Easter Eggs: Hidden Tracks and Messages in Musical Mediums

Weinel, J., Griffiths, D. & Cunningham, S.

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Jonathan Weinel, Darryl Griffiths and Stuart Cunningham
Creative & Applied Research for the Digital Society (CARDS)
Glyndŵr University
Plas Coch Campus, Mold Road, Wrexham, LL11 2AW, Wales
+44 1978 293070
`{j.weinel | Griffiths.d | s.cunningham}@glyndwr.ac.uk`

ABSTRACT

'Easter eggs' are hidden components that can be found in computer software and various other media including music. In this paper the concept is explained, and various examples are discussed from a variety of mediums including analogue and digital audio formats. Through this discussion, the purpose of including easter eggs in musical mediums is considered. We propose that easter eggs can serve to provide comic amusement within a work, but can also serve to support the artistic message of the artwork. Concealing easter eggs in music is partly dependent on the properties of the chosen medium; vinyl records may use techniques such as double grooves, while digital formats such as CD may feature hidden tracks that follow long periods of empty space. Approaches such as these and others are discussed. Lastly, we discuss some software components we have developed ourselves in Max/MSP, which facilitate the production of easter eggs by performing certain sequences of notes, or as a result of time-based events. We therefore argue that computer music performances present unique opportunities for the incorporation of easter eggs. These may occur to the surprise of audiences, performers and composers, and may support the artistic purpose of compositions as a whole.

1. INTRODUCTION

The term 'easter egg' in computer software, refers to a hidden message or component of the programme. The term is derived from the Christian tradition of hunting for decorative eggs during the Easter holiday. Easter eggs in software do not usually have any religious significance, but like the traditional egg-hunt they may be found in concealed places. Usually some kind of special or unusual activity within the software will be required to reveal them. Well known examples include the hidden flight simulator or 'hall of tortured souls' which have been featured in versions of Microsoft's Excel (Figure 1) [1]. The 'hall of tortured souls' is a small 3D game that imitates

the programmers' office, in the style of the video game *Doom* [2]. The hidden game features credits and digital images of the programmers. It is accessed by carrying out a particular series of actions on the 95th row of a blank spreadsheet upon opening Excel.
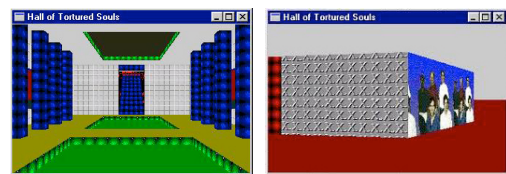

Figure 1. Screenshots from the 'hall of tortured souls', in Microsoft Excel 95.

This paper will consider the purpose and realisation of easter eggs, through consideration of their presence in computer software and other mediums such as TV programmes. This will provide a context through which to also consider the hidden messages in musical mediums as 'easter eggs'. We shall argue that easter eggs can amicably fall somewhere on a continuum between messages for the creators' personal enjoyment, and hidden content which supports and strengthens the message of an artwork. Particular attention will be paid to the methods through which messages can be hidden in musical mediums, and how these necessarily vary according to the potential of the medium in question. For example, we shall see how hidden messages have been placed on vinyl, through unusual groove pressings. We shall also comment upon how hidden messages can be placed within digital formats, such as through the use of image to spectrogram software, backmasking, hidden tracks and timestretching. Finally, we conclude with a brief discussion of our own *Egg Raid* software components, that have been created to facilitate the occurrence of easter eggs in performances with live instruments and electronics. Through the course of this paper, we shall therefore explain what easter eggs are, why composers might like to use them, and demonstrate some possible approaches for doing so.

2. EASTER EGGS IN SOFTWARE

There are countless examples of easter eggs in computer software, which the authors of *The Easter Egg Archive* website are attempting to catalogue [3]. In the 'software' category, these include video games, applications, operating systems and hardware as sub-categories. The con-

tents of these easter eggs varies, but it is fairly common for them to contain developer credits, humorous material, or 'in-jokes'. The inclusion of easter eggs such as the 'hall of tortured souls' seems to stem from the grueling process of software development. The easter egg may have given the programmers some cathartic satisfaction; an opportunity to work briefly on something whimsical and funny, providing release from the more serious aims of the project. The content is certainly personal, creative, and in some ways slightly mischievous[1].

In some cases then, software easter eggs can be seen as a hidden signature, perhaps with a private joke or reference by the author(s). The message of the easter egg may be mysterious, or whimsical. However, in other cases we can see easter eggs which fit more closely with the artistic concept of the main programme. In the video-game *Chip's Challenge* [6] for example, there is a hidden fractal-generating programme (Figure 2). Entering the password 'MAND' into the game reveals a Mandelbrot set, which the user can explore. The main game of *Chip's Challenge* is an action/puzzle adventure, the premise of which is that the nerdy protagonist (Chips McCallahan), must impress his female crush (Melinda the Mental Marvel), by completing over one hundred puzzles, in order to join her 'Bit Buster Club' and win her affections. In the context of the boffin romance of *Chip's Challenge,* the inclusion of the hidden Mandelbrot programme seems like an appropriate easter egg: it fits with the geeky, mathematical theme of the game. In this sense, when the game as a whole is seen as an artwork, the fractal easter egg is perfectly in-keeping.
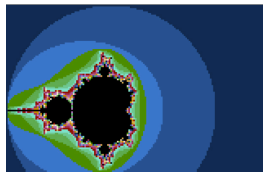

Figure 2. Screenshot of the *Chip's Challenge* Mandelbrot easter egg, on the Atari Lynx.

In the domain of software easter eggs then, we can see at least two types of approach:

1. The humorous, quirky easter egg, which though enjoyable, is unrelated to the main application.

2. The easter egg which corresponds thematically to the main programme, contributing to its artistic form as a whole.

In either instance the main purpose of easter eggs is quite similar to that of an easter egg hunt: they are fun surprises, waiting to be found. For the developers the joy comes from hiding the eggs, mischievously planting them or concealing them in places where they are not expected. The user then becomes the hunter, searching for the eggs or coming across them unexpectedly. The enjoyment comes from the surprise, perhaps eliciting similar emo-

tions to those we may have experienced as children, hunting for easter eggs or playing games such as hide and seek, or peek-a-boo. In the case of category 2 eggs, the surprise is one that also fits with the artistic theme or concept of the main work. As we shall see, many easter eggs may fall somewhere on a continuum between categories 1 and 2.

It should also be noted that while easter eggs may be included in software or video games for the personal satisfaction of developers, who perhaps have a   little extra time towards the end of the development cycle, their presence is not necessarily without commercial value. In video game culture, a select audience group will actively take enjoyment in seeking out all possible secrets that a game holds. For these gamers, good easter eggs add prestige and respect for the developers, which in turn can increase sales of a title[2]. The recent video game *Bioshock Infinite* [8] demonstrates this, featuring a large number of easter eggs [9], including some that specifically utilise audio [10]. Fans of the game invest time in seeking out these easter eggs and evidencing them on YouTube, sustaining the interest provided by the game for the fan-base.

3. EASTER EGGS IN OTHER MEDIUMS

The concept of hiding messages or certain elements within a medium is not exclusive to computer software. The impetus for artists to include personal, hidden or unexpected features in their artwork may be also be considered as an artistic imperative which predates digital culture.

For example, in Michelangelo's *The Last Judgement* painting of the sistine chapel, the pope's master of ceremonies Biagio da Cesena is depicted upon the face of Minos, who is leading the souls to hell, and whose genitals are being bitten by a snake [11]. Cesena had allegedly criticised the painting for containing too much nudity. This mischievous hidden element of the painting could be considered as a form of easter egg.

Other examples can be found in painting, some of which rest upon more tenuous interpretations. For example, Giovanni Maria Pala claimed to have found a hidden musical score in Leonardo Da Vinci's *The Last Supper* [12]. Whether or not Da Vinci deliberately intended this correlation is contestable. It is perhaps inevitable that hidden motifs are easily lost, or hard to verify. Nonetheless these examples illustrate that the notion of an 'easter egg' may be seen as a broader phenomena, extending beyond computer software.

Examples of easter eggs can also be found in TV shows and movies. An example can be seen in the episode "Raisin the Stakes: A Rock Opera in Three Acts" [13], from the animated series *Clone High*. The episode pastiches psychedelic culture and rock musicals such as *The Beatles - Yellow Submarine* [14] and *Pink Floyd - The Wall* [15] movies. In the episode, one of the characters is intoxicated, falls through a roof, and speaks backwards.

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[1] Perhaps the best example of a mischievous easter egg is found in Nintendo's *Wave Race* [4]. This unlocks an abusive commentator [5].

[2] This view of easter eggs in software was also supported by private correspondence with members of the video games developer Astraware Limited [7].

When the dialogue from this scene is reversed in an audio editor, it is heard as follows:

I am talking backwards and telling you to watch Clone High, and for us to get an Emmy… I'm   saying   that backwards… 'cause it's sneaky!'   [16].

Again, the hidden message seems to be one that is as much for the enjoyment of the creators as for the audience (whom would have to go to some trouble to find out what was said after having watched the episode)[3]. However, the use of this technique fits with the theme of the episode as a whole, which also features reversed graphics elsewhere in order to reflect the psychedelic theme. Thus the reversed dialogue works on multiple levels:

1. Heard normally, the incomprehensible dialogue suggests the character's perceptual derangement, which can be attributable to psychedelic intoxication and injury.
2. It also relates to the psychedelic theme of the episode, since reversed tape techniques ('backmasking') are a recognisable motif in psychedelic music (for example, *Tomorrow Never Knows* by The Beatles [17]).
3. The audio also parodies the subliminal satanic messages that were supposedly hidden in heavy metal records (and revealed when played backwards)[4].
4. When decoded, the message does not relate directly to the narrative of the episode, and could be seen as a private joke for the creators. However it also addresses the audience, breaking the 'fourth wall'. This is a technique used occasionally in other episodes for comedic effect. Thus the decoded message does not directly relate to the episode, but does relate to the conceptual approach of the series more broadly.

The episode therefore illustrates the possible use of easter eggs to establish a variety of effects for the writers and audience. Some of these effects can occur synchronously within the main diegesis of the work, but others may also occur asynchronously outisde of it. In general, we can see that easter eggs may exist for the personal satisfaction of the creators, but may also support the artistic purpose of the work as received by the audience. Notably, audio provides specific possibilities for carrying these hidden messages, and we shall now turn to look specifically at easter eggs in musical mediums.

4. EASTER EGGS ON VINYL

4.1 Locked Grooves

In recorded music, there is a significant tradition of including hidden material. How this hidden material is concealed, is somewhat dependant upon the format in question. For example, on vinyl material may be hidden through the use of locked grooves (grooves which cause the turntable to play an endless loop). Locked grooves containing music are not a normal feature of records. Most records will only contain a silent locked groove to prevent damage to the needle when it reaches the end of a side. The presence of a locked groove that contains music would be difficult to detect without prior knowledge or careful visual inspection of the grooves. Therefore, a music-containing locked groove has a good chance of surprising the listener during the performance of the recording.

A relatively well-known example is found on the vinyl version of The Beatle's *Sgt. Pepper's Lonely Hearts Club Band* [18]. On the final track "A Day In The Life", a looked groove is heard at the end of the song. Certainly this may come as a surprise for some listeners when encountered for the first time. Even if the listener knows about it, he or she may still experience a break from the usual process of listening to a record. For example, when the record reaches this locked groove, the listener must decide at what point the composition is over (or when they have had enough). In some situations this locked groove may surprise the listener in other ways; for example, if he or she fell asleep during the record, the locked groove may confuse them upon awakening. For "A Day In The Life", it is reasonable for us to consider the locked groove as an easter egg because it has this potential to surprise the listener[5]. In the authors' opinion we should also consider the incorporation of this unexpected element, which occurs through specific utilisation of the medium, to be part of the artwork as a whole.

4.2 Inverse Grooves

Another easter egg example can be found on the Nomex track: "Gorf Beat One", from the *Praxis U.S.A.* EP [19]. This compilation contains tracks by four different artists, working within the genres of hardcore techno, breakcore and noise. Upon placing the needle on side B1: "Gorf Beat One" by Nomex, the needle flops off onto the turntable platter, making an unpleasant noise. It may take several attempts before realising that the groove for the Nomex track is pressed backwards. To play it one must place the needle at the point where you would expect the track to end. Figure 3 illustrates the movement of the needle on records such as "Gorf Beat One" that have inverse grooves.

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[3] Note that the episode was first aired in 2003, before the arrival of YouTube in 2005. Today the passage can be more decoded more easily, by searching YouTube.
[4] For example, the 1980s court cases with AC/DC and Judas Priest. These bands were accused of incorporating subliminal satanic messages in their music through backmasking.

[5] It should be noted however, that the concept of 'easter egg' may not be less applicable to records such as DJ tools, where the inclusion of locked grooves is sometimes advertised as the explicit function of the product.
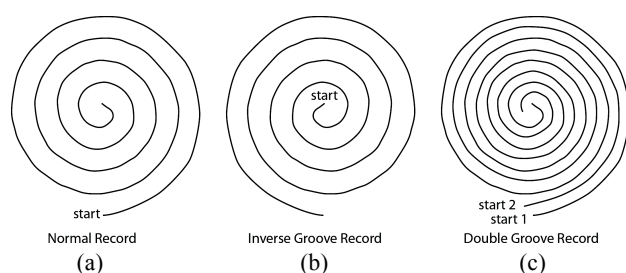
Figure 3. Diagrams showing the arrangement of normal (a), inverse (b) and double grooves (c) on vinyl records.

The use of an inverse groove on this particular track of the *Praxis U.S.A.* EP*,* seems entirely appropriate. The Nomex track in question is the most noise-orientated track on the EP, consisting predominantly of white noise. The use of an inverse groove seems to add a suitably antagonistic element of surprise to the experience of listening to the record. It does not appear to be accidental that the inverse groove is quite likely to create some additional noise when it throws the unsuspecting listener's needle off the platter!

Adam Kempa's blog [20], discusses the use of inverted grooves, referring to other examples. The artistic motivation for using inverted grooves is obvious on tracks such as Reese – *Inside Out* [21]. On others such as Megadeth's *Sweating Bullets* [22], the cover sleeve reads:

"Paranoid pressing on blue vinyl. Warning: do not attempt to play this record in the conventional manner! Both sides reverse play, from the inside groove outwards."

The inverse grooves are congruous with Mustaine's lyrics about madness and paranoia. Just as the lyrics deal with being at odds with the world, so too is the groove running the opposite way to that which we might expect. To emphasise this point, the chorus of *Sweating Bullets* includes the lyrics: *"I'm in trouble for the things I haven't got to yet"*. Thus, the use of inverse grooves mirrors the reverse notion of time in the song. However, since the record sleeve advertises the inverse groove, the element of surprise is perhaps diminished. In this case it seems reasonable to assume that the inverse groove is also used as a marketing gimmick; a means to create a more exclusive limited edition version (in combination with the use of blue vinyl).

4.3 Double Grooves

Related to inverse grooves, there is also the unusual use of the 'double groove' (also known as 'parallel grooves' or 'multi-sided records' [23]). As shown in figure 3, 'double grooves' are records where two grooves run simultaneously through a record, causing the needle to play different material depending where it is initially placed (the additional groove is sometimes called a 'third side'). Again, the element of surprise seems to be the main motivation for using this approach, which is found on rec-

ords such as *The Monty Python Matching Tie and Handkerchief* [24]. The Monty Python record clearly aims to deceive, surprise and delight using this method; the LP sleeve also takes a similar approach by posing as something it is not: a tie and handkerchief set. Mr. Bungle's *Disco Volante* [25], also uses this approach, concealing parallel groove tracks at certain points on the record. In this example, the use of double grooves supports a cryptic theme: "The Secret Song" and songs by "The Secret Chiefs Trio" are amongst those found on the hidden grooves.

4.4 Backmasking

The backmasking technique involves the reversal of sonic material (such as speech) to conceal a message [26], as described previously in the *Bioshock Infinite* and *Clone High* examples.

Backmasking has often been associated with occult practices. It is known that Aleister Crowley encouraged aspiring magicians to train themselves to think backwards using reversed phonographs. Indeed, the term 'occult' by definition refers to 'knowledge of the hidden', and practices such as these, and imitations thereof, have contributed to the affordance[6] of backmasking as a signifier for occult or Satanic practices.

The controversial association of backmasking with Satanism reached its height in the 1980s, when it was alleged that rock artists such as AC/DC had placed 'subliminal' backmasked messages within their music. Though the effectiveness of these supposed subliminal messages was largely dismissed, many other artists have used backmasking and reverse techniques in their work. Often this is used for the aesthetic results of reversing audio, as in musique concrète. In other cases, artists such as Marilyn Manson have used backmasking to signify the established cultural connotations with Satanism. Today though, the technique is perhaps most commonly used on vocals for radio-friendly edits of pop music to conceal swear words.

It was more laborious to produce music that contained backmasking techniques with earlier analogue recording equipment, than it became with the arrival of digital audio editors. However, almost any turntable can be used to hear what a passage of vinyl sounds like backwards, simply by manually winding the record in reverse[7]. When CD became the dominant format for consumers, it would have been more difficult for the average listener to easily decode backmasked messages, without the aid of a computer and digital audio editor or sampler. For iPod listeners, these messages may not be easily unveiled either. However, since the advent of YouTube, the majority of decoded backmasking can be found without the listener having to process the audio themselves, provided

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[6] Use of the term 'affordance' here refers to DeNora's discussion regarding the potential for sound to afford particular interpretations for audiences [27].

[7] Various modern turntables also feature a 'reverse' function that facilitates this.

internet access to this website is available. Thus, shifts from analog to digital formats can be seen to suggest different ways of hiding easter eggs in music, and also of discovering them. With this in mind, we shall look now towards other techniques for hiding messages in digital formats.

5. EASTER EGGS IN DIGITAL AUDIO

5.1 Hidden Tracks

Within digital formats the most common easter eggs are found in the form of hidden tracks [28]. These are found on many popular music CDs, where they may be concealed using a variety of methods. For example: Marilyn Manson's *Antichrist Superstar* [29] contains 99 audio tracks. The main album is contained on tracks 1-16, tracks 17-98 are silent and track 99 contains the hidden track. In other examples, a hidden track may be included on the last track of an album, after a long period of silence; Nirvana's "Endless, Nameless" begins at 13:51 on track 12: "Something In The Way" of *Nevermind* [30]. Hidden tracks may also appear at the start of an audio CD, such as on Agoraphobic Nosebleed's *Altered States of America* [31], where 'track 0': "Wonder Drug Wonderland" is found by reversing the CD from the beginning of track 1.

Hidden tracks may be used in various ways, though perhaps the main reason for their inclusion is to make use of the spare storage capacity of the medium. CDs can hold up to 80 minutes of music; much longer than the average pop album. Therefore, since outtakes or additional material may be available from the studio recording sessions, it may make commercial sense to include some of that content as hidden bonus material. With limited additional cost for the record company, this adds content that may increase the commercial value of the album as a product.

The contents of hidden tracks varies, though more often than not the hidden track seems to be somewhere to put extra or spare material; whether it is humorous content, a jamming outtake, or some other curiosity. Often the tracks seem to be separated from the main album because they are not serious, and are not part of the 'proper' album. However as with other examples which we have discussed, the hidden track may correspond with the theme of the album. For example, the hidden track that follows Korn's "Daddy" [32] (after a period of silence), is a tape recording of a heated domestic argument between a couple, regarding a car. Ross Robinson, who produced the album claimed to have found the tape recording in an abandoned apartment. In the context of album, the inclusion of this material as a hidden track is both surprising and disturbing, and fits thematically alongside the bands songs about drugs and domestic abuse.

5.2 Hidden Images

More recently, artists have hidden images in the spectral form of their compositions. This can be accomplished using various software packages such as *Photosounder* [33] or *Virtual ANS* [34], the latter of which is based on the ANS synthesizer, created by Evgeny Murzin from 1938 to 1958 [35]. Perhaps the most famous modern example of this technique is found in Aphex Twin's "Equation" track from the *Windowlicker* CD [36]. Near the end of the track the artist's face appears when the audio is viewed through a spectral analyser (Figure 4, a). This technique has also been used by other artists, such as Venetian Snares, whose track "Look" from *Songs About My Cats* [37] contains spectral images of his cats (Figure 4, b).

Both examples conform to the easter eggs model discussed throughout this paper; they are personal, hidden signatures by the artists, which are also slightly humorous curiosities. They also correspond well with the artistic themes of the respective works; for example, Aphex Twin is known for incorporating his face into the album images and music videos that accompany his work, and this is also explored in the *Windowlicker* music video produced by Chris Cunningham. The approach is interesting since it affects the sounds that are heard when listening to these sections; the contours of the images affect the tonal properties of the sounds, though without spectral imaging it is very unlikely that the message would be discernable through sound alone.
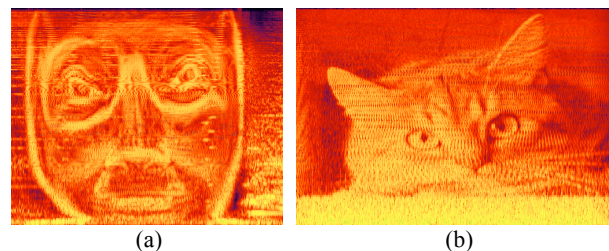

Figure 4. Spectral images hidden in music: (a) a face hidden in Aphex Twin's *Equation* track, (b) Venetian Snares' *Look* track, showing photographs of the artist's cats.

Related examples of images hidden in music can be found elsewhere. For example, the recent 'black midi' Internet meme involves the composition of MIDI tracks that contain as many notes as possible [38]. Examples of black midi tracks usually contain several million notes, and appear as a mass of black notes when viewed in stave notation; hence the 'black midi' term. Once created, black midi compositions are played back on software such as *Synthesia* [39], which may then fail in the process of attempting to reproduce the unusually large number of notes[8]. Screen capture videos of this process are recorded, and then shared on sites such as YouTube. As black midis incorporate a visual element, 'blackers' (the authors of black midi tracks) may incorporate hidden images within the MIDI score (Figure 5).

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[8] Black midi can therefore be considered in terms of glitch aesthetics, as discussed by Kim Cascone [40].
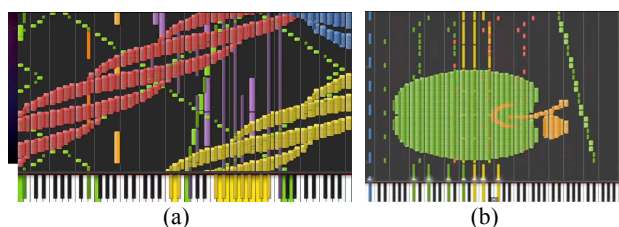
Figure 5. Visual patterns hidden in MIDI files: (a) patterns in *Shanghai Teahouse* [41], (b) *Bad Apple* [42].

5.3 Time-stretching

Timestretching of sonic material is an established technique of musique concrète, and electroacoustic music. Composers such as Pierre Schaeffer made use of various time-stretched materials, such as dog barking sounds, which become unrecognisable when time-stretched. These sounds are not usually discernable when the music is heard normally, but can be restored through audio processing. Schaeffer may not have specifically intended the concealed source material to be seen as 'easter eggs'. Nonetheless, timestretching can be considered as a possible technique for creating easter eggs.

In Weinel's electroacoustic composition *Direct Telepathic Transmission from Mars* [43] a time-stretched sample is used, which was taken from Iggy Pop's howling scream at the start of The Stooges *TV Eye* [44]. Since the material was stretched to approximately 200x the length of the original clip, the original material is unlikely to be recognised by the listener without prior knowledge. The material was chosen for its tonal qualities, but also provides a mischievous personal satisfaction for the composer, by knowing it is there.

Examples are also found in video game culture; the *Bioshock Infinite* example referred to previously, contains various audio easter eggs produced through use of timestretching. A similar example which could also be considered an easter egg is found in the Nintendo Game Cube start-up menu, which is revealed to be the same theme as the Nintendo Famicom start-up menu, when the audio is sped up by 16x [45].

As with spectral imaging and backmasking, timestretching provides a method through which source material can be translated into sound, in such a way as to hide the original source material from the listener. Even though the source is hidden, these processes affect the 'undecoded' sounds that the listener hears. However, the processes are also reversible, and the source material can subsequently be revealed.

5.4 Easter Eggs in Performance Software

Easter eggs can also be hidden in software devised for the performance of computer music. For example, Weinel included an easter egg in a piece of performance software that he programmed in Max/MSP as part of a collaborative project [46]. Corresponding with the title of the composition: *Mutations (megamix)*, the software includes an easter egg. When the user clicks on the 'info' button in the patch, and scrolls down the page, there is a transparent button that is barely visible. Clicking the button

produces an endless loop of a sample from the movie *Waterworld*, [47], in which a character shouts "*Mutation! He's a Mutant!*". The looped sample can be processed using the same MIDI controlled effects processing that is used for the main patch.

Our paper has now travelled full-circle, and returned to a discussion of easter eggs in software. Software offers an an inherently greater scope for easter eggs, due to the flexibility of programming languages. In language such as Max/MSP and Pure Data, it is possible for us to conceive of various live computer music performances that incorporate easter eggs. In the next section, we shall demonstrate other ways this may occur, by discussing our *Egg Raid* software.

6. EGG RAID

Egg Raid is a Max/MSP patch we have developed, that includes software components for creating easter eggs. The current version of the patch demonstrates two methods through which easter eggs can be incorporated into real-time computer music performances. The software components can be reused in other patches to facilitate easter egg surprises for the composer, performer and/or audience members.

Figure 6 shows the user interface for *Egg Raid*; a midi keyboard provides the main user input, and on the surface, the software appears to be a simple piano patch.

Figure 8 shows the hidden functionality of the patch. Notes that are played on the keyboard are filtered through a 'Pattern Recognition System', which recognises and sends a trigger message when certain pre-determined sequences of notes are played. This trigger causes unexpected sounds to emit from the 'Easter Egg Sound Generation' module. These include various audio samples related to eggs from popular music and film.

The patch also incorporates a 'Discordian calendar'[9], which uses the computer's clock to send trigger messages on dates of the year that are significant in the Discordian calendar, and on each 23rd of hours, minutes and seconds. The calendar triggers separate banks of easter egg sounds, which contain hidden spectral images of Discordian symbols (Figure 7).
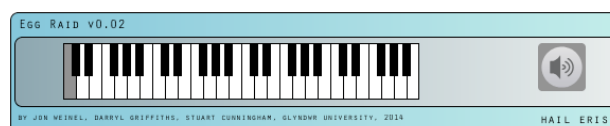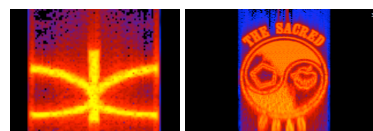

Figure 6. User interface for *Egg Raid* software.

Figure 7. Spectral images of Discordian symbols in *Egg Raid*.

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[9] Discordianism is a religious or philosophical movement, sometimes considered a parody religion, which venerates Eris, the goddess of chaos in ancient Greek mythology [48]. Discordianism has its own calendar, and holds the number 23 as significant.
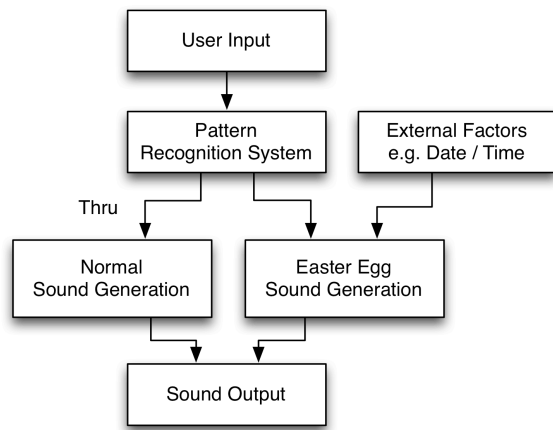
Figure 8. System diagram for the *Egg Raid* software.

7. CONCLUSION

Through the course of this paper we have reviewed some of the approaches used for planting easter eggs and hidden messages within various mediums, with an emphasis on music. The easter eggs discussed all depend upon exploiting the mediums in question. While in computer software a high level of flexibility is possible for integrating unusual features, formats such as vinyl and CD are restricted by the possibilities that are inherent in the medium. Nonetheless, we have seen how easter eggs can add an interesting feature to an artwork, even within such limitations. These features are often novelties or curiosities, which may be fun in their own right; easter eggs need not necessarily serve any greater purpose. However we have also seen how they may serve to support the conceptual themes of an artwork as a whole. While in the authors' opinion, the vast majority of hidden tracks found on CDs offer little more than novelty value, examples such as the Nomex track "Gorf Beat One" are substantially enriched by appropriate use of the medium.

As mediums change, the challenge for artists wishing to hide easter eggs in their work will surely be to find interesting, new and novel places to put them. Mediums such as vinyl are more popular as collector's items today, than as a mainstream medium for music. Yet the fascination and unique experience which can be gained from inverse grooves, locked grooves and double grooves should indeed be seen as one of the reasons why the medium holds continued value, and is worthy of preservation. Since digital formats now dominate the mainstream, artists may need to think 'outside the box' in order to hide their easter eggs. Spectrograms, backmasking and timestretching show possible approaches, where the undecoded sounds of the music are also affected. We have also demonstrated how live performance software can incorporate easter eggs, through our *Egg Raid* software, for example.

Finally, since easter eggs are being catalogued by sites such as *The Easter Egg Archive* and the users of YouTube, there may be a greater likelihood than ever before that easter eggs will be discovered and shared among audiences. The value that they can add to an art-

work will not necessarily go unnoticed, and composers may therefore consider it worthwhile to add them to their work. Indeed, as listeners we may also wish to 'keep an eye out' for easter eggs which may be out there, waiting to be discovered.

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