

# Open Outcry

*An Opera Conceived and Composed by Alexis Kirke*

## Initial Composition Notes

*(Note, more details on broader aspects of the project can be found in the project overview document, available on request)*

### **Overview**

The compositional vision relates to three elements: cello, voice, and conductor.

#### *Voice*

The voice will range from solo trading cries, to chaotic combinations of mixed tempo and pitch calling - when all 16 singers are trying to trade in their vocal ranges. When trading dies out, there will be times when the singing reduces to octets, quartets, duets and solos. This will also come about because singers are only allowed out onto the trading floor one at a time; and also because they leave the trading floor as they lose money. Singers will lower their tempos as they become tired, and will raise them as they become more keen to trade. They will also change their tempos to match the tempo of who they are trading with. When a singer is happy with their portfolio they will fall quiet, when they are unhappy, or think they can improve it, or want to get rid of some stocks that are plummeting, they will start singing again.

#### *Cello*

The cellist will not have a view of the market screens or the pit, they will play based purely on the singing that they hear. The “playing” will range from intense high speed runs and glissando, and percussive playing; to slow mournful and beautiful bowing. The cellist will also be permitted to utilize extended techniques – bowing any part of the instrument, percussive strikes, reversed bow playing. Hitting and flicking the body or the instrument like a drum. The cellist will also have access to a loop pedal allowing them to build multiple layers of sounds. The composer will provide the cellist with a “vocabulary” of techniques and harmonies to employ.

#### *Conductor*

The composer will conduct the opera in two ways:

1. Beat setting
2. Market manipulation
3. Market suspension

#### 4. Market Closing

Tempo manipulation involves simply setting a beat. The conductor will set a beat with his hand. All singers and the cellist must sing in multiples or divisors of that beat (though they can be non-rational multiples and divisors). When the conductor does not set a beat, singers and the cellist can choose their own tempo – though they must match the tempo of anyone they wish to trade with; and the cellist will be constrained by their own internal musical judgement.

Market manipulation involves changing the properties of the market through news items. This can cause the market to plummet or soar as a whole, or just in certain stocks. This will cause a flurry of trading amongst the trading singers, in a positive or anxious way. Alternatively, the market can be adjusted in such a way as to maximise the happiness of all trading singers. The emphasis will be towards allowing the trading singers behaviour to evolve naturally, but if needs be – for artistic reasons – the conductor/composer will manipulate the market.

Market suspension involves all trading and market movement being put on hold. At this point whoever is singing must continue singing what they are singing in a loop. So if there are only 2 singing traders singing, then they must continue. The cellist is unaffected by market suspensions. When the market is unsuspending, singing traders are free to sing based on their trading requirements and the market continues its process.

Market closing. As the performance comes to an end, the conductor will suspend the market. He will then ring a bell. The singing traders will then all have to look at the conductor. He will then bring them to silence bit by bit, to end the performance.

#### **Composing Technique**

The composing technique has two parts: pre-discussion, genetic algorithms, multi-agent market simulation, another discussion, work-shopping, discussion, trading rehearsal, re-writes.

##### *Discussion*

Because of the innovative nature of this piece, it will be necessary to discuss some basic operatic constraints with an experienced opera director/singer/composer. These will happen at various times during the process.

##### *Genetic Algorithms*

The singing traders will be taught a series of phrases with certain musical – perhaps extended signing technique - features which they can use to trade with. The precise rhythms and notes in these phrases will define exactly what the performance will

sound like. However, given the number of singing traders and the limited controls the conductor/composer has on them, innovative techniques are needed to compose the phrases. Phrases will overlap in different ways and at different tempos. The phrases will have to be composed *statistically* to give them *average* harmonic properties. In particular phrases will be composed so that *on average* when sung, buying phrases will be *consonant* with selling phrases. And also buying phrases will be *on average* dissonant with buying phrases, and selling phrases will be *on average* dissonant with selling phrases. This has the effect that when the market is in balance, the ensemble will be more consonant, when out of balance more dissonant. (Another key element is that when two trading singers want to trade, they must sing in consonant harmony – this is defined in the market rules in the project overview document.)

To enable the above properties, a genetic algorithm will be used to “evolve” a numbers of artificial “populations” of phrases with these properties. The genetic algorithms will also be constrained – as much as possible - by the physical constraints of the human voice and voice composition technique. However they will need to be manually adjusted by the composer afterwards as well for artistic and performative reasons. The composer will define the initial population, based on his normal composition principles and preferences. It is this population which will then be artificially “evolved” to adjust its statistical properties.

### *Multi-agent Market Simulation*

After a number of potential phrase sets have been generated through genetic algorithms, the composer will run some performance simulations using a method known as multi-agent systems. Each agent will be an artificial singer. Using these simulations he will select the most artistically preferable phrase set, and then re-compose elements of that set by ear, re-running tests to ensure they are still liked.

### *Workshopping and Trading Rehearsal*

The workshopping and trading rehearsal sessions will give the composer a chance to work with the performers – in collaboration with the artistic director, the choreographer and the financial markets consultant – to better define and refine the trading tunes and methods.