

# Solving the Dorabella Cipher

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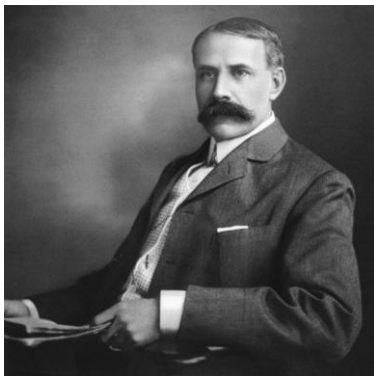
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## Background

We are all accustomed to thinking of classical composers as elderly men. If you Google the image of Johann Sebastian Bach, for example, you will most likely find a portrait by Hausman painted in 1748, when Bach was aged 63; or Richard Wagner, and you will most likely find an image of him in 1871, aged 58; or Johannes Brahms, and you will find him in his sixties. Beethoven you will probably find



aged 49. Almost universally, what we see are men in their senior years. The only exceptions to this seem to be those who died young; Frederic Chopin, for example, whose only known photograph was taken in the year of his death, 1849, aged 39; or Wolfgang Amadeus Mozart, aged 24, who died aged 35. The majority were old. But of course it was not always thus; all old men were young once.

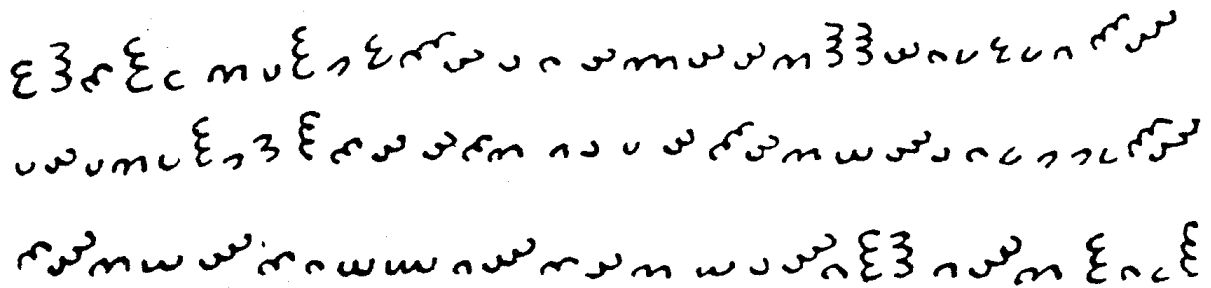
And so it is with Edward Elgar. Though most of our mental images of Elgar are of a man in his fifties or sixties, at the beginning of 1897 he was still in his thirties, and had not yet written the works for which he was to become famous, such as the *Enigma Variations*, in 1899; *The Dream of Gerontius*, in 1900; the *Pomp and Circumstance Marches*, 1901 and onwards; *The Kingdom*, in 1906; and so on. And for all of which, in 1928, he would receive a knighthood. He had already established a solid reputation, however, based largely on *Froissart*, composed in 1890, and the *King Olaf* cantatas, composed the previous year, in 1896.

And so it was that in 1897, while he was working on *Caractacus*, he made the acquaintance of a young lady, named Dora Penny, the 22-year-old daughter of the Reverend Alfred Penny, rector of St. Peter's, in Wolverhampton. Elgar was married at the time, to one of his students, Caroline Alice Roberts, a marriage which was to last until her death in 1920, aged 72. Elgar's relationship with Dora was almost certainly platonic, but there is little doubt that he enjoyed her company; so much so, in fact, that variation 10 of



his *Enigma Variations* is dedicated to her. And so it was that, in the middle of July 1897, just after he had celebrated his fortieth birthday, he sent her a short note. Not one written in English, however,

but an apparent cipher, consisting of 87 characters, each in the form of one, two, or three semicircles, in one of eight orientations.



The note withstood all attempts at decryption, and has become known as the *Dorabella Cipher*.

The cipher was featured in *The Musical Times* in 1970, in an article written by Eric Sams, together with a purported solution that never found much favour. In 2007 and 2008, the Elgar Society offered a prize of £1500 for its successful decryption, but no entry proved to be deemed sufficiently worthy of being called a winner, and the prize was not awarded. The cipher therefore remained unsolved.

### Speculation

Why would Elgar, a man who, in June 1897, had just turned 40, send such a note to a young lady, whom he had met on only a few occasions, and who apparently had no interest in puzzles or ciphers? Speculation abounded. Could it contain a clue to one his musical compositions? Could it be a quotation from Shelley or Shakespeare? Could it perhaps be an invitation to a sexual liaison?

Why had it remained unsolved for so long? Perhaps it was written in French, or Italian, or...?

What is that dot in the third line? Just an accident of the pen, or deliberate?

Perhaps it was not a cipher at all. But what would have been Elgar's purpose in writing a string of meaningless symbols?

If the note was indeed intended to convey some meaningful text, the next question is: what method would Elgar have used?

A simple substitution cipher seemed by far the most likely. Remember, this was way before the age of computers; the word "byte", meaning eight binary digits, was half-a-century away. All cryptographic techniques were therefore necessarily based on pencil-and-paper. Since Dora was a novice code-breaker at best, why go beyond simple substitution?

## The Solution

The solution did indeed turn out to be based on a simple substitution cipher. It relied for its coherence on a previous conversation (or letter) between Elgar and Dora in which he had described his effort at gardening – in particular, his pruning back (far too heavily, as it turned out) – of a particular garden bed, perhaps containing beautiful roses. Then:

**PSNOWDROCPBEIGEWEEEDSSETINITBU  
REIDIOCYONEENDTIREBEDLUIGICCIBU  
NUDLVNGLYTUNEDLIUTOSTUDOTWO**

or, with spaces and punctuation included:

**P.S. Now droop beige weeds set in it – pure idiocy – one entire bed! Luigi Ccibunud lovingly tuned liuto studio two.**

This is based on a simple substitution, except that four letters – I, N, W and Y – have been encoded using two different symbols. In addition, the letter ‘A’ does not appear at all. As for the decrypted message itself:

The **P.S.** is an exact substitution - the cipher was contained with another letter, so this seems a natural start.

**now droop:** a ‘c’ has been coded instead of an ‘o’, remainder is exact

**beige weeds set in it:** exact substitution

**pure idiocy:** a ‘b’ has been coded instead of a ‘p’, remainder is exact

**one entire bed!:** exact substitution. An extra ‘d’ is included in ‘entire’.

**Luigi Ccibunud:** Luigi is a common Italian name of the time.

**luv’ngly:** exact substitution. The missing character(s) is exactly at the dot in the ciphertext.

**tuned liuto:** exact substitution – “liuto” is the Italian word for “lute”. Note that “Luigi”, the name earlier on, is also Italian. Elgar wrote his “Lute Song” using words written by Alice in 1897, the same year as the cipher

**studio two:** perhaps missing an ‘i’, making “studio two”, which sounds modern, but *studio* was an Italian musical term in common usage in the 19<sup>th</sup> century meaning *study*, equivalent in meaning to the French *étude*.

## But What About...?

It should be noted that the solution above accounts for all of the symbols, all words follow one another logically and make sense, and all words are common to Elgar’s day. As such, the probability of it being incorrect in any major way is vanishingly small. Nevertheless, it is unsatisfactory, as there are four identifiable problems:

- (1) Why did Elgar not use two symbols for some letters? Would an exact one-to-one correspondence not have been more natural?
- (2) And, given the point above, why double up on some relatively obscure letters – I, N, W and Y – rather than, say, A, E, S and T, which are far more common in English usage?
- (3) Why leave the 'l' out of *studio*, and add a 'd' to *entire*?
- (4) Why include that string of characters CCIBUNUD in the middle of what otherwise makes perfect sense?

### The Discovery of the Key

And then, all became clear, on a chance observation that the name PENNY was entirely coded within the set of eight symbols all with two semi-circles. And the word WRITING appeared to be entirely (well, except for the 'N', already in "PENNY") coded within the set of eight symbols with one semi-circle. In fact, we have

L	A	D	P	E	N	N	Y
ω	3	m	ε	ϣ	Ϸ	ϸ	Ϲ
W	R	I	T	I	G	I	C
c	u	d	n	l	r	s	t
O	S	W	Y	K	P	B	U
ε	3	m	ω	Ϸ	ϸ	Ϲ	Ϻ

Elgar used the key

***Lady Penny, writing in code is a way to keep busy!***

Omitting spaces and using upper case, this is

**LADPENNYWRITINGINCODEISAWAYTOKEEPBUSY**

Elgar had 24 symbols to work with. Given that the symbols come in groups of 8, corresponding to 1, 2, or 3 semicircles, he could have used 'LADYPENW', but this is ugly. What Elgar actually used was beautiful:

**LADPENNY**

which plays on the sound of the D. Elgar then deleted every letter that's repeated, starting at the end and working back (this is the absolutely natural way to do it), until he got 24 characters:

**LADPENNY WRITIGIC OSWYKPBU**

which is exactly what we have.

### **Elgar's Wordplay**

Not only does the discovery of the key explain both (1) and (2), but in fact it also provides the vital clues to both (3) and (4). The first word of the key is LADY, but Elgar leaves out the Y, playing on the sound of the letter D (LAY-DEE). And so it can be seen that he also does this – always with the letter D, and no other – in three places in the cipher. First, in ENDTIRE (the letter D is silent), second, in LUIGICCIBUNUD (pronouncing the last part as BU-NU-DEE), and third in STUDO (STU-DEE-O).

Why? Because Elgar loved wordplay, and Dora's name (D Penny) would have amused him intensely, since a penny was indeed denoted by the letter D.

The second word play explains LUIGI CCIBUNUD. Now, LUIGI is a famous Italian name, of course. In Jerrold Northrop Moore's excellent biography of Elgar [2], one finds only one LUIGI – a composer Elgar had idolised throughout his earlier years. His name was Luigi Cherubini. Exactly the same hard consonants, C, then B, then N, exactly the same vowels U and I. The odds against this being a chance occurrence are vast. And what was Dora famous for above all else? Her stutter. So it seems likely that she stumbled over the name – "*Chi- chi-bunudi*"? And Elgar was teasing her a little...

### **Final Words**

And thus the message turned out to be a simple substitution cipher, written in English. Not containing anything profoundly important, alas, but just an innocent note that a man recently turned 40 – one interested in gardening and music - might send to a young lady companion; one encoded in such a way, however, that it proved too hard for over a hundred years.

### **References**

[1] Sams, E, available at [http://www.ericssams.org/sams\\_elgar1\\_draft.htm](http://www.ericssams.org/sams_elgar1_draft.htm)

[2] Moore, J N, (1984), *Edward Elgar: A Creative Life*, Oxford University Press.