. The ultimate expression of an open, sharing and richly secular culture will be when 'sites of cultural experience' are not to be distinguished from the complex pleasures of our everyday living, however utopian this might seem.

## 3. The Evolution of Bells as Public Art

Large bells can usually be heard over a relatively large area. Their sounds radiate across the public and private spaces of the surrounding community, and are inextricably linked to the social experiences that form that community's identity.

Bells were widely used in music in East Asia for hundreds of years prior to the arrival of Buddhism. These bells appear to have been largely tuned to scales derived for wind and string instruments. As Buddhism arrived in East Asia early in the first millennium of the Christian calender, it prompted the art of casting large, singular temple bells in which musical percepts such as pitch and consonance were largely irrelevant. From discussions with bell founders and priests in East and South East Asia, and reviews of the literature, the acoustical aesthetics of these bells remains somewhat unclear.

Large bells started being cast in Christian monasteries in the early Middle Ages and carillons of bells began being produced in the late Renaissance. Carillons steadily grew in size and numbers as bell casting and tuning technology improved. Tuning the overtones of bells on a lathe after the bell was cast was first discovered by the Hemony brothers in Flanders in the early 17th century, and then lost until rediscovered in the late 19th century in England. The most musical tuning they could find for the inharmonic overtones of bells involved tuning the first five overtones to the frequency ratios of 1: 2: 2.4: 3: 4. This amounts to a harmonic series with a minor 3rd interval inserted. The resultant sound is of a minor 3rd chord with a more prominent tonic [7]. Other difficulties in carillon design arise from maintaining a balance in the loudness of small treble bells compared to their much larger tenors. In the 1980's computer modelling of flexural vibrations improved to allow bells to be designed on computer. A major 3rd bell was developed in Holland using this technology [8]. However both these bells limit the musical expression of carillons, as their inharmonic overtone produces dissonances with other common musical intervals and sometimes pitch confusion.

Until relatively recent times the patronage of religious organizations was required to support the expensive process of casting large bells. With the industrial revolution came the capacity to refine the tuning of Western church bells that produced a wave of interest in carillons, especially in the USA during the early Twentieth Century. Many of these carillons were installed on university campuses, often without any formal relationships to a place of worship. During the same period carillons were also built as war memorials in Australia, New Zealand and England.

The secularisation of western societies was therefore accompanied by an increasing interest in the musical possibilities of large bells. The scientific analysis of their sound, required to improve their tuning, also led to a progressive demystification of their sounds, and in turn, research into the acoustics of bells raised issues concerning the perceived acoustic qualities of carillon bells as a musical instrument. Furthermore, individuals in multi-cultural, secular societies who are increasingly used to controlling their private acoustical experiences, were not as likely to approve of bell sounds (of any tradition) entering their private space.

Bell and gong sounds are inharmonic complex tones produced by three-dimensional flexural oscillations, as are sounds produced by the two-dimensional flexing of a drum skin. Very few inharmonic complex tones were produced in the world before the development of human manufactured materials. Apart from the occasional stone, naturally occurring materials rarely resonate long enough to produce a strong tonal sensation of any kind. So it's not surprising that the human perception of inharmonic complex tones is highly variable. Often the listener makes no attempt to perceive a pitch at all (eg. a clinking glass), or if pressed into making a judgement by a musical context will latch onto a prominent overtone, or make a best fit of the harmonic overtone series to what they're perceiving [9, 10]. For example tubular chimes have the 4th, 5th and 6th overtones at frequency ratios close enough to 2:3:4 to produce a pitch percept at the fundamental of these ratios, despite there being no overtone at this frequency actually present in the sound of the bell [11].

Any succession of tonal sounds scaled in frequency will produce a melodic contour, even if it difficult to define the pitch height of any given note. Sethares [12] was even able to show how inharmonic complex tones of rocks can be tuned in scales that minimise dissonance and sound consonant. The problems of pitch height confusion and dissonance arise when such sounds are played in ensembles including harmonic sounds. Sethares proposes that Javanese gamelan tunings may be the scales that produce the most consonant relationships between inharmonic gongs and the human voice [12].

## 4. The Federation Bell Installation

Bells can now be computer modelled and designed to the extent that they can provide exciting new musical opportunities. Since they do not always produce harmonic overtones, bells can be designed to produce a range of timbres producing multiple pitch perceptions. The Federation Bell installation contains a series of bells with intervals of just minor and major 3rds, 4th, 6th and 7ths arising from their overtones [13]. One bell has three pitch percepts: the fundamental, a 4th and a 6th. These *polytonal* bells were designed by tuning the bell overtones to subsets of two or three overlapping harmonic series. Care had to be taken that the just interval between the pitch percepts was sufficiently complex for a given absolute pitch that the listener didn't simply interpret the bell pitch as the single sub-harmonic (or virtual pitch) of the multiple harmonic series [14].

As well as producing new bells of more complex tonality, bells with purely harmonic overtones for up to the first seven overtones were also designed and produced [15, 16]. These bells overcome all of the difficulties in using bells with conventional Western tunings and instrumentation. They also have a generally thinner wall profiles than European bells and so can be struck by lighter, softer mallets and produce much less sharp timbres. The Federation Bell installation has 32 harmonic bells ranging from a one tonne bell with a fundamental at D2 (74Hz) to a tiny D6 (1172Hz) bell.
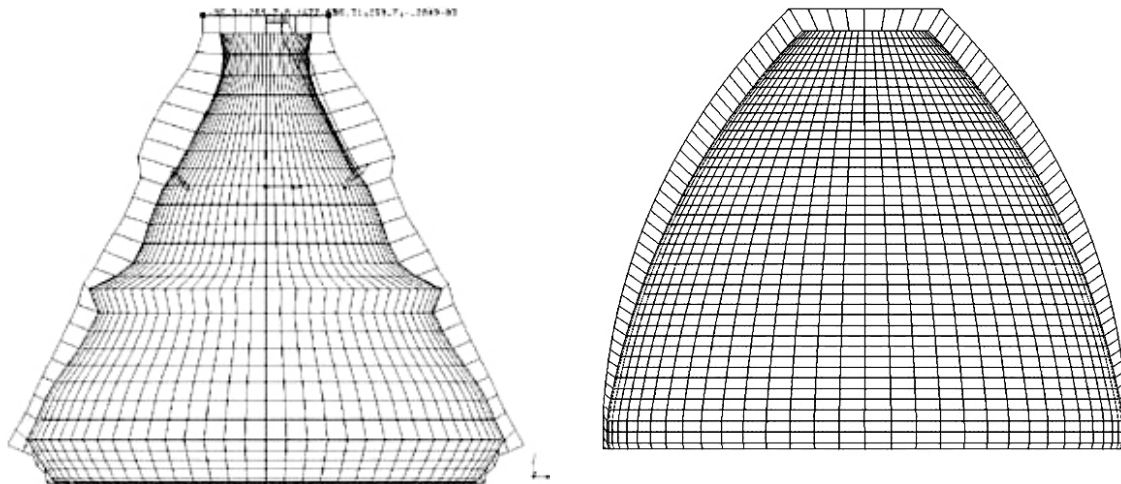


**Figure 1. Computer calculated profiles of a polytone bell with a just 7th interval (left) and a harmonic bell (right) produced using 'ReShape' software.**

Bells are ideal for such a musical installation as they visually inspiring and physically robust objects able to survive unprotected in a public environment with minimal maintenance. The installation bells are struck by electro-magnetically driven internal hammers. Since each bell is itself a rigid object containing its own hammer there were many design options for their supporting framework and spatial dispersion. An on-site computer converts midi files to the required electrical pulses to control the hammers. All the information required to write music for the bells (including tuning, installation plan and the sound of each bell) is available on a web-site [13]. Composers will be able to simply e-mail their work to a curated site to be scheduled for performance, and real-time streaming of 3D audio from the site may eventually be available.

**Figure 2. Federation Bell installation in Birrarung Mar, Melbourne.**

The installation is not tuned to the Western chromatic scale. Instead all the just intervals arising from ratios up to 5 form the basis of the tuning [13]. This tuning was chosen so that all the music played on the installation is written specifically for it, avoiding the socially divisive issues of popular styles. This tuning and the physical orientation of the bells (spatially dispersed and upside-down according to common notions) also asks the visitor to see and listen afresh to a unique instrument. A public musical instrument for which any-one with a computer and internet connection can compose, and that can be experienced in various ways by any-one able to visit the site. An instrument which may challenge many composers to think outside the ever increasing global hegemony of Western chromatic tuning, a product of the 19th century industrialisation of music [17], and beyond the reduction of complex sounds that produce a wide variety of acoustic percepts, to dots on the musical staff.

## 5. Conclusion

In our post-religious societies it is still possible to forge a community identity that is bedded in the sensual and the intuitive connection between each of us. Nineteenth century public-space works of art such as the dignitary on a plinth, or an allegory tableau sculpture will not do. Twentieth century proliferation of sculpture as architectonic forms that echo the built environment also will not do. Public-space art can as easily signal to its viewer their exclusion from the cultural and social elite as to be a portal for universal membership to it.

The old model used by religious communities shows the way for secular societies to develop community sensibility. In places of overwhelming sensory experience people gather together and unselfconsciously share emotional responses with one another. People in communities know themselves as a community by such exchanges. Secular societies have selected mass entertainment as a substitute for community, and it is only when these societies are under stress that people re-experience the profound nature of their community spirit. Sites of experience, such as the Federation Bells Installation, offers experiences wherein citizens can experience their essential collective nature despite the rampant individualism that is promoted in their secular society.

The Federation Bells, as a site of multi-sensory experience, offers a contemporary, secular experience of bells that has its roots in religious practices preciously observed over thousands of years. As a rare example of a designed acoustic feature it draws public attention to the local soundscape in which it is situated, and provides a temporal framework for contemplative audition. Music composed for the bells can be experienced from amongst the bells in a dramatic three-dimensional aural experience, or from as far as 100 metres away at the edge of the park, where they produce a delicate figure in the ambient sound-field. The installation has become a place of social ritual, a place to meet and rest, or a place to celebrate social rituals with specially commissioned musical works.

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