

MELBOURNE INTERNATIONAL ARTS FESTIVAL

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SIREN

RAY LEE



EDUCATION RESOURCE PACK
WRITTEN AND COMPILED
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FOREWORD

Thirty or so tripods, topped with revolving blades that are equipped with sirens and lights, in a large indoor space, for forty minutes. While such a description may sound simple, the scope and combination of these elements in this performance installation creates a complex and lasting effect. *Siren* is the latest in a series of works by renowned composer and performance artist Ray Lee, which push the boundaries of sound, light, movement and technology. Originally staged in a military hangar, this work evokes memories, emotions, and associations on numerous different levels.

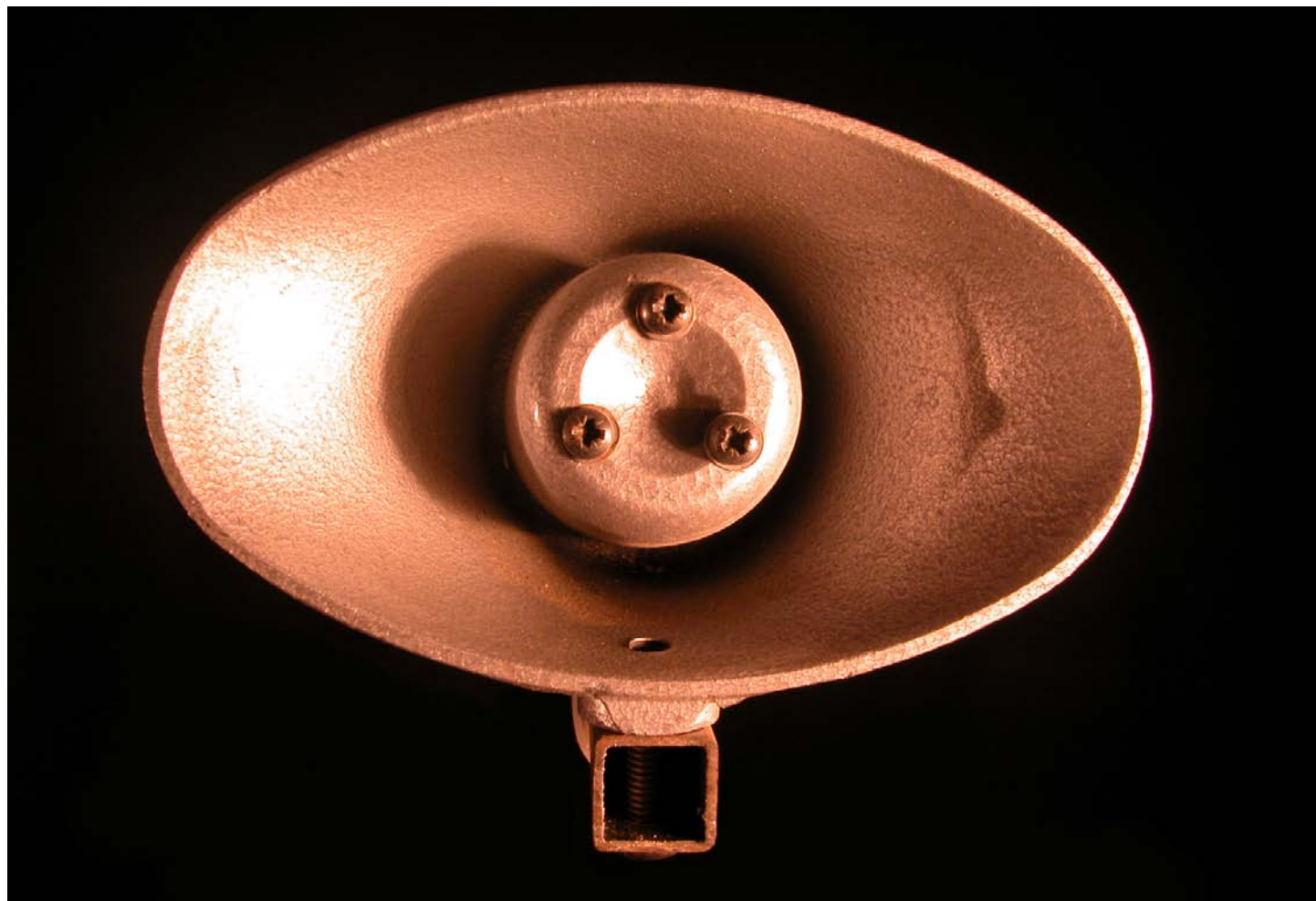
[The performers] use screwdrivers to tune each oscillator [the “sirens” of the title] to an Aeolian mode and set the blades whirling. The tones accumulate into a pulsing choral drone, coloured brilliantly with overtones and disclosing different facets as listeners wander through the ... space.

Julian Cowley describing the experience of *Siren* in *The Wire* magazine, no 277, March 2007.

Siren is a very different type of performance presentation to that which most students will have experienced. It is therefore important that they be given some context and perspective before experiencing *Siren* in order to fully appreciate it. The activities contained in this Education Resource Pack are designed to help students think about the various elements and associations of the work. Subject areas covered in this Pack include Drama, English, Humanities, Music, Music Technology, and Science. Some of the activities can be done in tandem, but there is no particular order which teachers must follow. Not all activities need to be completed, and each activity can be modified to suit the lesson according to the teacher’s discretion. Teachers are encouraged to view the video and audio material of Ray Lee’s work contained in the Appendices in order to properly appreciate *Siren*, and to prepare for the activities herein.

DAVID PERRY

Education Pack Writer



CURRICULUM LINKS

The VELS Standards (Level 6) were consulted in the preparation of this Education Resource Pack. Some of the connections are outlined below.

THE ARTS – INCLUDING DRAMA AND MUSIC

Students are engaged in activities that enable them to:

- analyse, interpret, compare and evaluate the stylistic, technical, expressive and aesthetic features of *Siren* in terms of the way music and sound is used in its presentation;
- comment on the impact that arts works, forms and practices inspired by the concept of siren has on arts works and society in general; and
- effectively use a range of contemporary media, materials, equipment and technologies.

ENGLISH

Students are engaged in activities that enable them to:

- read, view, analyse, critique, reflect on and discuss imaginative texts that explore personal, social, cultural and political issues of significance to their own lives; and
- compose a range of texts, such as poetry.

HUMANITIES (HISTORY)

Students are engaged in activities that enable them to:

- learn about change and its impact on people's lives and the significance of continuity; and
- communicate their understanding of history using the conventions of a range of forms of representation.

SCIENCE

Students are engaged in activities that enable them to:

- design and conduct scientific investigations in ways that lead to the collection, interpretation and presentation of valid data; and
- give both qualitative and quantitative explanations of the relationships between force, mass and movement.

ACTIVITY 1

ACROSTIC POEM – SIREN

If any one unwarily draws in too close and hears the singing of the Sirens, his wife and children will never welcome him home again, for they sit in a green field and warble him to death with the sweetness of their song.

Homer, *The Odyssey*

When creating titles for their artistic works, artists often choose words that are evocative and can be interpreted in a number of ways. In English, this can be a fascinating task, as there exist many words that have different meanings, yet a shared origin: the word “siren” is one of these. It is possible to distil these different meanings, using class activities such as the one below, to come up with an agreed “universal meaning”. This can be a useful tool for students to expand their vocabulary for literary compositions that involve poetic devices such as metaphors.

PREPARATION

You will need:

- Meaning of “siren” from Greek mythology (refer Appendix A)
- Printout of Venn diagram example (refer Appendix A)
- Optional: printout of sample acrostic poem (refer Appendix A)

ACTIVITY

1. Teacher creates a brainstorm on the board – with the word “SIREN” in the middle bubble. Students are to think of as many meanings or associations with that word as possible. Suggestions may include:
 - AMBULANCE / FIRE / POLICE
 - AIR RAID SIREN
 - SPORTS SIREN – HALF TIME etc
 - DANGER
 - GREEK MYTHOLOGY
 - MERMAIDS (eg *Sirénes* in French)
 - SCREEN SIRENS
2. Teacher now chooses between four to six of the words or ideas suggested by the class, and creates six different combinations, one for each group in the class. For example: AIR RAID / SCREEN SIREN; AMBULANCE / SPORTS SIREN. Groups are to create a Venn diagram for the combination that has been given to them (refer Appendix A for an example).
3. All Venn diagrams are collected from the groups and the findings in common are listed on the board (for example, *warning of danger, makes a loud noise*). Students are to read through these findings and agree as to which of these are universal, ie that they could be applied to all or most meanings of the word “siren”.
4. Students are to create an acrostic poem using the letters of the word S – I – R – E – N. An example is given in Appendix A, which can be shown to students as a projection on the board or large printout if the teacher desires. The poem should try to be as universal or as generic as possible, ie not about a specific object but more about the idea of a siren.

ACTIVITY 2

AIR RAID

The first thing I knew was...dust started to fall on me. The floor gave way...and I immediately realised what was happening. The roof came down...I covered my head with my hands...and wondered – frankly – whether this was the end.

A bomb survivor's description of her experiences, from the BBC archive WW2 People's War, www.bbc.co.uk/schoolradio/history/worldwar2audioclipslibrary_clip13.shtml

An air raid siren is a distinctively civilian experience of war, as it signals possible death from indiscriminate bombing by the enemy. Even to those who have not experienced war first hand, the sound of an air raid siren is undoubtedly chilling. Ray Lee's installation *Siren* uses similar devices to create a performance event, which has strong associations with actual air raid sirens, particularly considering its first performance was in an air force hangar! Students can learn about the air raid siren's role in World War Two through the BBC archive WW2 People's War as part of the following activity.

PREPARATION

You will need:

- Resources as described from Appendix B
- Library and internet facilities

ACTIVITY

1. Without explaining what it is, teacher plays the air raid siren audio clip (number 1) from Appendix B. When the clip has finished playing, teacher asks:
 - What did you feel as you listened to that sound?
 - What do you think it is supposed to mean?
2. Teacher reads the text connected to audio clip number 1 (from the BBC website) to the class. Teacher asks:
 - Imagine you are a child in a London classroom during that time. What would you feel when you hear that sound?
 - Why would they have chosen that particular sound as the air raid warning?
3. Teacher now plays the "all clear" siren audio clip (number 2) from Appendix B. Teacher then asks:
 - How is that sound different to the first?
 - What do you think it might mean?
4. Teacher reads the text connected to audio clip number 2 (from the BBC website) to the class. Teacher asks:
 - What did you feel as you listened to that sound?
 - Does that seem like a "reassuring" sound to you?
5. Teacher reads the accompanying texts and plays the remaining audio clips to the class. Teacher asks:
 - What else do you know about this period of history – why were the air raids occurring?
 - In what ways would people have been affected by these experiences?
 - Why are air raids such a distinctively civilian war-time experience?
6. Class is given a creative writing / research activity to complete in the library. Recommended resources are given in Appendix B, and students should also use printed library material:

Imagine you are writing a letter to a friend from an air raid shelter in London in 1940. You need to describe to them the experience of hearing the warning siren and your escape to the shelter, which can be anywhere you wish. In your letter you may be afraid, worried, hopeful, light-hearted – whatever you like! Make sure your descriptions are authentic and based on your research – you need to find at least three different source materials to use for your writing task.

ACTIVITY 2

AIR RAID continued ...

EXTENSION ACTIVITIES

Students are shown the online clips from Ray Lee's *Siren* (refer Appendix B), and are also told the story (from the website) of its original presentation in Hangar 3022, which was a very unusual experience for the audience. Students are asked:

- *Now that you know about the emotional significance of air raid sirens, how unsettling or evocative would this setting be for the audience?*
- *Would it be a different experience for audiences who viewed it in other settings, such as disused courthouses, galleries, or former meat markets (which is the case for the 2009 Melbourne International Arts Festival)? Why?*
- *Students are given information on air strikes in the current war in Iraq (refer Appendix B). Students are asked: What parallels do you see between the Londoners in World War Two and Iraqi citizens in 2003? Do you think you can identify with them more closely, having researched the air raids of WWII London?*

ACTIVITY 3 EQUAL TEMPERAMENT

If I may propose an analogy of my own: Equal Temperament is like pasteurised cheese, which means it's easier to make and more people can eat it; but it doesn't have as rich a flavour.

Nicholas Lezard, reviewing *How Equal Temperament Ruined Harmony (and why you should care)* by Ross W Duffin, in *The Guardian*, November 2008.

The piano (or *pianoforte*) is arguably the definitive instrument of Western music in the last 200 years. Most children in Western cultures who learn an instrument generally start with studying the piano. Its versatility has enabled many composers to use it as a tool for composition, and there are innumerable well-known piano pieces that show to effect the skill of concert pianists, who as *virtuosi* could be seen as the Western music equivalent of, say, sitar players in Indian music.

However, the benefits that the piano has brought to the development of Western music and culture are offset by the tonal compromises that have been made. Equal temperament (refer Appendix C) means that sonically “authentic” intervals do not appear on the piano. Therefore, the ubiquity of the piano sound can mean that Western musicians can potentially develop an inaccurate “harmonic sense” through being accustomed to intervals that are, in fact, slightly “out of tune”. Composing a work like *Siren* necessitates having a good sense of just intonation (refer Appendix C), and it is useful for students to develop this sense with these activities. Activities 3 and 4 in this Education Pack can be taught sequentially or individually.

PREPARATION

You will need:

- Piano with removable panels
- Articles from Appendix C

ACTIVITY

1. If possible, the teacher removes the panels of the piano so that the strings are exposed. Students are invited, one at a time, to lean close to the strings and make noises such as shouting, clapping, singing, whistling. Students and the teacher discuss what they notice about what happens with the piano strings.
2. Without sounding the note, the teacher or a selected student holds down the C1 key (i.e. 1 octave above middle C), then strikes the middle C key whilst still holding down the C1 key. The teacher asks:
 - What do you hear? (*Students should hear the C1 note resonating even though it has not been struck*)
 - Why do you think that has happened?
 - Using information gained from the articles in Appendix C, the teacher explains that the overtones cause these notes to resonate sympathetically.
3. The teacher repeats step 2 but this time with G1 (ie the G above C1). The teacher asks the same questions as in step 2, but also adds:
 - How is the sound different to the previous sound? (*students should notice that it is not as loud as the C1*)
 - Why do you think this is? (*some students may have observed that it is not the same key – ie not another C – and further away*)
4. The teacher explains (using information from Appendix C) how each note can be split into different tones. Students are invited to guess which other notes might respond in the same way. The teacher repeats the step for each piano key suggested by the students, and they are to observe which notes resonate the loudest.

EXTENSION ACTIVITY

Teacher distributes articles from Appendix C that explain the history and tuning of the pianoforte. Teacher asks reflection questions to ensure that students understand the content:

- What do you understand by the term equal temperament?
- Why do you need to “de-tune” notes so that they fit into the scale on the keyboard?
- What might the piano sound like if we changed the tuning to just intonation?
- How can we overcome the possibility of losing our “harmonic sense” due to Western culture’s heavy emphasis on the piano?

ACTIVITY 4

OVERTONE SINGING – STIMMUNG

I firmly believe that musicians are special, they should be treated by the others as artful birds, very, very necessary while the rest is chatting and howling and barking. Karlheinz Stockhausen, 2007, quoted in www.tfproject.org.

The success of an installation like *Siren* is in the composer's ability to use the intrinsic nature of sound and acoustics created by the movement, architecture and timbre aspects of all parts of the installation. One of the great composers of the latter twentieth century, Karlheinz Stockhausen, demonstrated his understanding of sound in the landmark composition, *Stimmung* (refer Appendix D). Whilst this composition is not an "installation", it departs from conventional composition technique in that it relies on overtones and harmonics created by the singers to give a sustained sound.

Overtone singing is defined in the links given in Appendix D. Students should be made aware that any note played by an instrument is not just one tone of a single pitch. The experiments in this activity help them to develop this aural awareness. The listening tasks in this activity are also useful for students to develop their music-analytical skills through exposure to very different types of music.

PREPARATION

You will need (refer Appendix D):

- Printouts of waveforms
- Online videos and audio of traditional overtone singing
- Printed information on Karlheinz Stockhausen and *Stimmung* Audio extract of *Stimmung*
- Teachers should read through the articles and links and/or undertake their own research in order to understand the at-times complex theory behind sound production and acoustics.

ACTIVITY

1. Teacher asks:

- What scale intervals do you know? (*students may answer major third, perfect fifth, etc*)
- Why do some of these intervals have different names – eg "major", "perfect", "diminished"?
- Teacher now picks out the term "perfect". Class discussion:
- Which intervals are preceded by the term "perfect"? (*ie perfect fourth, perfect fifth, perfect octave*)
- Why do you think they might be called "perfect"? (*ie because they exist "in nature"*)

2. Class is now shown the waveform diagrams from Appendix D, demonstrating how the wave lengths of the notes in a perfect octave mathematically "fit" in with each other. Teacher explains that a perfect octave, as well as fourths and fifths, can be created as overtones from the root note.

3. Class watches the examples of overtone singing from Appendix D. Teacher asks:

- How do you think these "whistling" overtones are being created? (*students may observe that it is the shape of the mouth that is being altered to create the different pitches*)
- Have you ever heard these before, occurring naturally?

4. Teacher now guides the class to a solid (preferably brick) wall in the class room or elsewhere to practise creating overtones. Teacher gives directions:

- Face the wall, get as close to it as you can, and sing a very low sustained note on the syllable "aw".
- Without changing the pitch or the position of your jaw at all, slowly contract your lips towards shaping the syllable "oo".
- If you cannot hear yourself well, cup your hands behind your ears.
- Try to hear the whistling sound bouncing back at you - it should change pitch as you alter your mouth shape.
- See if you can achieve "Mary Had a Little Lamb" using this method!
- Students may find this step alternately amusing and frustrating, depending on their success in creating the overtones.

EXTENSION ACTIVITY

Class now listens to the audio extract of *Stimmung*, and reads through the printed information about this work (refer Appendix D). Teacher asks:

- What do you think it would be like to listen to this work for the full seventy or so minutes?
- How is this work different to other musical compositions you have heard?

ACTIVITY 5 BULLROARER

Today we know that the bullroarer is a very ancient object, specimens from France (13,000 B.C.) and the Ukraine (17,000 B.C.) dating back well into the Paleolithic period.

Thomas Gregor, *Anxious Pleasures*, University of Chicago Press, 1987.

In *Siren*, the tripods that have the sirens attached function in the same way as a *bullroarer*. Information about the history of this ancient tool can be found in Appendix E. Students can gain an understanding of the varied physical changes in sound that are used in *Siren* by creating and using a bull roarer in the following activity.

PREPARATION

You will need:

- Materials as described in Appendix E - enough to make one bullroarer for each student
- Information on bullroarer as described in Appendix E
- Large open space, such as an oval
- Internet access and projection screen

ACTIVITY

1. Teacher shows the class a video demonstration of a bullroarer (refer Appendix E).
2. Students are asked:
 - How do you think the sound is produced?
 - Have you seen this instrument before?
3. Information on bullroarers is distributed to students or projected on the screen. Students may wish to discuss or ask about the ancient historical nature of the instrument.
4. Teacher now produces the materials for making the bullroarer and the class make their instruments step by step, following the teacher's instructions. The teacher should ensure that a variety of different sized materials are used in order to make many different types of bullroarer.
5. When all student bullroarers have been made, the teacher checks to make sure they have been put together well, before taking them outside to the open space.
6. All students sit together to watch the teacher before trying out their bullroarer. Teacher demonstrates the action required to create the sound. One student at a time comes to the front to try the action. When the teacher is satisfied that students can do the action competently, students are allowed to find an open space for themselves and make the bullroarer sound.
7. After a few minutes, the teacher summons the students back to his/her space to discuss the activity so far:
 - Were you able to sustain the sound?
 - Did the sound change? How?
 - Are you able to control the sound in the same way that you can play a musical instrument?

EXTENSION ACTIVITY

Students discuss how everyone's sound can be combined or layered to create a class composition.

ACTIVITY 6 LIGHTHOUSE

We hear everything but we rarely take the chance to listen.

Sound recordist Chris Watson, quoted in *The Australian*, February 2009

Listening is an essential skill for students undertaking any kind of music activity, particularly when exposed to new and unusual works such as Ray Lee's *Siren*. Students can be taught how to listen as a skill through simple class activities such as the one below. *Timbre* refers to the individual sound of an instrument or object when played, and it is timbre that participants must listen for when playing the game *Lighthouse*.

PREPARATION

You will need:

- A large open space
- Enough percussion instruments for half the members of the class. There should be one only of each type of sound, with each sound being easily distinguished from the others. Suggested instruments are: chime bar, guiro, cabassa, claves, cowbell, triangle, cymbals, wood block, bongo, djembe, castanets, rainstick, tambourine, bells.
- Blindfolds may be used if desired

ACTIVITY

1. Teacher leads a discussion:

- What is a lighthouse?
- Why is it needed?
- Do you think there could exist an *aural* (teacher defines this term if required) version of a lighthouse? How would it work?

2. Teacher demonstrates the activity:

Using one of the percussion instruments, one person acts as a "moving lighthouse" to guide the "ship" (their partner) through the "rocks" (other students scattered around the space). The "ship" closes their eyes or is blindfolded, and has to follow the direction of the sound made by the "lighthouse". The "lighthouse" moves around the space as required in order to guide the "ship" in the right direction.

3. Students are placed in pairs, one as the "ship" and the other as the "lighthouse". Percussion instruments are allocated, one per pair. Teacher asks: How will you be able to hear your own "lighthouse" when other "lighthouses" are also playing?

One at a time, each pair plays their instrument so that the "ship" is able to distinguish the sound. For each "ship", the other "ships" around them are considered to be "rocks".

4. During the activity, all "ships" are to navigate their way through the space without seeing, and should start at various points in the space, travelling in different directions. The "lighthouses" move about the space carefully as required in order to direct their "ship" without accident. The objective can be to cross a particular line or reach a particular point, or merely to avoid crashing into the "rocks", with the last remaining "ship" (that hasn't crashed) being the "winner". Pairs should swap roles at an appropriate point.

QUESTIONS FOR REFLECTION

- How difficult was it to hear your "lighthouse"?
- Were there any "tricks" you came up with to make it easier to detect your "lighthouse"?
- Did you change your playing technique in order to make your sound clearer?

ACTIVITY 7

MANIPULATING DIGITAL SOUND

Opportunities for recording, editing and manipulating sound are now available to more people than ever. Simple computer programs perform the same work that bulky, expensive recording equipment and tapes used to do. Some of these programs, such as Audacity, are free for download from the internet. In the same way that Ray Lee has started with a simple idea – a single sound – and created a complex, fascinating composition in *Siren*, students are able to use such software to create complex musical works or soundscapes from just one sound.

This activity is intended as an introduction to using computers for editing any type of sound file. Options for installing software, particularly if teachers are interested in integrating ICT more closely in their lessons, are detailed at Appendix F.

PREPARATION

You will need:

- Class computer lab with headphones and projector screen / speakers for teacher demonstrations
- Audacity program (refer Appendix F)
- Audio files of sound effects accessible to students, pre-prepared and filed in a folder in Audacity program (refer to Appendix F for links to free sound effects)
- Teachers should be familiar with how to use the program – check the program’s “Help” section or tutorials online (refer Appendix F) – and have created a folder of sample sound effects, from which to show demonstration samples to the class (see first step of the activity). Printed explanatory material and/or a projector showing the various steps of using the program should be available to students.

ACTIVITY

1. Teacher demonstrates on the overhead projector how to locate and open the Audacity program on the computer system.
2. Teacher opens any sound file from the sound effect folder they have created and plays this sound over the speakers to the class.
3. Teacher now selects the whole file and applies a chosen effect (such as Change Pitch / Change Tempo). The class listens to the change in sound. Teacher reverses this step using CTRL-Z (depending on the computer) and now selects only a part of the file to apply one effect, then a different effect to the rest of the file.
4. Students are to go through the various steps of finding, choosing and opening a file, then experimenting with the various editing techniques. They should demonstrate their creations to the teacher.
5. Teacher now demonstrates the New Audio Track function and how several tracks can be played at once. On one track, the copy and paste function is used to create an ostinato or repeated sound. On another track, the file is repeated and manipulated in a variety of different ways to create a musical composition or soundscape. If overlap is required, then another track can be created and used. They should be able to create a linking theme or story to their soundscape.
6. Students should now work on a similar project themselves – creating an ostinato track (about 30 seconds to 1 minute) as an accompaniment in their own composition. Once again, these should each be played to the class if possible, or even burned to CD.

EXTENSION ACTIVITY

Students can collect image and/or video files and create visuals to accompany their finished soundscape using video editing software.

ACTIVITY 8

DISCUSSION – DIGITAL VS NATURAL SOUND

I very much doubt whether anything so rich [ie Siren] could be created using digital means ... These machines are a kind of anti-digital statement, they're about as purely analogue as you can get ... It's part of my personal crusade to make music a more visually entrancing experience.

Ray Lee, quoted in *The Daily Telegraph*, January 2007.

The history of recorded, electronic, and digital music is fascinating and has been detailed by musicologists and enthusiasts the world over. However, the sentiments expressed above by Ray Lee give pause for thought. For most young people today, it is likely that the majority of recorded music that they hear (and for many of them, recorded music is the music they hear most of the time) is in digital form, whether on a CD or on a computer device. For this reason, it is important for class teachers of Music to include some type of historical analysis of digital music in their curriculum. The following activity provides such a suggestion for teachers.

PREPARATION

You will need:

- A4 sheets with printed terms (described below)
- Library / internet research access (refer Appendix G)

ACTIVITY

1. Teacher initiates a class discussion:

- How many ways can people listen to music? (*these could include anything from singing to yourself in the shower, live performances, mp3 players, radio, mobile phones, and so on*) The different ways are listed on the board.
- Which ways do you most commonly listen to music?
- How would we now order these different methods historically? (*eg singing comes before playing an instrument, radio comes before mp3 players*) Teacher numbers these in order as discussed by the class.

2. Teacher now asks how these different items can be sorted into two groups only. There may be a number of suggestions, which should be heard and discussed, but ultimately the teacher should make the division between music that is live and music that is recorded or transmitted.

3. The teacher erases those items which pertain to live playing or performance, and focuses on the remaining items. The class is asked again: how can these remaining items be sorted into two groups? Eventually students should reach the conclusion that all items can be divided into digital recordings and analog recordings (*the latter term may need to be given by the teacher*). Teacher now explains that they will be researching the history of these recording methods.

4. Students in groups or individually are given A4 sheets with the following terms in CAPITAL LETTERS at the top:

- PHONAUTOGRAPH
- PHONOGRAPH CYLINDER
- REEL-TO-REEL TAPE
- COMPACT CASSETTE
- GRAMOPHONE RECORD
- COMPACT DISC
- DIGITAL AUDIO TAPE
- MP3 FORMAT
- DVD

These individuals or groups are to research their item, writing at least three distinct facts from their research on their sheet.

5. When completed, the class should arrange their sheets on the board or a wall as a timeline, taking care to show the two separate lines of analog and digital formats.

EXTENSION ACTIVITIES

An excursion to a radio station or recording studio can complement this activity.

Depending on the year level, students may be interested in pursuing the “audiophile” argument of whether analog or digital is “better” (refer to Google search at Appendix G).

ACTIVITY 9 ACOUSTICS

Sound is, like light, a basic energy source and it has a powerful sensory effect on the whole being - mind, body and spirit. David Pearson, *The Natural House Book*, Angus and Robertson, 1989.

The effects of noise on health have long been known, and there exist numerous grass-roots campaigns to limit excessive noise from a number of sources. Many of these campaigns have had success in changing all sorts of legislation. Activities that develop an awareness of one's immediate "sound environment" can be easily overlooked in the curriculum, but even the simplest experiments, such as the one below, can be very effective in raising children's awareness of and interest in their "sound environment".

PREPARATION

You will need:

- Access to resources from Appendix H
- 2 chime bars (with mallet) of contrasting pitch for each pair
- 1 woodblock (with mallet) for each pair

ACTIVITY

1. Teacher informs the class that they will be undertaking a brief outing around the neighbourhood close to the school. The objective will be to remain silent and pay attention to the ambient (teacher may need to explain this term) sounds that they hear. Teacher asks:
 - How can we classify the quality of a sound – how can we describe the sound? *Answers may include:*
 - * *PITCH* (high and low)
 - * *INTENSITY* (loud and soft)
 - * *DURATION* (long, short, impulsive, sustained, decaying)
 - * *TIMBRE* (rough, smooth, brilliant, muffled, etc)
 - These qualities of sound are written on the board, each at the top of its own column (see example Appendix H).
2. The class takes a walk around an area of the neighbourhood close to the school. The teacher should try to choose a path where there is a variety of contrasting sound sources. Students are to keep an oral or written record of the sounds they hear. This could even include their own footsteps or voices of their fellow students.
3. Upon their return to the classroom, students recount the sounds they heard and these are listed in the first column on the board. They then give a description of the quality of each sound.
4. In the next lesson, students revise the different qualities of sound with the teacher. Teacher asks:
 - How does the acoustic environment affect any of these qualities of sound? (e.g. sounds have a longer duration when created inside a large hall; sounds with a low pitch are heard more easily through the ground or the water; in the open air, we hear higher pitched sounds more easily than lower ones)
 - How can we test this?
5. Students are put into pairs and are given the chime bars and woodblocks. Teacher asks:
 - The two chime bars are different to each other according to which quality of sound? (answer: pitch)
 - The woodblock is different to the chime bars according to which quality of sound? (answer: timbre, possibly duration)

ACTIVITY 9

ACOUSTICS continued ...

6. Instructions for the experiment (to be undertaken in pairs) are given:

- Find a specific acoustic environment - this can include: a long corridor; an empty school hall; the library (if permission given!); a hard-surface court such as a basketball court; a grassed oval or playing area; the footpath outside the school.
- One member of the pair (student A) is to stay in the one spot with the chime bars and woodblock. The other (Student B) will be gradually moving further away and keeping a record of the sound.
- Student B sits a metre away from student A, who hits the first chime bar softly. Student B keeps a record of the duration of the sound, then moves to around five metres away. The step is repeated (student A must ensure he / she hits the bar with exactly the same force each time) and the duration is recorded again. Repeat the step, adding around five metres to the distance each time, until the chime bar cannot be heard. Note the distance at which the chime bar ceases to be audible.
- Repeat this task with the second chime bar.
- Repeat this task with the woodblock.
- Now conduct the experiment again under exactly the same conditions, but in a contrasting acoustic environment from the list above. This time, also keep a note of a change in intensity between the two acoustic environments.

7. Teacher gathers the students back in the classroom and the results are tallied on the board. Teacher asks:

- Which of the three instruments could be heard from the furthest distance?
- In which acoustic environment were you able to hear the instruments most clearly?

EXTENSION ACTIVITY

Understanding the nature of different acoustic environments can enable students to analyse the noise levels and acoustic design of their own home and school environments. Have students undertake a noise level audit of learning areas such as classrooms and libraries and see if they can find solutions where there are excessive noise problems. Refer to Appendix H for resources and ideas on how to improve “sound hygiene”.

ACTIVITY 10 THEREMIN

Hand built, early electronic circuitry powers spinning sirens, rotating loudspeakers, mechanical arms and machines. A complex system of electronic noise machines and devices brings the vast empty top floor of the mill to life with humming, crackling, whirring electronic noises and sirens.

Description of Ray Lee's *The Theremin Lesson*, www.invisible-forces.com/frame-trp-thereminlesson.htm

Students can gain a deeper appreciation of Ray Lee's work by comparing *Siren* to an earlier work, *The Theremin Lesson*. This work has similar features to *Siren*, particularly in its adoption of older, "lo-fi" technology, which in this case is the *Theremin*. This unusual instrument was invented in the Soviet Union in 1922 and has gone through waves of popularity. It is distinctive in that it is one of the first electronic musical instruments, and is said to be the only instrument that can be played without being touched. Reading the story of its inventor, Leon Theremin (described in article 3 in Appendix I), it is possible to argue that his life was even more interesting than his instrument! Besides teaching about the Theremin, the following activity also introduces or revises the concept of categorisation of musical instruments.

PREPARATION

You will need:

- Items from Appendix I as required
- Computer projector and speakers

ACTIVITY

1. Teacher-led discussion:

- What are the various ways we can create music with instruments? (*suggestions may include hitting, plucking, strumming, bowing, blowing, singing, various techniques with computers or technology*)
- How can we group or categorise all these ways of making music? (*Students will most likely be drawn to traditional classifications such as aerophones, chordophones, and so on*)
- Most of these instruments are played through a specific type of physical contact. Is there an instrument that is played without touching at all?
- If you were asked to create an instrument that is played without touching, how would you make it? (*Class may discuss various design ideas at this point*)

2. Teacher tells the class that they will be seeing an instrument that is played without touching, then shows the Theremin video from Appendix I. When finished, teacher asks:

- Have you seen this instrument before?
- How do you think it works?
- How would you describe the sound that it makes?

3. Students are given/shown printed material on the history of the theremin, then shown video/audio examples of how the Theremin has been used in different genres of music (including Ray Lee's work *The Theremin Lesson*), both from Appendix I.

4. Students revisit the classification step from earlier in the activity and discuss where the Theremin might fit in various methods of musical instrument classification.

EXTENSION ACTIVITY

Students (with teacher supervision) can search via the internet for instructions on making their own Theremin (many such sites exist). Students can try to make their own in class.

ACTIVITY 11

SPIN

Sometimes you smile, sometimes you frown

Oh babe I go up and down

My heart spins round and around

I'm walking on air

I get nowhere

You keep me swingin' (Fisher/Hare); recorded by Matt Monro as "Fred Flange" on the Peter Sellers album *Songs for Swinging Sellers* (1960)

Spinning is a movement that can be fascinating in terms of physics, particularly in the way that it can distort force and energy in a number of ways. The Doppler Effect is created through spinning action and movement. Along with overtones and harmonics, Ray Lee's works rely on and use the Doppler Effect to create distinctive sounds. A scientific definition of the Doppler Effect is given in Appendix J, and it is worthwhile for classes of any year level to gain an understanding of how it works through fun experiments, such as the one below. This activity can be taught immediately before or after a visit to the installation *Siren* for maximum effect.

PREPARATION

You will need:

- Resources from Appendix J
- Prepared fan experiment for demonstrating Doppler Effect (refer item 3 in Appendix J)
- Library/computer lab with internet access

ACTIVITY

1. Teacher writes the word "spin" in a circle in the middle of the board. Students are instructed to form groups and come up with as many meanings as possible for the word "spin". While they are working on this task, teacher comes around to each group and directs them to write one of their findings on the board in the form of a mind map (example given Appendix J). There should be around 6 - 10 findings listed.
2. In another part of the board, the teacher writes the word "distortion". Students are asked for a definition of this word, then the teacher explains that where there is spin, something is consequently distorted. Students are instructed to return to their groups and come up with an explanation as to how their group's meaning for the word "spin" relates to distortion.
 - *Eg. Political spin or spin doctoring means that the truth is distorted.*
 - *When you feel dizzy (ie your head is "spinning") your senses are distorted.*
 - *The spinning of a top is able to "distort" gravitational forces so that it remains upright.*
3. Teacher now asks:
 - What is an example of sound being distorted by spin? (possible answers may include reference to the bullroarer from the earlier activity)
 - How is it that sound can be distorted by spinning or movement?
4. Teacher directs students to research the Doppler Effect through printed resources and / or by following the links suggested at item 2 in Appendix J.
5. Class undertakes fan experiment prepared by teacher, as described at item 3 in Appendix J.

EXTENSION ACTIVITY

Watch the video of Ray Lee's *Siren* (refer Appendix B). How are movement, spin, and the Doppler Effect used by the composer in this work?

ACTIVITY 12

CREATE A RAY LEE INSTALLATION!

Emergency! Ray Lee has just been commissioned to create a brand-new installation for the Melbourne International Arts Festival in 2010, but the impossible has happened: he is out of action and unable to meet the deadline. With your knowledge of Lee's works and his successes all over the world, you are perfectly placed to take the first creative step towards producing his next show, following the Ray Lee tradition.

Students who have experienced Ray Lee's installations, including *Siren*, may be inspired to create their own. Offering the above scenario can be a fun way of stimulating their creative ideas, as well as getting to understand other sound and music installations from other composers.

PREPARATION

You will need:

- Access to internet OR printouts of summaries of Lee's various works (refer Appendix K)
- Sound samples from other Ray Lee installations (refer Appendix K)

This activity should ideally be completed after students have been exposed to *Siren* at the Melbourne International Arts Festival.

ACTIVITY

1. Teacher asks the students what they noticed about *Siren* that makes it different to other musical performances they have seen. Answers may include:
 - *It was long and sustained, (rather than being a finite performance)*
 - *The sound was created without using musical instruments*
 - *The audience was able to move around the performance space*
 - *Movement and its relation to the sound were part of the performance*
2. Students are then asked about their understanding of an installation as opposed to a conventional musical performance:
 - How is it different?
 - Is it closer to an exhibition as in the visual arts, as opposed to a concert?
3. Students to read through the summaries of Ray Lee's other works (refer Appendix K). Teacher asks: *What are the elements in common between these works?* Answers are discussed and listed on the board.
4. The scenario in the introduction to this activity is read to the students. Class is formed into groups, who are to discuss the common elements to Ray Lee's works and come up with a proposal for the next Ray Lee installation. Groups should consider:
 - *Lee's use of "older" technology (Theremins, sirens, loudspeakers, organs)*
 - *The importance of movement as part of the performance, both in a visual and sound-producing sense*
 - *An emphasis on the quality of sound, its components, and how it is produced (eg overtones, electronic sound, Doppler effect)*
 - *The acoustic quality of the performance space (eg old factories, hangars)*
 - *A performance that is "looped" or sustained*
5. Groups are to present their completed proposals to the rest of the class using verbal explanations and diagrams. Students may even wish to send their written proposals to Ray Lee for his consideration (refer Appendix K).

APPENDIX LIST

P 20	APPENDIX A	ACROSTIC POEM: S I R E N
P 21	APPENDIX B	AIR RAID
P 22	APPENDIX C	EQUAL TEMPERAMENT
P 23	APPENDIX D	OVERTONE SINGING
P 24	APPENDIX E	BULLROARER
P 25	APPENDIX F	MANIPULATING DIGITAL SOUND
P 26	APPENDIX G	DIGITAL VS NATURAL SOUND
P 27	APPENDIX H	ACOUSTICS
P 28	APPENDIX I	THEREMIN
P 29	APPENDIX J	SPIN
P 30	APPENDIX K	CREATE A RAY LEE INSTALLATION!

APPENDIX A

ACROSTIC POEM: S I R E N

1. MEANING OF SIREN

noun 1 a device that makes a loud prolonged signal or warning sound. 2 *Greek Mythology*: each of a number of women or winged creatures whose singing lured unwary sailors on to rocks. 3 a woman who is considered to be alluring but also dangerous.

ORIGIN: originally denoting an imaginary type of snake: from Greek *Seiren*

Compact Oxford English Dictionary

See further:

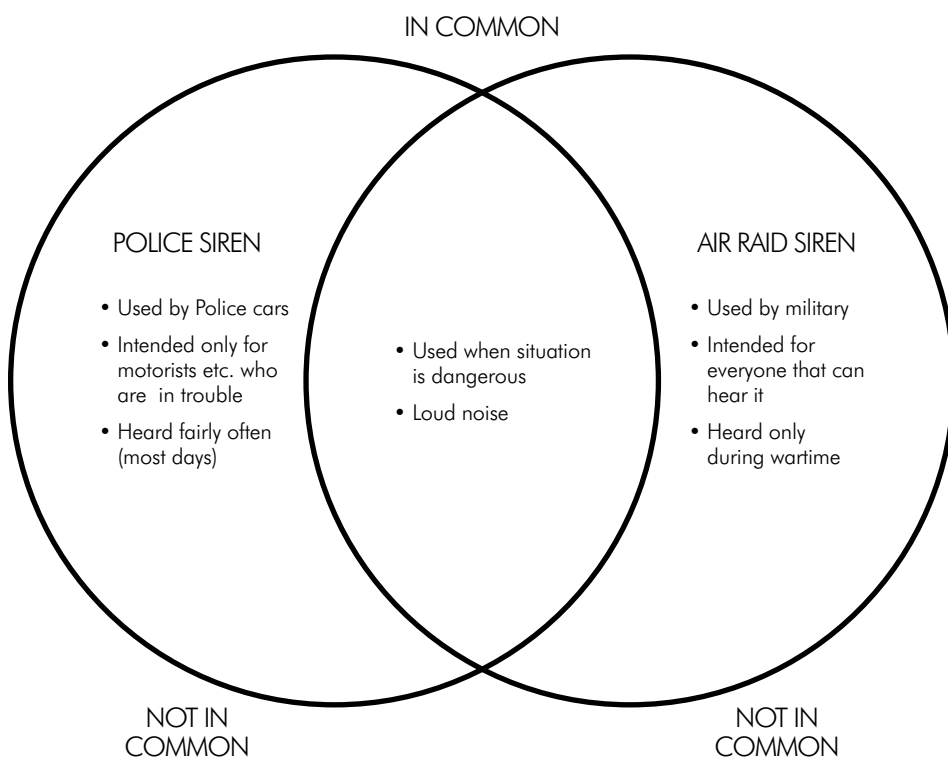
<http://en.wikipedia.org/wiki/Siren>

[http://en.wikipedia.org/wiki/Siren_\(noisemaker\)](http://en.wikipedia.org/wiki/Siren_(noisemaker))

http://en.wikipedia.org/wiki/Civil_defense_siren

[http://en.wikipedia.org/wiki/Siren_\(amphibian\)](http://en.wikipedia.org/wiki/Siren_(amphibian))

2. VENN DIAGRAM SAMPLE



3. SAMPLE ACROSTIC POEM

Sometimes, I hear a noise
Incessantly droning
Repetitive and piercing; it says:
Everything is
Not all right

APPENDIX B

AIR RAID

AUDIO CLIPS

1. "Warning"
www.bbc.co.uk/schoolradio/history/worldwar2audioclipslibrary_clip02.shtml
2. "All clear"
www.bbc.co.uk/schoolradio/history/worldwar2audioclipslibrary_clip20.shtml
3. Air raid in progress
www.bbc.co.uk/schoolradio/history/worldwar2audioclipslibrary_clip09.shtml
4. London during the air raid
www.bbc.co.uk/schoolradio/history/worldwar2audioclipslibrary_clip10.shtml
5. Fire engine during London fires
www.bbc.co.uk/schoolradio/history/worldwar2audioclipslibrary_clip11.shtml
6. A bomb survivor describes her experience
www.bbc.co.uk/schoolradio/history/worldwar2audioclipslibrary_clip13.shtml
7. Sheltering in London's tube stations
www.bbc.co.uk/schoolradio/history/worldwar2audioclipslibrary_clip14.shtml

STARTING POINTS FOR RESEARCH ON AIR RAIDS IN WWII

www.bbc.co.uk/ww2peopleswar

www.bbc.co.uk/ww2peopleswar/about/lzone_lessonplans.shtml

INFORMATION ABOUT RAY LEE'S SIREN

Text: www.invisible-forces.com/frame-siren.htm

Video: www.invisible-forces.com/ray%20lee%20-%20downloads.htm

ARTICLES ON AIR STRIKES IN THE IRAQ WAR

www.commondreams.org/search/commondreams?cx=002299596031389324112%3Aodhtzdyi_ja&cof=FORID%3A9&query=air+raid+iraq&op=Search&form_id=google_cse_results_searchbox_form#892

APPENDIX C

INTONATION AND TEMPERAMENT

1. EXPLANATIONS OF JUST INTONATION AND EQUAL TEMPERAMENT

(some quite technical explanations)

http://en.wikipedia.org/wiki/Just_intonation

www.yuvalnov.org/temperament/

(also links to other student-friendly explanations about music and sound)

www.pragmaware.net/articles/harmony/index.php

2. EXPLANATIONS OF “PERFECT” INTERVALS

http://en.wikipedia.org/wiki/Perfect_fifth#The_pitch_ratio_of_a_fifth

3. HISTORY OF THE PIANOFORTE AND ITS TUNING

www.pianoforteonline.co.uk/piano_history.htm

http://en.wikipedia.org/wiki/Piano_tuning

APPENDIX D STIMMUNG

1. IMAGE OF TWO WAVES THAT ARE NOTES OF A PERFECT OCTAVE

<http://cnx.org/content/m10862/latest/octavewaves.png>

Similar content on the same site, recommended to teachers for studying this material: <http://cnx.org/content/m10862/latest/>

2. LINKS TO AUDIO EXTRACTS OF “THROAT” AND OVERTONE SINGING

http://en.wikipedia.org/wiki/Overtone_singing#External_links

http://www.youtube.com/results?search_query=overtone+singing&search_type=&aq=f

3. EXTRACT (40 SECONDS) AND INFORMATION ABOUT STIMMUNG

<http://www.bl.uk/onlinegallery/features/breakingtherules/events.html#stimmung>

<http://en.wikipedia.org/wiki/Stimmung>

4. INFORMATION ABOUT KARLHEINZ STOCKHAUSEN

http://en.wikipedia.org/wiki/Karlheinz_Stockhausen

APPENDIX E BULLROARERS

1. INSTRUCTIONS ON HOW TO MAKE A BULLROARER

www.sodbuster.com/kids%20Articles/KID102097JC.htm

2. INFORMATION ON BULLROARERS

[http://en.wikipedia.org/wiki/Bullroarer_\(music\)](http://en.wikipedia.org/wiki/Bullroarer_(music))

3. BULLROARER VIDEO

www.google.com.au/search?hl=en&q=bullroarer+video&btnG=Search&meta

APPENDIX F MANIPULATING DIGITAL SOUND

1. TUTORIALS FOR USING AUDACITY

www.youtube.com/results?search_query=audacity+tutorial&search_type=&aq=0&oq=audacity

2. INSTALLING AUDACITY

<http://audacity.sourceforge.net/download/>

3. USEFUL SITES FOR DOWNLOADING SOUND EFFECTS -

www.mediacollege.com/downloads/sound-effects/

www.partnersinrhyme.com/pir/PIRsfx.shtml

www.pachd.com/sounds.html

APPENDIX G

DIGITAL VS NATURAL SOUND

1. STARTING POINTS FOR RESEARCH ON AUDIO FORMATS

http://en.wikipedia.org/wiki/Audio_format

http://en.wikipedia.org/wiki/Gramophone_record#External_links

2. GOOD STARTING POINTS FOR A DISCUSSION ON THE COMPARISON OF DIGITAL AND ANALOG SOUNDS (THE “AUDIOPHILE DEBATE”)

Online worksheet:

<http://electronics.howstuffworks.com/digital-versus-analog.htm/printable>

Google search:

www.google.com.au/search?q=argument+digital+natural+sound&ie=utf-8&oe=utf-8&aq=t&rls=org.mozilla:en-US:official&client=firefox-a

APPENDIX H ACOUSTICS

1. Qualities of sound example

SOUND	PITCH	INTENSITY	DURATION	TIMBRE
Footsteps	Medium/Low	Soft	Short	Muffled
Bird Song	High	Soft	Impulsive	Smooth
Mechanic Workshop	High/Medium	Loud	Long And Short	Sharp, Metallic
Plane Overhead	Medium/Low	Loud	Sustained	Muffled

2. Resources about noise and “sound hygiene”

www.nonoise.org

www.quietclassrooms.org

APPENDIX I THEREMIN

1. SOME INTERESTING SUGGESTIONS FOR CLASSIFICATION OF INSTRUMENTS

http://en.wikipedia.org/wiki/Musical_instrument_classification

2. THEREMIN DEMONSTRATING HIS INSTRUMENT

www.youtube.com/watch?v=w5qf9O6c20o&feature=Playlist&p=6811F7FE13247A8F&index=0

3. HISTORY OF THE THEREMIN

www.moogmusic.com/history.php?cat_id=2

4. CONTEMPORARY QUOTES ABOUT THE THEREMIN (OPTIONAL TO DISTRIBUTE)

www.thereminox.com/story/27/

5. MUSIC SAMPLES USING THE THEREMIN

Good Vibrations:

www.youtube.com/watch?v=TCeD_6Y3GQc

Whole Lotta Love:

www.youtube.com/watch?v=TZ62jmdjVDk

Day the Earth Stood Still (trailer):

www.youtube.com/watch?v=OfpSXI8_UpY

Forbidden Planet (trailer):

www.youtube.com/watch?v=ErFsW4-FDWw

Ray Lee's The Theremin Lesson:

<http://www.invisible-forces.com/frameset-downloads.htm>

APPENDIX J

SPIN

1. MULTIPLE MEANINGS AND ASSOCIATIONS OF THE WORD “SPIN” (NOT AN EXHAUSTIVE LIST)

[http://en.wikipedia.org/wiki/Spin_\(disambiguation\)](http://en.wikipedia.org/wiki/Spin_(disambiguation))

2. EXPLANATIONS OF DOPPLER EFFECT

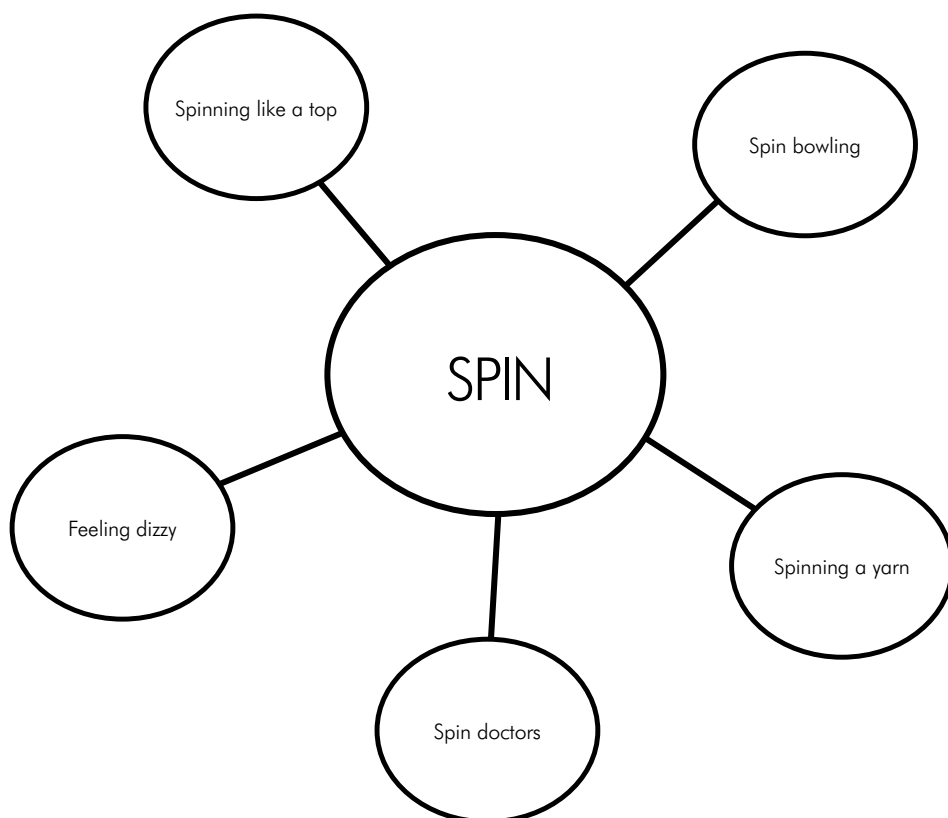
www.school-for-champions.com/science/sound_doppler_effect_equations.htm

www.physics.ubc.ca/~outreach/phys420/p420_03/marissa/doppler.htm

3. DESCRIPTION OF DOPPLER FAN EXPERIMENT

www.school-for-champions.com/science/sound_doppler_answers.cfm#Experiment%20talking%20into%20a%20fan

4. MIND MAP



APPENDIX K

CREATE THE NEXT RAY LEE INSTALLATION!

1. LIST AND SUMMARIES OF RAY LEE'S WORKS

www.invisible-forces.com/ray%20lee%20-%20projects.htm

2. SOUND AND VIDEO FILES OF RAY LEE'S WORKS

www.invisible-forces.com/ray%20lee%20-%20downloads.htm

3. CONTACT FOR RAY LEE

ray@invisible-forces.com