Codebreaker . . . . . .James McCarthy
(b. 1979)

We Shall Be Happy
Hyperboloids
Gordon Brown's Apology
Sing Me At Morn
Deep in the Night
It Is Enough
Declaration of War
On the Deck of a Ship
There Will Come Soft Rains
Turing's Arrest
De Profundis
The Borders of Sleep
A Mother's Lament
Perhaps if Death is Kind

The storming of the beaches of Normandy, the unprecedented dropping of atomic bombs in Nagasaki and Hiroshima – these actions are considered by some to be pivotal events of WWII's end. Few people, however, would conjure WWII imagery while watching YouTube videos or sending a text message. The man responsible for the technology associated with cell phones and computers is Alan Turing, father of the modern computer, artificial intelligence.

Composer James McCarthy chooses Alan Turing as the central figure in his new work for chorus and orchestra, *Codebreaker*, which unveils the often-untold narrative of the role one man had in ending WWII.

Alan Mathison Turing was a British mathematician and scientist who joined the Royal Navy in 1939. Turing was hired by the Royal Navy specifically for his known genius in the subject of decryption - - the unraveling of hidden messages. Turing eventually oversaw "Hut 8," the British naval division responsible for German naval cryptanalysis.

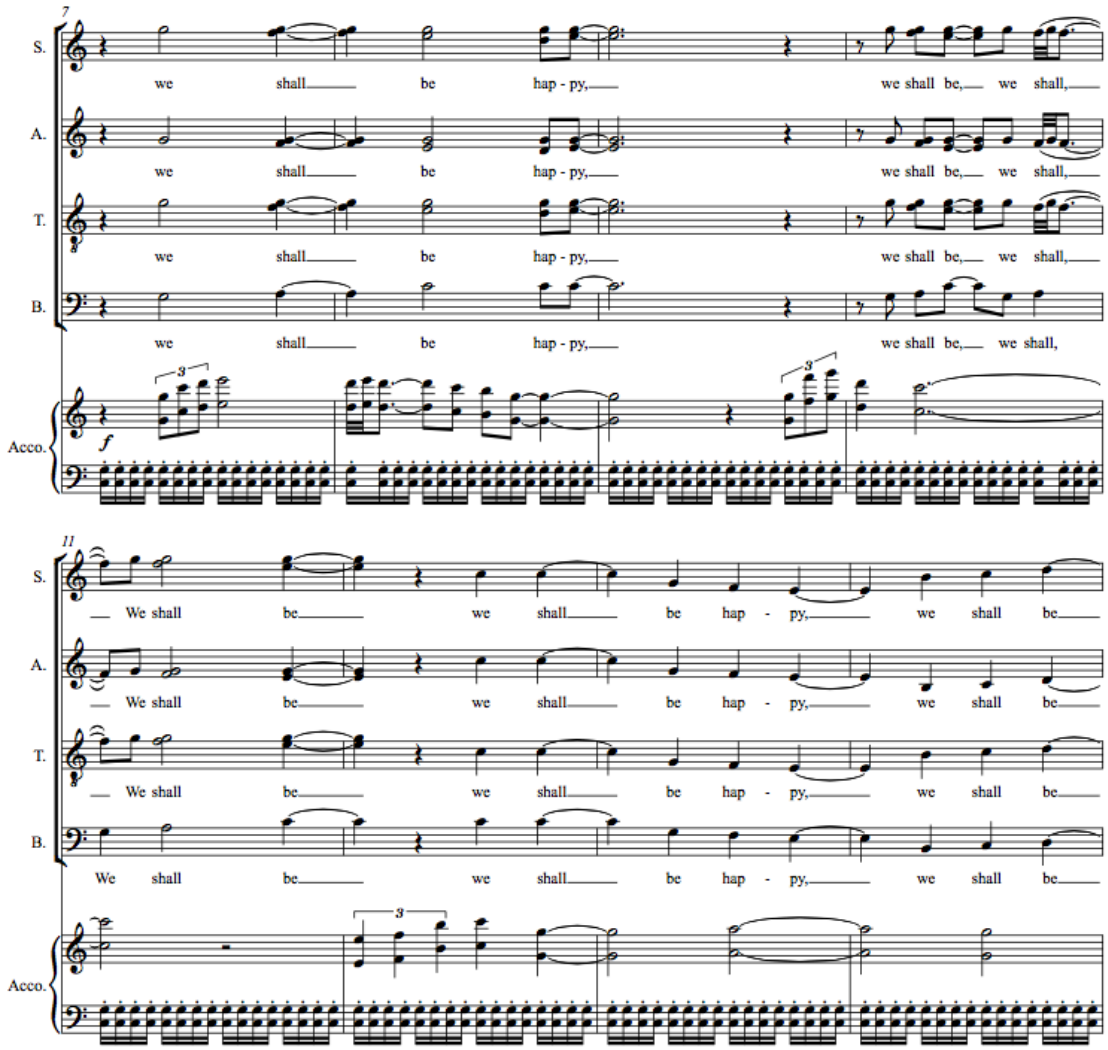
During the war, the Germans communicated every military plan in code; the code was scrambled by the "Enigma Machine" and was delivered daily via radio. Before Turing, no one could predict where the next U-boat strike would happen. In 1942, the German navy sank more than 100 ships off the eastern coast of North America alone. The pinnacle of Turing's work at Hut 8 was the upgrading the Polish decryption device, the "bombe," a device quickly capable of decrypting the messages sent by the Enigma machine. Most important, the Allied forces then had a system for knowing where the next German U-boats were going to strike - - a huge advantage in what Winston Churchill called the "Battle of the Atlantic."

Writer David DiSilvo notes, "Without the ability to break German codes to determine the locations of the U-boats, the Allies may very well have lost the Battle of the Atlantic, and quite possibly the war." DiSilvo continues, "Though it's impossible to quantify the exact impact of Turing's contributions, some military historians estimate that the war would have continued for at least another two years, and two million more lives would have been lost."

At the end of WWII, the Royal Navy relieved Turing of his duties, and he continued to make further contributions in the world of computer science. In 1952, police invaded his home and arrested him on charges of Homosexuality - - homosexuality continued to be a criminal act in the UK until 1967. Turing was given a choice of a prison sentence or chemical castration. Afraid of the defamation of his reputation, he chose to be chemically castrated, an act that would see him endure many adverse side effects, including gynecomastia (the development of female-like breast tissue in men). A year later, at the age of 42, Turing ended his life by taking a lethal dose of cyanide.

Composer James McCarthy, fascinated by the Turing story, musically captures the story of his life, work, and tragic death in his new work *Codebreaker*, scored for chorus, orchestra, and soprano solo. Contrary to many archetypal oratorios (e.g. Handel's *Messiah*), *Codebreaker* is not broken into many movements separated by arias, choruses, recitatives, and orchestral interludes, but rather, the work is through-composed, whose secular narrative hinges on the voices of three pivotal characters: Sara Turing (Alan's mother), Christopher Morcom (Turing's schoolmate with whom he fell in love), and, of course, Alan Turing himself. Although the work is not ordered into separate movements, per say, the work has moments where the character and nature of the music changes to tell a different point in the story.

Unlike the statue of Turing found in London, McCarthy says of his work, "I wanted *Codebreaker* to be a portrait of a living, breathing human being and not the musical equivalent of a marble monument to a Great Hero." McCarthy, indeed, does not begin the story in stoic mourning for Turing, but rather, opens the work with a living, breathing, exuberance, punctuated by the piano and timpani, exclaiming, "We shall be happy!"



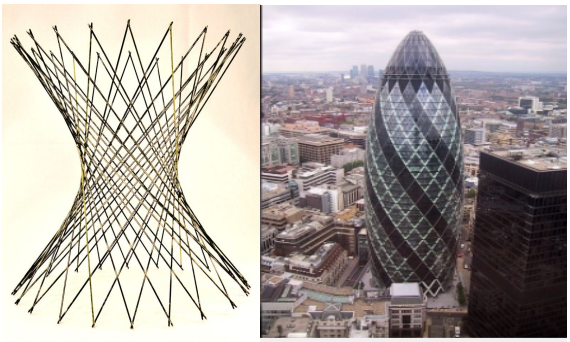
McCarthy crafts life and exuberance in his opening through different rhythmic manipulations. Musical metaphors to a rapidly beating heart and irregular breathing are seen in both the orchestral parts and the choral writing. When one experiences extreme excitement, the heart races, and one often cannot talk in slow, metrically predictable, speech patterns. The rhythmic figures in the left hand of the above accompaniment are reductions of both the piano and timpani. This repeated figure, or *ostinato*, gives the music propulsion, while the choral parts pair the beating heart imagery with irregular breathing. One notices, unlike most music written in 4/4 time, neither the phrases nor

stressed syllables are placed on the stronger beats of 1 and 3. Rather, McCarthy emphasizes the text with an off-beat ("out-of-breath") treatment. Additionally, There are moments when the protagonist (in this case, the chorus in Turing's voice) speaks with irregularity. In m.7, the chorus sings the phrase on longer note values, then reiterates the text in m. 10 in smaller note values, and in m. 12, gives a final reiteration of the text with note values in length between the first and third iterations.

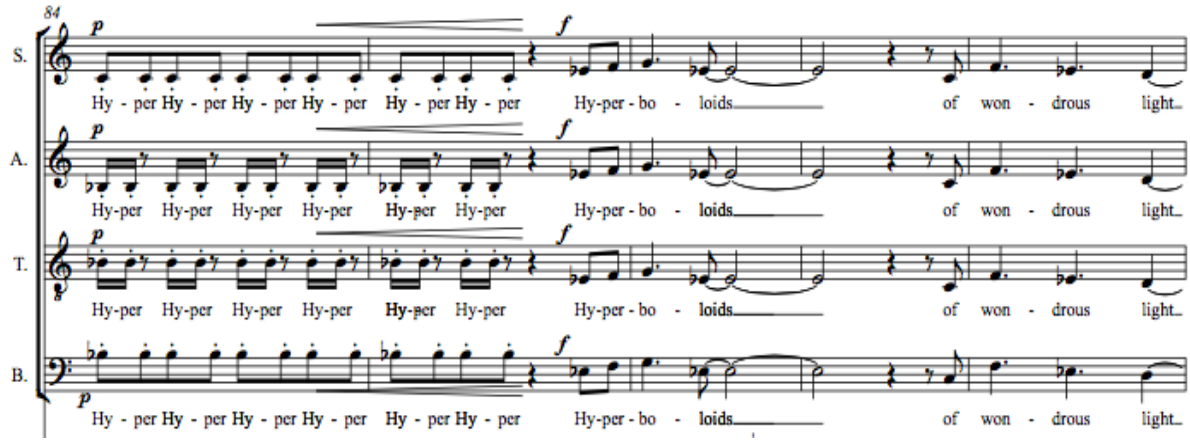
To give the audience a deeper appreciation for Turing's love of science, McCarthy turns the page in the narrative to Turing's love of physics, and how he used the vocabulary associated with physics to write a playful poem to Morcom. On the back of a postcard in 1954, Turing writes the following poem to a colleague:

> Hyperboloids of wondrous Light Rolling for aye through Space and Time
> Harbour there Waves which somehow Might Play out God's holy pantomime.

To understand the poem better, one must understand that, a hyperboloid is a series of two sets of either convex or concave lines intersecting at a single point, creating one or more elliptical planes. Consider the following examples:



Turing, a physicist, knew that light rays form hyperboloids. Musically, McCarthy illustrates the two sections of lines.



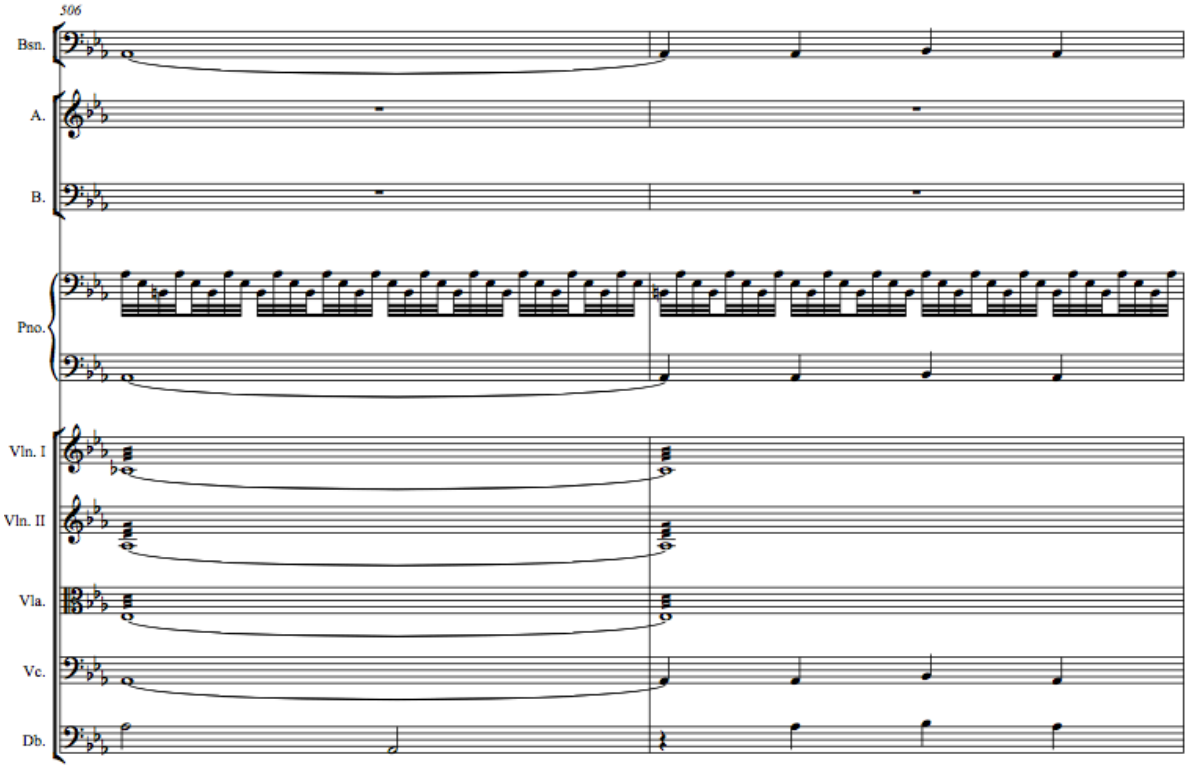
Throughout this portion of the work, the soprano and bass voices sing the same rhythmic pattern (one of the line sections of a hyperboloid), while the alto and tenor voices sing an alternate pattern, thus creating the second series of lines in the formation of a hyperboloid. In the hyperboloid shape, the lines eventually intersect, and McCarthy does that with the music, as one can see by observing mm. 84-86, when all the voice parts are not only singing the same rhythm, but also unison pitches in two octaves.

After an introduction to the more superficial aspects of Turing's life, Sara, Alan's mother, introduces the audience to Alan's first love, his schoolmate, Christopher Morcom. The setting of WWI poet, Wilfred Owen's, "Song of Songs," immediately follows her narrative. "Song of Songs" is set in a lush chorale style, and is immediately followed by Sara's dramatic declaration of Christopher's death.

The boys had shared a mutual love of computer science and had been experimenting with artificial intelligence. In a letter to his mother after Christopher's death, Alan had written, "I must not let him down. I promise to consider the question: can machines think?"

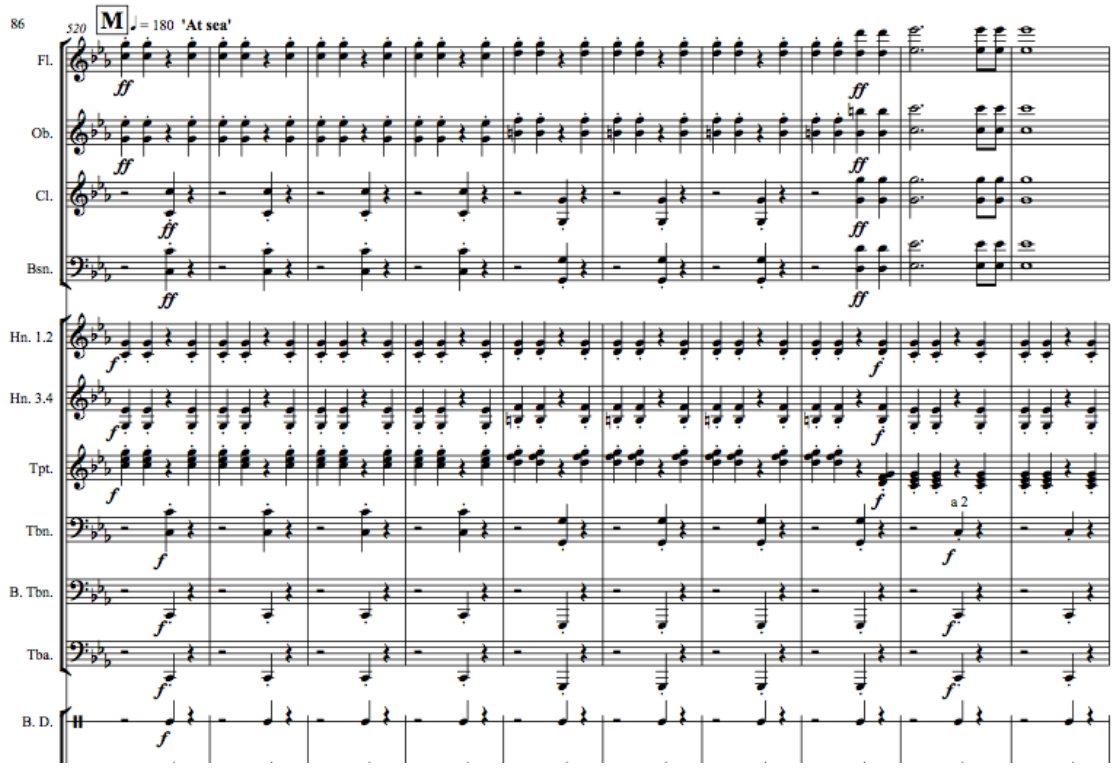
McCarthy uses the “can machines think?’ quote as the perfect segue to the next point in the story. The Royal Navy hires Turing to start work on a decryption machine, and McCarthy tells Turing’s wartime narrative from a maritime perspective of being out on a ship.

McCarthy creates an aural maritime illusion for the audience in two ways: with the instrumentation and the vocal writing. First, imitating the physical attributes of the sea, McCarthy contrasts depth with undulation. The deep, mysterious, abyss of the sea, is painted through the use of long, sustained (or slow-moving), notes in a low register. The instruments representing “the abyss” are the strings, the piano, and the bassoon. In contrast, the undulating rise and fall of the surface waves are painted by the descending arpeggiation ostinato (or “extended duration of exact repetition”) seen in the right hand of the piano. Together, the juxtaposition of these two textures depicts the sea.



McCarthy then uses a quasi sea chantey to create the illusion of the story being told from the deck of a ship. A sea chantey is a maritime work song, one that creates a rhythm for long durations of manual labor. Typically, the chantey form is: solo, chorus, solo chorus, etc. Over the "sea music" described earlier, McCarthy alternates unison choral sections with full chorus sections in harmony. The unison sections are paired alto-bass, and soprano-tenor.

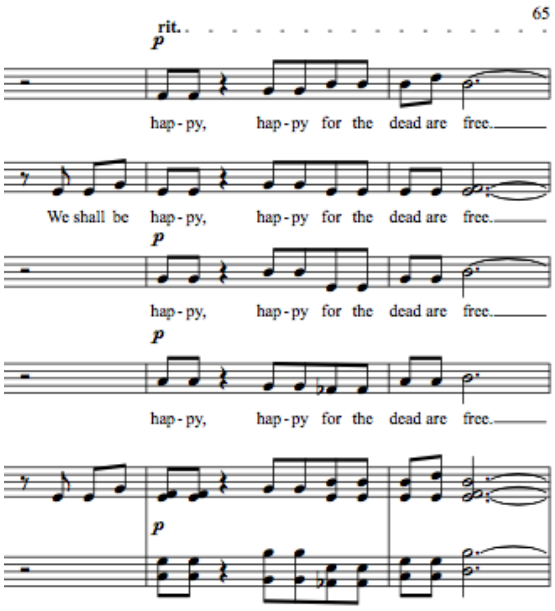
McCarthy soon turns the picturesque sea scene from sustained and placid, to aggressive and agitated. The destructive "Battle of the Atlantic" is illustrated through the increase of tempo (180bpm) and dynamic (*fortissimo*), and the imitating of cannons in both the brass and bass drum parts.



After the work examines Turing's life during his service to the Royal Navy, McCarthy shifts the focus of the narrative to Turing's final days on earth. McCarthy explains, "In the 1930s, Turing had been captivated by Disney's groundbreaking animation *Snow White* and he often repeated the following line: 'Dip the apple in the brew, let the sleeping death seep through.' In 1954, two years after his arrest and chemical castration, Turing dipped an apple in cyanide and took a bite."

McCarthy chooses two British texts to illustrate the last days of Turing's life. The first is "De Profundis," a poem by Irish novelist and playwright, Oscar Wilde. "De Profundis" is set in an *a cappella*, chorale style (or, like a hymn without accompaniment). The second text is "A Mother's Lament for her Son," by Scottish poet, Robert Burns. The lament, accompanied only by the string section, is sung by the soprano soloist, "Sara Turing," with these final lines: "O, do thou kindly lay me low with him I love, at rest."

Immediately following the lament, McCarthy creates a return of the opening text: "We shall be happy." In his notes on *Codebreaker*, McCarthy says that the opening line, "We shall be happy," actually comes from the final lines of the work, making it, "circular." McCarthy continues, "I just couldn't bring myself to leave Turing in the dark, frightening and lonely place he truly ended up. He deserved so much better. So here it is: I imagine that, in his final moments, he would have wished to be reunited with Morcom, as he wished throughout his adult life."



A monument to Turing and his work was erected in London in 2001. In 2013, Queen Elizabeth II posthumously granted Turing a "mercy pardon" and apologized for the manner in which England treated one of its greatest heroes.