Interconnected Alchemy: An Apparatus for Alchemical Algorithms

A proposal for a research presentation at the Alchemy in Experimental Sound Art Symposium

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The trope of the fraudulent or occult alchemist, prevalent since the mediaeval period of alchemy's introduction into European thought, belies the endeavour of practitioners from ancient Egypt onwards. Alchemists used observation, experimentation, and drew conclusions to understand the world around them. Notions of interconnectedness, harmoniousness and codification pervade the alchemical pursuit—and alchemy interconnects literature, art, mathematics, and music.

We have assembled a set of tools—our alchemical apparatus— for creative exploration and experiments in the interconnectedness of alchemy. These tools are used interactively to design experiences which combine music, algorithms and literature, linked through numerical and visual codes.

We are especially interested to bring algorithms into the mix, inspired by the observation of an early interconnection: the first known introduction of the term of 'alchemy' into England was through Robert of Chester's 1144 Latin translation of Muhammad ibn Musa al-Khwarizmi's Arabic-language *Book of the composition of alchemy* (820); the same author's work on Indian numbers of around 825 (translated into Latin as *Algoritmi de numero Indorum* or 'Algoritmi on the numbers of the Indians') brought the word 'algorithm' to Europe.

One of our tools is "numbers into notes", a web app for algorithmic composition based on early mathematics, in which the role of the human is to parameterize the algorithm and map number ranges to musical notes—previously used at an "Ada Sketches" event at the Royal Northern College of Music. As well as producing music, the tool generates provenance graphs which provide a record of the experiment.

http://demeter.oerc.ox.ac.uk/NumbersIntoNotes/

We bring this together with alchemical texts encoded for machine. To pursue our algorithmic ambition, one of our texts is the 'Bakhshali manuscript', held in Oxford's Bodleian Library, which is a remarkable birch bark manuscript that provides unique evidence for how the earliest Indian mathematics was written—and provides the first evidence of the concept of zero. The text is a collection of algorithms and sample problems in verse, with a commentary explaining them in a combination of prose and numerical notation.

Interactive interconnection is provided by two forms of codes developed at University of Nottingham. Muzicodes are an approach to incorporating machine-readable codes into music, so that the performer and/or composer can flexibly define what constitutes a code, and perform around it—the codes act as triggers to control an accompaniment or visuals during a performance. Artcodes are visually beautiful images which encode numeric codes, resulting in the same interactivity of a QR code while offering a more engaging and playful experience.

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Notes

Alchemy can be defined as "a seemingly magical process of transformation, creation, or combination" (https://en.oxforddictionaries.com/definition/alchemy) which in this usage has inspired our work creating music through combining codes.

The first known introduction of the term of 'alchemy' into England was through Robert of Chester's 1144 Latin translation of Muhammad ibn Musa al-Khwarizmi's Arabic-language Book of the composition of alchemy (820). The same author's work on Indian numbers of around 825 (translated into Latin as Algoritmi de numero Indorum or 'Algoritmi [al-Khwarizmi] on the numbers of the Indians', https://en.wikipedia.org/wiki/Algorithm#History:_Development_of_the_notion_of_.22algorithm.22) brought the word 'algorithm' to Europe.

The term alchemy is first recorded in English around 1390 ("alchemy, n. and adj.". OED Online. September 2016. Oxford University Press. http://www.oed.com/view/Entry/4691 (accessed November 30, 2016)) and already by 1400 is used disparagingly: "Experimentz of alkamye þe poeple to deceyue" (Ibid.).

But this trope of the fraudulent or occult alchemist, prevalent from the mediaeval period of alchemy's introduction into European thought onwards, belies the scientific endeavour of practitioners from ancient Egypt onwards, who worked on "operations, metals, drugs, compounds, and medicines" (as described in the eleventh century by Abū Rayhān Bīrūnī, physician and chemist)
Alchemists also used observation, experimentation, and drew conclusions to understand the world around them.

Alchemy is:
Pursuit of knowledge
Codifying the natural world (see Brahe, Sendivogius, Newton, Boyle etc.: artificial division between alchemy and "true science")
Using the latest technologies to enable experimentation and discovery

Our modern usage of 'alchemy' takes nineteenth- and twentieth-century (and today's) notions of knowledge obtained through the scientific method and relates alchemy as charlatan's or false knowledge
But this is anachronistic: overlaps of common methods and aims in metallurgical crafts, alchemy and chemistry (https://en.wikipedia.org/wiki/Alchemy)

Alchemy inspiring music in the early modern period
Another expression of the discovery (uncovering) of revealed divine creation

We're using technology to re-codify alchemy and its calculations, through musicodes and art codes) into music.

*Oxford connection: **Bakhshali manuscript** - first evidence of the concept of zero, represented by a round dot. A leaf from a remarkable birch bark manuscript, that provides unique evidence for how the earliest Indian mathematics was written. The text is a collection of algorithms and sample problems in verse, with a commentary explaining them in a combination of prose and numerical notation. (http://www.bodleian.ox.ac.uk/bodley/news/2011/2011-sept-30)*

Details of the ms, Oxford, Bodleian Library MS. Sansk. d. 14:
https://en.wikipedia.org/wiki/Bakhshali_manuscript

For more audio related Mixed Reality Lab references see below:

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