Introducing the CDP Sound Transformation Programs

Release 8 (MAC / PC)

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Music is a vast cornucopia of wonders. There are many approaches and ways of talking about it. This document aims to set forth our approach and terminology to help orient you the user. Some concepts may already be familiar, but with unfamiliar terminology. We hope that this Introduction will help you to make a connection between the CDP software and your current way of working.

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SECTION 1 – Introduction

The CDP System is designed for the in-depth exploration of the possibilities for sound transformation. The CDP software is all offline processing of soundfiles, not 'realtime', generally from pre-existing 'sampled' sound. It therefore belongs to the *musique concrète* type of electroacoustic music. Much very complex processing can therefore be accomplished in just a few seconds. The emphasis is on the design of sounds, either for fully electroacoustic music compositions or as sound bites or tracks in songs or other media. Many use CDP alongside other software in a hybrid studio environment.

You can use the CDP software via a **Graphical user interface** (GUI) or via a **Command line interface** (CLI), depending on preference and the particular task in hand. The main GUIs available are *Sound Loom* on PC & MAC and *Soundshaper* on PC only. Settings used can be retained as **Presets** and **Patches** (*Soundshaper*) or **Instruments** (*Sound Loom*), or as **batch files / shell scripts** (command line), and re-loaded at another time. The GUIs have mechanisms to keep a text file record of what you do in each working session. Thus the emphasis is on creativity, innovation, awareness of detail, careful building of form and accurate record keeping.

Comprehensive documentation of all the CDP processes is supplied with the program and is also available online.

PARAMETERS

Soundshaper **Parameter Dialogue:**
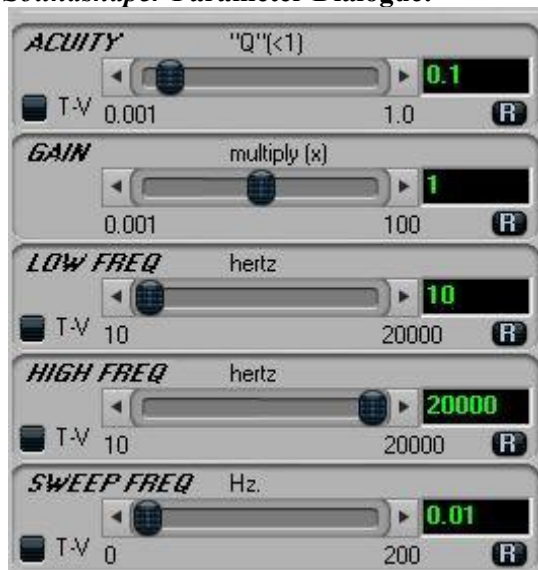
Parameters specify features of a sound that we can alter. In order to work with music on the computer, various features and components of sound have to be identified and given a quantified range of values.

The CDP software provides access to a multitude of detailed sound transformation parameters, which can be set individually and their values known. These parameters can be set with a single **fixed** value, or with **variable** values, either selected randomly within a specified range, or changing over time. (also known as 'automation'). For time-varying data CDP mainly uses **breakpoint** files: text files consisting of a series of *time* and *value* pairs. These can be created in a text editor or by using facilities in the GUIs.

The ability to think about music in terms of parameters is an important skill. They model the components of sound and form the basis of parametric thinking, a new way of dealing with musical ingredients. It can be as simple as UP & DOWN, NEAR & FAR, HOW MUCH & HOW LITTLE along scales of values. Working on music with computers is actually a very physical, experiential activity – and it is the accumulation of experience about what happens that gradually brings it all to life.

'**Parametric thinking**' means discriminating and understanding the physical measures of the features of a sound as it changes over time. Initially this is done in numbers, but as one becomes familiar with sonic features and their effect on us, the thinking becomes more directly poetic and dramatic: they are understood as gesture and as psychological impact.

KEY FEATURES OF A SOUND

The following information summarises the key features of sounds and the core terminology

associated with them.

Time-Domain
The image below shows a *time-domain* signal display.
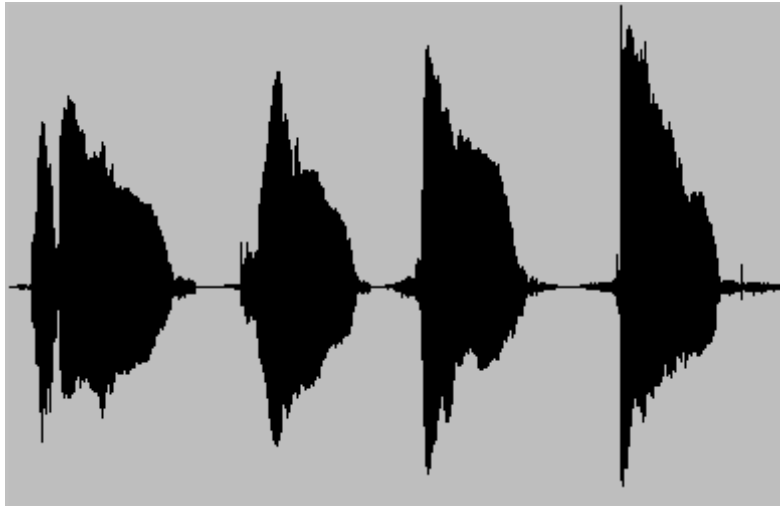
Time (horizontal) + amplitude of samples (vertical)

A *time domain* display of the sound shows **samples**: time units and amplitude levels at that time point. The graphic display shows *time* on the horizontal axis and *amplitude* (loudness) on the vertical axis, positive values above the zero line (speaker cone moving forwards) and negative below (speaker cone moving towards the back). This type of information and display is used for processing **soundfiles**.

Amplitude refers both to the raw shape of a waveform (the height of the peaks and troughs) and also, more importantly, to the range of numbers with which that waveform is represented in the computer. There are many ways of doing this, but in all cases the two key numbers are those which represent silence and the peak (maximum) amplitude. Together these define the *amplitude range* of the signal. To express amplitude, the CDP software uses either the **0 to 1** numerical range or standard Decibels. The value **1.0** defines the peak level, and the value **0.0** signifies silence. Expressed in decibels, this range is **0dB** (full amplitude) or **-96dB** (silence). With 24bit or 32bit audio, dB values can be even lower than -96dB. Our Gain-dB Chart gives an overview of the numerical relationships between gain and dB, and may prove helpful. (See the CDP documentation's CHARTS page, under the EXPLAIN tab.)
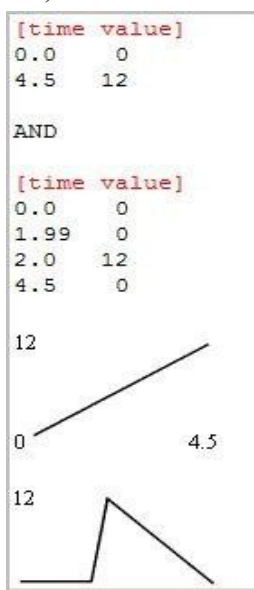

Amplitude changes constantly over time, forming the ***amplitude envelope.*** This term 'envelope' refers not to the value of each digital sample, but to the overall amplitude shape of a signal as it changes over time. This can be represented as a simple *time value* **breakpoint file** – a succession of straight lines over time: a time and a value for every sample. To control the action of parameters over time, far fewer time-points are needed. Thus the term **control rate,** and it is for this that most CDP breakpoint files are used. This will be familiar to many users of DAW editing tools as an 'automation signal'.

Two breakpoint files are shown on the left. They control the movement of pitch in semitones. The CDP software linearly interpolates intermediate values between the user-specified values at different times, creating a ramp between the two values. These examples involve pitch, so the ramp is heard as a glissando, except in the second file between time 1.99 and 2.00, so close in time that the pitch change is virtually simultaneous, i.e., heard as an intervallic leap.

Much of the power of the CDP system comes from the use of such breakpoint files to control some or all parameters of a process, to create a sound that changes over time in a wide variety of ways.

Frequency Domain
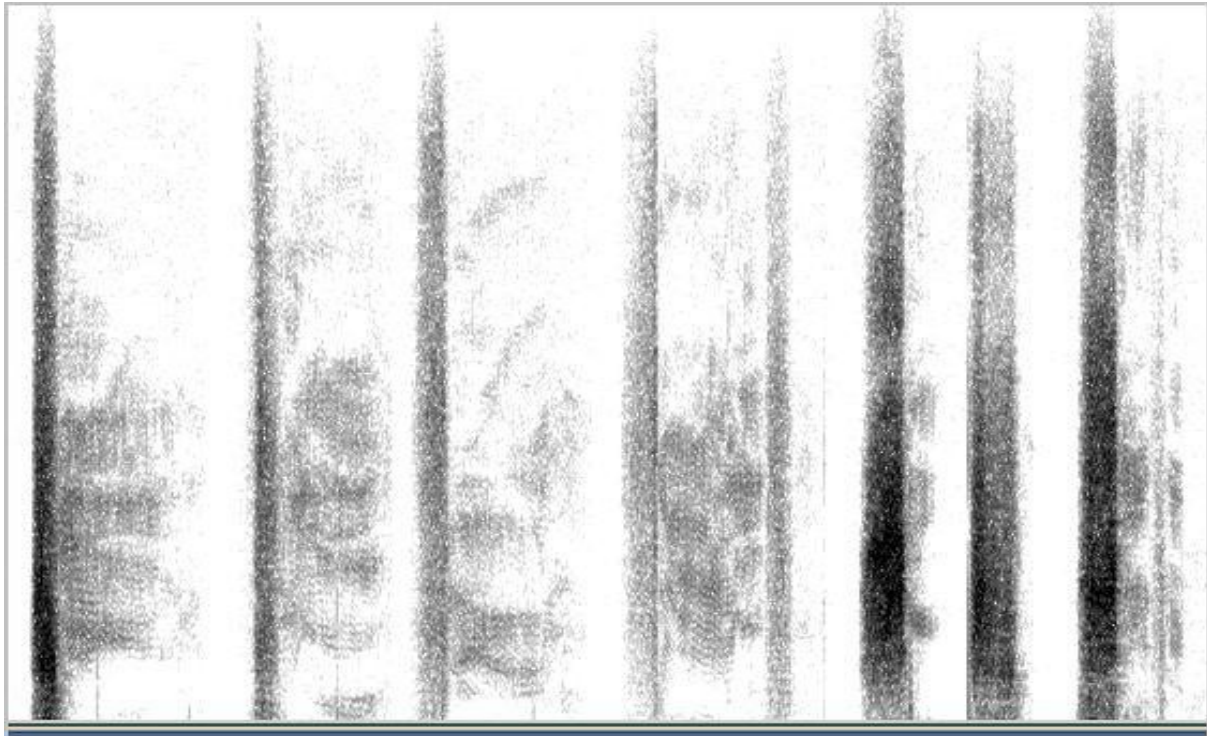
Time (horizontal) + frequencies (vertical)

A *frequency domain* (FFT) display shows **partials** (frequencies) and their **amplitude** levels (processing analysis files)., e.g. in a 3-D display or with colours. The ***sonogram display*** above, from *Sound Loom*, shows **time** along the horizontal axis and the **frequencies** along the vertical axis, with amplitude of the bins shown in a greyscale. This type of information and display is used for processing **analysis files**. Another term for the frequency domain is the *spectral domain*. Analysis files are *converted* from and back to soundfiles with PVOC Analyse and PVOC Synth.

You will find CDP functions for both the *time* and the *spectral* domains. Sometimes they are referred to with these terms and sometimes as **soundfile** or **analysis file** functions.

The spacing of partials in a sonogram depends on whether a linear or a log vertical scale is used (*Audacity* offers both). Partials are **harmonic** if they are integer multiples of the fundamental. The partials are bound together, as it were, into what is perceived as a single pitch. Evenly spaced harmonic partials will only be seen in the log display, corresponding to musical notes. **Inharmonic** partials are fractional (or decimal) multiples of the fundamental and can be perceived more individually, like the different tones in a bell or a gong. The makeup of the partials in a sound and how they come and go over time is known the ***spectral envelope*** and determines the **timbre** of a sound.

KEY CONCEPTS AND TERMINOLOGY

Sample rate: number of **samples** per second with which the physical sound is represented. CD quality is 44100 samples per second. For the highest quality "pro-audio" production, higher sample rates are in common use, such as 96000. In the CDP software, output soundfiles are given the same sample rate as the input soundfile, whatever it is. There is also software to change the sample rate of a soundfile. Rates less than 44100 are not recommended. **Digital noise** occurs when there are significant differences of amplitude from one sample to the next. Higher sample rates minimise this by sampling the signal more times per second.

Amplitude: our basic measure of loudness. **Gain** is the degree of change to amplitude, and can similarly be expressed as a linear amplitude change or as a dB change. A **Gain Factor** of 0.5 (i.e., where every sample value is multiplied by 0.5) corresponds to a change of -6dB. Excessive use of *gain* can result in digital noise, and distortion can occur when the signal level rises above the maximum, e.g., > 1.0. This can happen very easily when mixing soundfiles (the amplitudes are summed), so the *mixfile* allows you to specify the amplitude of each component soundfile.

Zero crossings are when the waveform crosses the zero line. The **Attack Transient** is the rate and amount of amplitude increase at the start of the sound – both a natural physical characteristic of many sounds and an important musical *gesture*. Often it is only from the attack that we recognise what is making the sound. It also affects what we perceive as the **timbre** or tone colour of the sound. **Decay** is how the sound ends, the rate at which the sound returns to silence. Another use of zero crossings occurs in CDP's DISTORT Set of programs, based on the irregular patterns formed when a complex waveform crosses the zero point.

Frequency/pitch/partials: oscillation components of the sound.
Frequency is a general term for (wave)cycles per second, measured in *Hertz*. The standard orchestral tuning standard is defined as Concert A = 440Hz. "Middle C" on the piano has a frequency of approximately 261.6 Hz. Like amplitude, frequency is measured on a linear scale, while musical '**Pitch**' is defined logarithmically in terms of *intervals* – such as the semitone or the octave. Thus the two most important properties of a sound can be represented either linearly (amplitude, frequency) or logarithmically (dB, pitch).

Partials is a general term used for all frequency components making up a sound, whether **Harmonic** or **Inharmonic**. **Noise** is an irregular complex of partials, and **Distortion** produces added *noise* components in various ways.

Timbre is the perceived 'tone colour' the (changing) partials produce, the sum total of all the partials, known as the **Spectrum** of the sound. **Density** is the closeness of partials (or note events).

SECTION 2 – Your Working Environment

Your working environment will or may include:

- **Sounds** in **.wav** or **.aiff** format. In the process of composition you may work with mono inputs much of the time. Some functions which produce stereo outputs will *only* accept mono inputs, e.g., PAN. In other cases soundfiles with 2 or more channels are now supported. (*Soundshaper* supports both stereo and multi-channel files throughout, handling these matters internally.) Check the documentation for **PAPLAY** or **PVPLAY** (in SYSUTILS) for more details about soundfile support.

  If you have problems with sounds made with other software, they can usually be resolved by making a copy of the sound with CDP's COPYSFX program. This will re-write the sound with standard **wav** or **aiff** header information, which will be recognised by the CDP software. The problem can arise when other software does not write a header that is fully compliant with the standard.

- **Graphical User Interface(s):** *Soundshaper* (PC only) &/or *Sound Loom* (PC and MAC). The CDP programs themselves are found in e.g. **C:/cdpr8/_cdp/_cdprogs,** whether using a MAC with *Sound Loom* or a PC with *Soundshaper* or *Sound Loom*.

  The graphical interfaces construct command lines from the information you provide in their dialogue boxes. They then pass this command line to the underlying command prompt for processing that CDP function. Very little processing is built into *Soundshaper* or *Sound Loom* – but do note the very powerful MUSIC TESTBED facilities in *Sound Loom*.

  The Time Domain functions take soundfiles as input and produce soundfiles as output. The Spectral (Frequency Domain) functions take frequency analysis files as input and produce analysis files as output. Conversion between soundfiles and analysis files is done by PVOC (performed automatially in *Soundshaper* or found in the Spectral Menu.)

- On the PC there are also some other graphic programs: *GrainMill* (granular manipulation: graphic version of the BRASSAGE program), *Brkedit* (breakpoint editor with additional facilities for data reduction and for comparing two breakpoint files; it can be accessed directly or from within *GrainMill*), and *Viewsf* (a very simple soundfile display program, but it does zoom down to the single sample level and display individual sample values).

- If on PC, you are also recommended to install Rajmil Fischman's AL-ERWIN. AL is an algorithmic compositional environment that can be seen as a hybrid mixing program which combines track-based and sound-design type mixing. "It is designed for the creation and manipulation of sonic events and their organisation into a structured musical work." ERWIN is a plug-in for advanced granular synthesis: it "applies the solutions of Schrödinger's equation for an atomic potential with radial symmetry (a well-known equation from Quantum Mechanics) to the creation of granular clouds".

- Consider adding additional third-party **wave editing** tools to your overall system, such as: AUDACITY (https://www.audacityteam.org) and/or WAVOSAUR (https://www.wavosaur.com – Windows-only). Both of these support VST plugins and are useful for wav to mp3 conversions.

  You may also want to have your favourite **DAW** (digital audio worksation) available, for further audio editing, sound processing and especially audio sequencing and mixing. Several excellent DAWs are free or inexpensive.

- **A plain text editor** — you will need this to create or edit plain text files (i.e., no formatting information), such as **breakpoint files** (as described above, e.g. *time value* data) to define time-varying changes (**.brk** or **.txt**), **note data files** for TEXTURE, or **mixfiles,** which can be

for mono or stereo files (**.mix**) or for multi-channel files (**.mmx).** *Soundshaper* has a built-in notepad-like editor for text files.

Typical plain text editors on PC are Notepad++, Wordpad, Textpad and Emacs. The standard text editor on the MAC is **TextEdit,** but several others are available**,** including the classic UNIX version of Emacs and TextWrangler/BBEdit. (Wordpad sometimes adds '.txt' when you SAVE AS with a '.brk' extension, so you have to rename it to get rid of the '.txt')

Emacs has powerful macro facilities and the extension can be anything. To download Emacs, see https://gnu-emacs.en.softonic.com) A quick guide to Emacs is included in the CDP documentation. (see the TUTORIALS page under the EXPLAIN tab.)

- **Breakpoint files** can also be created with one or other of the graphic editors provided with the CDP System: the graphic breakpoint editors in the respective GUIs, or BRKEDIT, which provides a facility to audition a breakpoint file as time-varying amplitude or frequency.

- **Command Line** (optional)**:** you can also use the CDP programs from a **command line interface (CLI) –** the **Terminal** on MAC or the **Windows Command Processor** on PC. This can be useful, for example, to access CDP system programs such as DIRSF and COPYSFX. When working with the CLI, you enter program names (and command lines) at the prompt. It is important to set the path to the CDP programs for the computer system as a whole, so that the interpreter can find the programs from any working directory. We have provided documents about using command lines within the PC ("The Windows Command Prompt") and the MAC ("Using Terminal"), both accessible from the CDP Documentation's TUTORIALS page (under the EXPLAIN tab).

  Particularly useful is to create **shell scripts** (**.sh** on MAC) or **batch files** (**.bat** on PC), which can be used to run several processes at once and build up a 'library' of your most effective process sequences. The *SoundBuilder* demos have examples of how to build batch files (see the CDP Documentation's TUTORIALS page under the EXPLAIN tab).

  Other scripting languages that can be run from a command shell include Perl, Python, TCL/Tk, and *Tabula Vigilans*. These are suited to the control of CDP programs in a more algorithmic way, whether simple or complex. These can all be programmed and run from a specialist text editor such as EMACS. Some of the most advanced work with the CDP System, such as data sonification, has been done *via* the CLI and scripting languages.

- Finally, you may also be interested in exploring ***ProcessPack***, a TCL/Tk 'umbrella' program developed from 2007-13 by Richard Orton and Archer Endrich working as Wellspring Music. It is now available via the CDP Website and hosts a number of modules designed as high-level composition tools, i.e. more directly concerned with shaping passages of music, with algorithmic-based shaping tools. It is very complementary to CDP, which also has a significant algorithmic dimension. In addition to new facilities, it also makes use of a number of CDP programs as internal components, thus integrating them into a broader composition context.

SECTION 3 – CDP REFERENCE DOCUMENTATION

Especially in the initial stages of using the system, the CDP Reference Documentation is useful for explaining the meaning of the parameters in greater detail and providing some background on what sound transformations the program can be expected to achieve. The documentation is in HTML format and the key reference pages are also available as printable PDFs. It is available online or can be downloaded for offline use:

Online: https://www.composersdesktop.com/docs/home.html
Offline: download it from the CDP Downloads Page: **https://www.unstablesound.net/cdp.html**.

Function Groups

The CDP System is presented as a series of program groups**,** initially built around the different programs in Release 5, which had several functions within each one. Newer single-process programs have since been added to the most appropriate group for reference purposes.

The **Home Page** is **home.html** and the **Main Index** page is **index.html**, From there you can access all parts of the documentation via menus and links. The Main Index lists all the CDP processes within their Function Groups and links to these groups and processes. There are other indexes to the different processes, including the **Alphabetical Index** (listed by the process name), the 'button' or **Table Index (**listing program groups and their functions in a table) and the **Operations Index** (listed alphabetically by what the process does). You may also find it useful to have the **CDP Desk Reference to** hand This is in printable PDF format and is located in the docs\DeskReference sub-folder.

You can also access the CDP documentation from within *Soundshaper* under the menu **HELP>CDP Help** or via **INFO** buttons in *Sound Loom*. *Soundshaper* also gives the name of the CDP program being used, at the bottom right of its window, and clicking on this name should bring up the relevant reference page for the process.

Charts and Glossaries

There are a number of printable **Reference Charts** that can be accessed from the **CHARTS** page. You might want to print out the ones you find you use the most and have them laminated, for permanent easy-access desk reference. They include:

- **CDP Files and Codes -** the definitive guide to the various input codes, text files and binary files used in CDP processes, with examples.

- **Pitch chart -** Equivalent Pitch Notations: MIDI, *Csound* and Frequencies. A special PDF version of this chart is provided for printing neatly on 2 sheets (single or double-sided).

- **Transposition Chart** – Chart of Transposition Ratios

- **Gain to dB Chart** – Chart of Gain – dB Correlations

- **Note Data Chart** – Note Data File Chart for the Texture Functions

- **Texture charts** – 2 Useful Reference Charts for Texture

- **Transposition and Shifting** – Chart of Inputs and Outputs for Transposition & Shifting functions
- **Audible Design to CDP** – cross-references Trevor Wishart's book *Audible Design* with the corresponding CDP functions.

Also note the following two glossaries, accessible from the CHARTS page:

- **Technical Glossary** – an explanation of computer audio terms used in CDP programs and documentation, and the

- **Musical Glossary** – an explanation of key musical terms needed for manipulating sound. This seeks to make connections between the facilities of the CDP software and a range of possible musical composition objectives.

Formats of supplementary files

A key document within the documentation is **Files and Formats: a** guide to the different types of text files used within CDP. You can access this document from any of the CDP Reference pages or from the CHARTS page of the Reference Documentation (see **CDP FILES AND CODES)**

SECTION 4 – GETTING STARTED WITH CDP

The CDP System is a rich toolkit of many different processes. Some of these may be familiar from other software, but others are more unique and "experimental".

The materials provided approach the software in two ways:

- Describing the available CDP processes, or selections of these, and how you might use them.

- Worked tutorial examples, for use with *Soundshaper*, *SoundLoom* or Command-line, often for all three.

The following documents (apart from the Desk Reference) **can all be accessed from the CDP Documentation's TUTORIALS page:**

CDP Processes

- **Introducing the CDP Sound Transformation Programs** – this document.

- **CDP-LITE** – a 3-level guide to about 40 basic functions arranged by musical task: Level 1 is a very general description, Level 2 provides More Information, and Level 3 is the full Reference Manual.

- **A Keyhole View** present selections of key processes, with suggestions for use and links to the Reference Documentation.

- **CDP Guide** – lists all the current CDP processes, classified according to *Soundshaper*'s menus: Edit/Mix and other soundfile processes, spectral transformations including pitch processing, synthesis, information and utilities. A brief description is given for each process, with a link to its Reference Manual.

- **Desk Reference:** A printable index, listing all CDP programs (up to Release 7) in their Function Groups and higher categories, with the types of input file needed, their modes and a brief description of each mode. (See the CDP Documentation CHARTS page to view/download.)

- **The Sound Loom Basic Guide** – by Archer Endrich. Introduction to the basic operation of the SoundLoom GUI, with worked examples in the Time and Spectral Domains.

- **The Sound Loom & CDP** – by Trevor Wishart. A survey of the SoundLoom GUI, set in the context of practical compositional objectives.

Tutorials with Demo Examples

- **Getting Started with CDP in 12 Steps:** for those using either *Soundshaper* or *SounLoom*, these basic examples provide a good starting point.

- **Creative Sound Design** (forthcoming): a well-structured course in 20 steps, providing a progressive exploration of some basic processes, while at the same time introducing procedures in *Soundshaper* (PC version) or the use of Terminal/shell-scripts (MAC version).

- **CDP Tour Examples:** like the 12-step tutorial, this presents key processes in 9 categories, with source and result sounds, input text files used, parameters and commentary.

- **Sound-Builder Templates:** six sets of process chains, where the output of one process becomes the input of another. The process chains are run from batch files (Windows) or shell scripts (Mac OS) An ideal example of using the system from the Command line/ Terminal. The batch files are provided, and each example has a play list from which you can hear the results of each step of the process before going on to your own experiments.

- **Dice Demo** – Six examples from Archer's composition, *Crossing the Dark Rift.* The tutorial goes through the construction of the final result step-by-step, showing how to gradually sculpt a sound towards that imagined by the composer.

For more extended in-depth tutorials, download and explore these workshops:

- **Tutorial Workshop 1**: designed for new CDP users, this shows how to use over 170 functions from 9 program groups, with a playlist.

- **A Learning Manual for CDP:** a comprehensive set of documents for exploring CDP as a whole system. There are explanations of processes as well as many worked examples, suitable for both *Soundshaper* and *SoundLoom*.

  Topic 1 is preliminary and the examples begin with Topic 2 – Basic Modifications – followed by Mixing Sounds, Mingling Sounds and Assembling Sounds with TEXTURE.

  There are also documents for further study, covering wider aspects of sound design and the CDP environment.

- **Tutorial Workshop 2: Composing with the CDP Texture Programs** explores 21 examples in great detail. Designed for experienced users, it seeks to connect the program set's facilities with musical objectives.

- **Tutorial Workshop 3: Transposition, Shifting & Combinations.** A detailed look at CDP's functions in these areas, most of which are in the spectral domain, with technical explanations and worked examples.

  Tutorial Workshops 2 and 3 are designed for use with Batch files (PC) or Shell Scripts (MacOS), but could also be run from a User Interface.

- **Drunk Tutorial** – a set of 6 examples for creating sounds with EXTEND DRUNK that illustrate the use of time-varying breakpoint files for a number of parameters.

- **Grainmill:** Three tutorials --

  ○ **A GrainMill Tutorial,** by Philippos Theocharidis. His excellent examples give a good indication of what is possible with this granular manipulation program.

  ○ **GrainMill Examples,** by Richard Dobson – Sixteen examples which illustrate how to use *GrainMill* for very specific and controlled effects.

  ○ **Big One,** by Archer Endrich – Archer's 'BIGONE' example illustrates the use of multiple breakpoint files timed to expand the original sound into an ever-changing granular texture.

Additional Materials and Tutorials

Technical/setup and General Documents

The **TUTORIALS** page has links to several useful supplementary documents, including:

- **Running the CDP System** – This gives an introduction to sound design, presents a number of strategies with which to approach this kind of work, and defines a few basic concepts.

- **The Windows Command Prompt** – a guide to the Windows command line interpreter.

- **Using Terminal**, by Richard Dobson – configuring MacOSfor command-line programs

- **The Operation of the Phase Vocoder,** by Richard Dobson – a non-mathematical introduction to the Fast Fourier Transform and covering some key programs in the CDP software which are in the Spectral Domain

- **Introduction to Sound Design** ,by Archer Endrich – this 'Study Guide' places the CDP software in the broader context of sound design for film. It was created in 2000 as part of the work for a Millennium Award to give workshops in sound design.

- **Computer Sound Transformation**,by Trevor Wishart (2000) – a personal perspective, outlining the early development of computer techniques within CDP.

- **Sound Transformations in Electroacoustic Music**, by Leigh Landy (1991) – background, aesthetics and categories of transformation in electroacoustic music.

Other tutorial documents

- **Texture Pack** (see **\docs\htmltuts\Txpack**) helps you get started with the complex but enticingly powerful programs of the TEXTURE Group. It includes all the breakpoint and note data files needed to run the examples discussed in the HTML reference document for Texture. The package includes batch files to make and delete the examples, but you can also use the **Presets** built into *Soundshaper* or the **Patches** supplied with *Sound Loom*. The text form of the batch files provides a concise listing of all the examples and their files. *Readtxtu.txt* provides an overview of the examples and their associated files.

- **3 Csound Tutorials** - *Csound* orchestra and score files, along with introductory material, by Andy Hunt. Also some introductory Csound files by Richard Orton.

SECTION 5 – HINTS AND TIPS

Input soundfile not recognised

One problem that you may encounter is CDP not recognising an input soundfile when it has been made by some other software. This can be caused by non-standard anomalies in the wav header of the soundfile made by the other software. The problem can be rectified by making a CDP copy of the sound with CDP's **COPYSFX**. This can be run from the Command Line (copysfx infile.wav outfile.wav and see Usage for the various options), or *via Soundshaper* : Menu – Edit/Mix > SF UTILS > COPY. (COPYSFX is not available in a *Soundloom* menu.)

CDP programs retain whatever type the infile is. Note that the CDP software does not handle mp3 files ─ these can be converted with a sound editor such as *Audacity*.

File Extensions

Because CDP uses a number of different types of file, each with their own extension, it is very useful to have *file extensions visible* on your PC so that you can tell at a glance what type of file you are looking at. To show file extensions, click the View tab in a Windows File-Explorer window and tick **File Name Extensions.** (There is a list of the various CDP file extensions at the end of the *CDP Desk Reference* in **C:\cdpr8\docs\DeskReference**.)

Data files
I (AE) tend to prepare my supplementary breakpoint and text files with a text editor beforehand and then open them in a *Soundshaper* process dialogue. This way they stay inside my chosen directory.

 A quick way of creating a text or breakpoint file is to write one line, then highlight it and save it to the clipboard, duplicate it (Control-V paste) and then edit the duplicates. This can save a lot of typing. Thoughtfully designed breakpoint and text files greatly enhance results.

Multi-Channel Toolkit

If you will be working with multi-channel soundfiles (2+ channels), Richard Dobson has contributed the *Multi-Channel Toolkit* for CDP. This handles a number of specialised tasks relating to multi-channel – including Ambisonic – soundfiles. These programs are present in the main CDP distribution and referenced in the Documentation. (See the **M-C TOOLKIT** link in the left panel of the Main index.) Richard's own document *mctolkit.pdf* can be downloaded from the Documentation DOWNLOADS page. His Website link is: **http://www.rwdobson.com/mctools.html**. As this is a specialised package, you are invited to donate to his running costs.

Soundshaper Hints

Loading Soundfiles and Data files

Soundfiles: There are several ways of loading a sound into *Soundshaper*. One of the quickest is to have a folder open in Windows File Explorer and simply drag the file onto the Patchgrid. Check first that the chosen row is empty, and is highlighted if it's not Row A. (Otherwise the new file will replace the current source in that row.)

Leaving Option 6 "Use Project Folder" **unchecked** for now, run a process and the same folder will be pre-selected in the SAVE FILE panel for saving your output.

Data files: Similarly, **y**ou can drag text data files onto the Parameter Page from a folder open in File Explorer. When you click **TV** for a time-varying parameter, *Soundshaper* first loads a default file

from a sub-folder of **\TXT**, if available, and you can then click OPEN to select your own file – or simply drag the file onto the page.

Time Domain / Spectral Domain

Soundshaper uses a standard PC menu structure. Time-Domain processs, which take a soundfile (**.wav**) as input are under the menus **Soundfile** or **Edit/Mix**, while Spectral Domain processes , which take an analysis file (**.ana**) as input, are under the **Spectral** menu. Icons within the menus show the native file type (colour coded) and also the number of inputs.

Soundshaper has a built-in **Auto-convert** function so that the correct file format will be used for for a given process – you can provide a **.wav** file for a Spectral Domain process that requires a **.ana** input, and *Soundshaper* will convert it automatically. *Soundshaper* also supports stereo and multi-channel processing (up to 8 channels) throughout (with a very few exceptions). For spectral processes, which are natively mono-only in CDP, it adds channel extensions (_c1, _c2, etc.) to its temporary filenames. It is also recommended to tick the option **Auto-FFT** (Options menu) so that analysis files are converted back to soundfiles for playing/viewing. (The PVOC conversion is now so fast that this should not be an issue, unless you are processing very long files.) Even so, it is good to know which type of file is needed, for example, should you be using *Soundloom* or the Command Line.

Secondary inputs

Some CDP programs require two input soundfiles. *Soundshaper* will prompt you to select a second file, as required. Sometimes the second file is optional. With some exceptions, when CDP can have more than two inputs, the general rule is that while the second one might be compulsory, the rest are normally optional. *Soundshaper* reflects these choices in its dialogue. Further details are given in the *Soundshaper* Manual. 'Two inputs' is a topic covered thoroughly in *A Learning Manual for CDP*.

Markers and loops

Soundshaper enables a selection to be set on the graphic display of the soundfile. These are **loop points** (although you may turn looping off in the checkbox). Click or drag with the Left Mouse Button for the loop start point and Right Mouse Button for the end point of the portion to be selected. Select **PLAY FROM Loop start** to the left of the soundfile display.and turn off looping to fine-tune the times by ear.

Soundshaper also supports multiple cue-points – **markers –** displayed in pairs at the right of the transport. There are buttons to send the left loop time, or the end-of-file time, or both left and right loop times (**Get Loops** button) to the markers. To create a series of time-points, catch and move the left loop point a number of times. This is best done on the Parameter Page display, where the collected markers can then be sent to a time-varying breakpoint list.

You can also process a portion of the soundfile, having selected either **PROCESS At Loop Points** or **PROCESS At markers** to the right of the display. For example, you can set timepoints and click the **CUT** button to extract that portion to a separate soundfile.

Soundshaper Upgrades and Updates

The CDP Downloads page. links directly to Soundshaper's download for a **full** version or an **upgrade** from a previous version.

For minor **updates** of the present version, go to **http**s://www.soundshaper**.net/dloads.html** and follow the instructions provided. You may want to check the page for updates at various times, although new versions are usually posted to the CDP Forum.

SECTION 6 — ADDITIONAL HELP

CDP Users' Forum

Along with the distribution of CDP Release 8 we also have an online **CDP Forum** at :
https://unstablesound.net/cdpforum. We expect this to be the first port of call for any questions about the using the software or about problems encountered. Please report any problems providing the following information:

- program name,
- parameters used
- type and length of the input file
- and any error messages received.

If you post queries & problems to the CDP Discussion Group, a wide range of expertise may be brought to bear on solving your difficulty. And we shall also respond when needed.

- Information & *Soundshaper* updates at: **https://www.soundshaper.net**
- Information & *Sound Loom* updates at: **http://www.trevorwishart.co.uk**
- Check the CDP Website: **https://www.composersdesktop.com**
- You can find the latest version of and information about *Csound* at **https://csound.com**.

  Note the fantastic learning tools *The Csound Book* and *The Csound Catalog*, both edited by Richard Boulanger. *The Csound Book* has several contributions from prominent CDP users. Richard Dobson has also contributed about 150 pages to *The Audio Programming Book*, ed. Boulanger & Lazzarini. \

Website Links

- CDP Website: **https://www.composersdesktop.com**
- CDP Downloads: **https://www.unstablesounds.net/cdp.html**
- CDP Docs online: **https://www.composersdesktop.com/docs/home.html**
- CDP Users' Forum: **https://www.unstablesounds.net/cdpforum**
- Soundshaper download: **https://www.soundshaper.net/dloads.html**
- Trevor Wishart's website: **http://www.trevorwishart.co.uk**
- Richard Dobson's website: **http://www.rwdobson.com**

Some of these links may be brought within the CDP site in future.

SECTION 7 — ABOUT CDP

The CDP System has been designed by and for composers as a tool with which to push their work with sound towards ever more adventurous realms of innovation.

There have been many contributors over the years, but most of the sound transformation software has now been conceived and written by composer-programmer Trevor Wishart, hence our calling this software the '**CDP-Wishart**' libraries. There has also been much technical input and maintenance by Richard Dobson, documentation written and/or edited by Archer Endrich, and GUI front-ends by Trevor himself (*Sound Loom* – MAC & PC) and Robert Fraser (*Soundshaper* – PC only). We hope you'll have lots of fun and success exploring the world of advanced sound design – a core music technology for the 21st century.

[Archer Endrich and Robert Fraser. Updated 25 April 2023 for CDP Release 8]