For most of us, codes are riddles wrapped in enigmas wrapped in mysteries. Even the Saturday crossword or Sudoku can be a stretch. Yet we’re surrounded by codes everyday, whether it’s a puzzle in the paper, the GPS on our smartphones, or every time we browse the internet.

Initially stumped by that most common—and frustrating—of codes, a cryptic crossword clue, writer Sunil Badami finds himself surfing an internet 'Wikislide': discovering the connections between code and poetry, evading shadowy government agencies, and ending up in the murky corners of the dark web, where he’ll try to unlock the secret to one of the Web’s most intriguing and eerie mysteries.

*Riddle. Mystery. Enigma.* takes you on a journey from the familiar to the unexplored, through the mysterious history of cryptology and coding, and how it affects our lives today. Part radio documentary; part radio code breaking exercise; definite radio goose chase. Plus you get the opportunity to solve our own intriguing secret code, encrypted into the episode.

Yes, this is secret coded radio. Keep your ears open, you don’t want to miss anything.

Writer: Sunil Badami
Producer: Sunil Badami and Jesse Cox
Sound Engineer: Steven Tilley

Radiotonic
Australian Broadcasting Corporation
SUNIL: Like lots of people, there’s nothing I love more than sitting down on the weekends with a cuppa and the crossword. Recently, I’ve tried taking up the cryptic...

SFX: SUNIL WHISPERING CRYPTIC CROSSWORD CLUES AND FLIPPING PAGES

MUSIC: ‘COINCIDENCES’ FROM I HEART HUCKABEES FILM OST

WILL: Cryptic crosswords don’t have straightforward clues like basic crosswords – every clue has a bit of wordplay.

SUNIL (talking to himself): 3 down, kind of alias, 16 across, pretend, pseudonym, 14 down, the right sort of woman to start a dame school...

WILL: You would think having two paths to the answer would make the puzzle easier.

SUNIL (talking to himself): 14 Down... The right sort of woman to start a dame school...

WILL: In fact, it’s harder because you don’t know which part of the clue is the straightforward part and which is the wordplay.

SUNIL (talking to himself): The right sort of woman...
SUNIL: Like lots of people, I’m often completely stumped by some of the clues. Luckily, help is on hand!

SFX: Skype call sound

WILL: I love solving crossword clues, so hit me! My name is Will Shortz. I’m the crossword editor of the New York Times, puzzlemaster on National Public Radio in the United States, and I have the world’s only college degree in Enigmatology, the study of puzzles.

SUNIL: Will, look – I’m having a real problem trying to solve this crossword clue. Can you help me? 14 down, it’s 3 letters, the clue is “the right sort of woman to start a dame school…”

MUSIC: ‘COINCIDENCES’ FROM I HEART HUCKABEES FILM OST

MALE VOICES: If we help you with this clue, will you shut up? 17 across, 3 letters... 16 across, 5 letters... I’m rather good at crosswords, trouble is they make them too easy...

MUSIC: ‘CANTO AT GABELMEISTER’S PEAK’ FROM GRAND BUDAPEST HOTEL FILM OST

WILL: The world’s first crossword appeared in, the New York World, which was an old newspaper, appeared in 1913. Those early puzzles were all straightforward. Where every answer was a single word in the dictionary and the clue was the dictionary definition. So if the answer was tree, the clue was almost always woody plant. They started adding wordplay to the clues. Over time, a whole body of rules developed for what we now call cryptic crosswords. The most basic type, I guess, is anagram –

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1 This is a clue from the Bletchley Park Crossword. The answer is Ada, as in Ada Lovelace.
**MALE VOICE (whispering):** Radio-con-it.$^2$

**WILL:** Rearrange the letters of something in the clue to get the answer. Another could be a homophone where the two words sound the same but they’re spelled differently. Another kind is dropping a letter. There might be a hidden word... The English language seems to be made for creating cryptic crosswords. Spelling and sound in English don’t always coincide. Lots of words in English have two different meanings. Like bark can be the sound of a dog, it can also be the covering for a tree. We can hide the part of speech in English in the subtext, in the cryptic sense.

**[MUSIC: ‘PAINTED SUN IN ABSTRACT’ FROM SOCIAL NETWORK FILM OST]**

**SUNIL:** It’s one of the things I love about writing – using metaphors and similes and ambiguity to say one thing and mean another. But why all the double speak?

**CHI:** Well, there’s lots of reasons why we say one thing and mean something else. In the ways we interact, we don’t always use the literal meanings for things. My name is Chi Luu. I’m a computational linguist and I’ve worked on dictionaries and multilingual search engines, and I write a language column called Lingua Obscura. Computational linguistics can be described as the intersection of linguistics, which is the science or the study of language and language structure, and computer science. We often think of metaphor as something that we use in an elevated way, in literary language – like there are these two things, literary language and everyday language – but it’s everywhere in language, and so you end up using metaphor to convey part of your human experience to someone else to sort of, express additional information. We simply can’t use language literally all the time because even the things that we think are the most basic and most literal of words, are really kind of a short form for something else.

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$^2$ *Radio-con-it* is an anagram of *Radiotonic*
FEMALE COMPUTER VOICE: (reads Ada Lovelace’s Wikipedia article in French)

SUNIL: In a way, all language is a kind of code, isn’t it? And you have to know the word – the language I’m speaking – to know what I mean.

MUSIC: GAMELAN SOFA SURFERS ENCOUNTERS

JAMES: We’ve probably had secret messages as long as we’ve had secrets to keep. The Spartans from Ancient Greece used to send messages in secret, so we’ve had them for thousands of years. My name’s Dr James Grime, I am a mathematician, and I currently run the Enigma Project, which is a educational outreach program all about the history and mathematics of code breaking.

SFX: SOUND OF PENCIL ON PAPER

SUNIL: Cryptography, from which the cryptic crossword gets its name, is the science of writing and solving codes, derived from the Greek words for “secret” and “hiding.” In fact, the earliest form of cryptography was writing itself – when most people couldn’t read, it was easy to keep secrets, simply by writing them.

JAMES: One of the famous examples of code making is a code that Julius Caesar used to use himself. Julius Caesar, being a soldier or general, would have to send secret messages. So what he used to do is he would write out the alphabet and then he would shift the letters across. So one example is to shift the letters, say 14 letters across, for example, here’s a secret message.

MUSIC: ‘COINCIDENCES’ FROM I HEART HUCKABEES FILM OST

JAMES: FORWCHCBWQ³. In that case, an F would become an R, and I could send a secret message using this idea.

³ FORWCHCBWQ decoded spells Radiotonic
SUNIL: Sorry, James! I was just trying to work it out. So, what is the difference between a code and a cipher?

JAMES: A code turns a message into maybe another message or word. For example, you might take a sentence like attack at dawn and you turn that into eagle – that would be a code. A cipher works differently. A cipher works on the level of individual letters, so you turn one letter of the message into a different letter, or into a shape, or into a number. So each letter of your message gets changed. Not all codes are secret codes. Some codes are used for communication, such as Morse code. Morse code turns letters into dots and dashes.

SFX: MORSE CODE SPELLING OUT RADIOTONIC

JAMES: Now the idea there is not to turn it into a secret message but to help you transmit the message over a great distance, by radio. And today we use wireless technology, wireless internet

SFX: DIAL UP MODEM

JAMES: to transmit messages from our computers to the internet and across the world. And those messages are sent in binary or in coded messages in the same way.

SFX: GPS CAR NAVIGATOR VOICE, DRIVING CAR SOUNDS

SUNIL: We’re in a Black Thunder (laughs), rolling down to Hampden Park Public School. We’re going to meet some kids from Code Club.
SUNIL: It’s a club designed to teach young kids how to code, or program computers.

KELLY: Through coding, kids can learn how to problem solve open-ended problems.

KID: We need to do it point to point

TEACHER: Yes...

KELLY: These could be problems like cures for cancer or how to stop traffic from ever happening in an urban environment. These are problems Australians really need an answer to. We really need to see these problems solved one day.

KID: And then you have to build the same script for each one and forever...

KELLY: I’m Kelly Tagelan, National Program Manager for Code Club Australia. In order for human beings to interact with technology, and basically give it commands, there needs to be a medium for conversing and what have is coding, computer programming, is that language.

SUNIL: So why do we call computer programming coding?
**KELLY:** Computer programming is called coding I think it’s because it’s been colloquialised, right? So the act of actually computer programming is known as coding, and I think it’s because there are the people on the inside that understand the language and there are people on the outside that experience the language, don’t understand, when they look at it, it looks like a secret code.

*SFX: ELECTRONIC AUTO-TUNED VOICE READING DIFFERENT COMPUTER TERMS*

**SUNIL:** It sure sounds like another language! Or a secret code.

*SFX: COMPUTER KEYBOARD KEYS BEING STRUCK*

*MUSIC: ‘THEME’ FROM ETERNAL SUNSHINE OF THE SPOTLESS MIND FILM OST*

**CHI:** Language is like code in several ways – it’s compositional, so you can break language down into units, and people have described language logically. Language can be seen as an algorithmic code of communication to share information. But code is really the process by which you convey information from one point to another point.

**SUNIL:** What’s an algorithm?

**CHI:** An algorithm is really just a recipe for doing something. So you want to get from one point to another point and you need some information to get from that point to another point.

*SFX: KIDS IN CLASSROOM*

**ARUBA:** My name is Aruba, I’m 11.

**SUNIL:** What do you like about code club?
ARUBA: I like how English and coding is the same. So if it says in Code Club, move ten steps, the boy just move ten steps closer to the door.

MUSIC: ‘COINCIDENCES’ FROM I HEART HUCKABEES FILM OST

SFX: COMPUTER KEYBOARD KEYS BEING STRUCK

YOUNG BOY (whispering): When Bird... set score to zero

SUNIL: The kids all love making games. So I got them to show me how.

SFX: COMPUTER KEYBOARD KEYS BEING STRUCK, YOUNG BOY WHISPERING

YOUNG BOY (whispering): If touching apple, then broadcast touch, change score by 400... 2403... 2403...

MUSIC: ‘Nimrod’ FROM ENIGMA VARIATIONS BY SIR EDWARD ELGAR

KELLY: Very few people actually know that the first coder was a woman – Ada Lovelace. She was a contemporary of Charles Babbage, the mathematician-philosopher and inventor of the first computer science-learning machine in 19th Century London. And they – together – created the first, what we would have called, computer code.

SFX: COMPUTER KEYBOARD KEYS BEING STRUCK

SUNIL: Ah, here we are. Augusta Ada King, Countess of Lovelace... English mathematician and writer, born 10th of December 1815. When Ada first saw Babbage’s analytical machine, which was basically the first ever computer invented in the world, she was so fascinated by it, she wrote notes on it, and in the notes, she

\[4\] The answer to the kids game is 2403, the date of the first Ada Lovelace day: 24 March
included the first algorithm – or computer program – ever intended to be carried out by a machine. Her mother, Isabella, was herself a really brilliant mathematician, and Isabella immersed Ada in the study of maths and science, and forbade her from studying any poetry at all in case she turned out like her former husband, Ada’s father, the infamous Romantic poet George, Lord Byron. Ada was as fascinated by poetry as she was obsessed by mathematics, and she wrote to her mother once defiantly “You will not concede me philosophical poetry. Invert the order! Will you give me poetical philosophy, poetical science?” Ada saw in that poetical science the way that maths was a kind of language, combining logic and imagination.

**KELLY:** When I was learning about Shakespearean literature and I learned about iambic pentameter and how all of the language was timed according to maths and then I start learning about poetic science, then my brain just starts lighting up. When I think about kids and coding and think about their ability to take something that strictly in their imagination and they’re able to put that into computer code and make it an experience that others can have, that’s when science, for me, becomes very poetic.

**MUSIC:** ‘PAINTED SUN IN ABSTRACT’ (FROM SOCIAL NETWORK FILM) OST

**SUNIL:** If a cryptic crossword setter makes crosswords that are hard enough to challenge puzzler solvers but not so hard that nobody can solve them, and a code maker makes codes that are too hard for code breakers to break, how do poets use codes like metaphors and similes to make their readers understand what they’re trying to say and reveal even deeper meaning?

**CHI:** A lot of poetry uses new metaphor. When you have a metaphor that’s very conventional, everybody understands it,. In poetry, if you come up with a brand new metaphor, the brain has to understand it, and I think the – the trick is not going too far.

**SUNIL:** If we don’t know what a poem means, does it mean it isn’t a poem anymore?
**CHI:** The thing is that poetry is about the message. In poetry the meaning is not necessarily the crucial element. I think when people say how is poetry like code or how is code like poetry, it’s this romantic idea of... there are certain attributes that poetry has like elegance and succinctness and in a certain sense, yes, code is like poetry because it can have a structure that can look like poetry, but the syntax is very strict in code. It has to be able to execute. Poetry does not. Poetry can essentially take its bones, separate them into component parts, and move them around a little bit, and within that context, it can still be considered poetry. But if you move a curly brace from one place to another in code, then your code is broken, it’s not code anymore. Code ultimately has to make sense. Poetry does not need to.

*MUSIC: ‘GHOSTS I’ FROM GHOSTS I-IV BY TRENT REZNOR*

**DAN:** Whenever you browse online securely, you’re using encryption. Whenever you’re doing a secure transaction, you’re using encryption. Our economy now depends on encryption. My name is Daniel Mathews, I’m a mathematician, I’m a lecturer at Monash University, I was also a founding member of Wikileaks. Classically, cryptography was about encrypting and decrypting messages and using ingenious ways to do this. Modern cryptography is different in several ways. So one way is it’s not just about encrypting and decrypting messages, it’s about the messenger as well. So maintaining anonymity, authenticating the person that’s doing the communicating. Another way it’s different is that it’s been totally democratized. So whereas historically, cryptography was either something you did for fun, as a puzzle, or something used primarily by military or intelligence. Today it’s used everywhere.

**SUNIL:** And many people are now using modern encryption technology to protect their privacy and avoid being tracked by corporations – which mine our data for commercial purposes – or by governments, which monitor and retain it for security purposes.
DAN: If you are a human rights activist in an authoritarian country, you might well want to avoid being tracked by the government. People who just want to assert their right to privacy. They don’t like the fact that they’re being mass surveilled. And there are other reasons as well – pirating videos, pirating movies –

MUSIC: ‘GAME OF THRONES THEME’ BY RAMIN DJAWADI OST

ELECTRONIC VOICE: Illegal download

TYWIN LANNISTER: Do you wish to confess?

SUNIL: Me? No. No! No way. No...

SUNIL: So now, instead of hiding the message, people hide themselves – or at least their computers.

MUSIC: ‘GHOST SONG’ FROM VIRGIN SUICIDES FILM OST

DAN: On the internet, each computer, roughly, has an address, and that address is called an IP address. It consists of a series of numbers, and that’s basically what’s used to locate that computer.

MUSIC: ‘COINCIDENCES’ FROM I HEART HUCKABEES FILM OST

DAN: Say a number like –

COMPUTER VOICE: 2-0-3-point-2-point-2-1-8-point-2-1-4

DAN: you can just type that into your web browser and then your web browser will find that website and it will actually show you the domain name.

5 This IP Address takes you to the ABC homepage – www.abc.net.au
SUNIL: And to hide even further, many people go to very deep, very dark places indeed...

*MUSIC: ‘GHOST SONG’ FROM VIRGIN SUICIDES FILM OST*

DAN: The deep web and the dark web, things relating to the parts of the internet that are not so easy to see, or not so easy to access. And there are two separate concepts here. So what I would call the deep web simply refers to things you can’t access via search engines - via Google. And that’s about 99% of the internet.

SUNIL: Things like bank files, government or military servers, corporate intranets, hospital records, stuff like that.

DAN: On the other hand, there’s the dark web.

SUNIL: This is all those shadowy parts of the internet you can’t get to unless you know the secret address, or using specialist software.

*MUSIC: ‘SUMMER: DREAMS’ BY CLINT MANSELL & KRONOS QUARTET FROM REQUIEM FOR A DREAM FILM OST*

DAN: You’ve got things like drugs, you’ve got markets for all sorts of objects legal and otherwise. You’ve got whistleblowing websites, you’ve got websites about crypto-currencies like bitcoin, you’ve got websites about anonymity, you’ve got forums, you’ve got chat sites, and you’ve also got things like, uh, uh, child porn as well, so it’s quite a mix of things and quite a range of uh, you know, social acceptability and legality.

SUNIL: On 5th January 2012, an intriguing and mysterious message appeared in the depths of the dark web.

*MUSIC: SCHOTTKEY 7TH PATH APHEX TWIN SELECTED AMBIENT WORKS 85-92*
CHRIS: It wasn’t announced, there was no fanfare, it just appeared, quietly, on the notorious 4Chan website.

SFX: COMPUTER KEYS BEING STRUCK

SFX: ELECTRONIC FEMALE VOICE SAYING “HELLO”

CHRIS: It was a simple black square and the message on it read:

CHRIS & ELECTRONIC FEMALE VOICE: We are looking for highly intelligent individuals. To find them, we have devised a test. There is a message hidden in this image. Find it and it will lead you on the road to finding us.

SFX: COMPUTER KEYS BEING STRUCK, DIAL-UP MODEM

CHRIS: Cicada 3301 is simply what you make of it – it could be a brainteaser, Sudoku that lasts you a few minutes, it could be a scavenger hunt that consumes your life for months and months, it could be a community where you simply meet other people trying to solve these problems or it could be something more sinister... My name’s Chris Bell. I’m a writer, a screenwriter, and an avid fan of complicated puzzles. I first wrote about Cicada 3301 back in November 2013. Part of the delight, I think, a lot of people find with Cicada 3301 is this huge variety of clues and puzzles that need to be solved.

SFX: COMPUTER KEYS BEING STRUCK

ELECTRONIC FEMALE AND MALE VOICES: Agrippa, a poem by William Gibson, M C Escher, Atbash cyphers, the Caesar cypher, prime numbers, magic squares, RSA encryption.
CHRIS: These are the most fiendishly difficult problems that I think have ever been set on Earth, and we don’t know who’s doing them, we don’t know why and we don’t know for what purpose and to what end.

SUNIL: Appearing every January 5th until 2014 – because according to some Cicadians, the 6th is the Feast of Epiphany – Cicada 3301 has left enigmatic and mysterious riddles across the dark web and the world, with clues appearing as far apart as Seoul, Moscow, Mexico City, Paris, LA... and Erskineville!

SFX: CICADAS HUMMING

MUSIC: INSTAR EMERGENCE (ANONYMOUS) CICADA 3301

CHRIS: There is a code that underpins all Cicada puzzles. Prime numbers appear a lot. Both parts of the name Cicada 3301 are central to the puzzles you find in it. 3301 is a prime number which features regularly. Cicada, the insect, appears in imagery, in references, even in sounds throughout the puzzles. The cicada insect appears only every 13 or 17 years – prime number years. So the insect itself is key. A lot of the puzzles, with ciada, require an enormous amount of collaboration and this is why I think they’ve been so popular.

MUSIC: ‘IN A TIME LAPSE’ BY LUDOVICO EINAUDI

SUNIL: Cicada 3301 has spawned a slew of collaborative puzzle solving websites...

CHRIS: I think the amount of people who’ve solved Cicada in the world is a handful. I think it’s maybe... maybe two dozen, but certainly no more.

SUNIL: And it’s hatched a swarm of conspiracy theories...

SFX: COMPUTER KEYS BEING STRUCK
**ELECTRONIC FEMALE AND MALE VOICES WHISPERING:** A sinister left hand path religious organisation disguised as a progressive scientific organization made up of military officers, diplomats and academics who are dissatisfied with the direction of the world with a plan to transform humanity into a Nietzschean ubermensch.

**CHRIS:** Apparently, those people since have been made to do personality tests and solve individual puzzles themselves, but none have revealed exactly what they’ve been asked to do or why they’ve been asked to do it, or indeed what the organization behind Cicada 3301 is all about. There could be any reason for this. They might be dead (laughs). They might be whisked away by some nefarious sort of new organisation, sort of quasi-military organization, to be part of an enormous hacker group. Or they might just be in on the joke. Obviously this makes the security agencies like the NSA, the CIA, MI6 front and centre – they’re always the pantomime rogues that get roped into these things. And indeed, there is a lot of evidence to suggest that they’re using these kinds of online tests for recruitment. Technology’s enhanced both the puzzle making and the puzzle solving, I think, considerably. Back in, you know, the days of World War 2, and people were setting crypto-analytic problems like this, it was all done on cryptic crosswords.

*SFX: CLIP FROM THE IMITATION GAME FILM*

**MAN’S VOICE:** You’ve finished?

**WOMAN’S VOICE:** Yes.

**SUNIL:** In the film The Imitation Game, about British codebreakers during World War 2, there was a scene where were recruited by the brilliant mathematician Alan Turing, with a cryptic crossword.

*MUSIC: ‘KT’ FROM HARALAMBOS BY BEXAR BEXAR*

*SFX: CLIP FROM THE IMITATION GAME FILM*
JAMES: There is some truth to that story, but not exactly how it was presented in the film. There was a crossword competition. The crossword competition was set by the *Telegraph* newspaper to see if anyone could solve it in under 12 minutes. Apparently about 30 people attended this competition and 4 people actually succeeded and did solve the problem in under 12 minutes. Ah, I believe the winning time was 7 minutes and 58 seconds.

JAMES: So today you might expect that today we don’t need these kinds of people anymore, now that we have fantastic computers that can search a great number of keys for codes. In fact, those computers can only do what we teach them to do. So it is a battle of wits between two human minds: the code breaker and the code maker. A computer can only search faster than a human can, but it can’t think like a human.

WILL: I think we start solving a puzzle logically, and if we get stuck, then we start making leaps of imagination – that’s where good puzzle solvers come to the fore.

MUSIC: AGUAS DE AMAZONIA BY PHILLIP GLASS, PERFORMED BY UAKTI

WILL: I think solving puzzles is in our DNA. We like to solve problems. Most puzzles and problems we face don’t have clear cut solutions and we’re not completely in charge of our lives... With a human made puzzle, you’re completely in charge yourself – that’s a great feeling of empowerment.

KELLY: There was a girl in Hobart... she turned to me and said “I like coding my own games because I make the rules.” So she’d been playing a game she really enjoyed on her iPad, but she got frustrated because there’s only certain things that Barbie
would be allowed to do! And so she wanted the heroine of her game to be able to
do more and think more and solve problems. Do you know what the heroine of her
game does? Helps the polar bears find directions to new ice caps so that they don’t
starve. This is a real world problem she’s solving in a game that she’s come up with
herself!

*MUSIC: ‘COINCIDENCES’ FROM I HEART HUCKABEES OST*

**SUNIL:** That reminds me! That cryptic crossword clue!

**SUNIL:** The right sort of woman to start a dame school...

**WILL:** 3 letters. Well, uh, the answer is ADA. Uh, and there are two paths to the
answer. First, the straight part, is the right sort of woman, because Ada is a woman’s
name. And it literally starts a dame’s school – it’s the first three letters there, a
dame. A-D-A.

*SFX: CICADAS HUMMING*

**SUNIL:** So it all comes back to Ada. Or is that Cicada?⁶

*MUSIC: ‘COINCIDENCES’ FROM I HEART HUCKABEES OST*

**KELLY:** An easter egg (laughs)? An easter egg is how computer programmers show
off. It’s a little secret, a little joke, a little game, a little nugget, kind of hidden in
computer code, using technology to, kind of, reveal something unexpected.

**SUNIL:** In the same way, I suppose, poetry or literature do with metaphor, analogy,
simile and symbolism, to reveal a deeper meanings. Or radio does with secret
sounds.

⁶ Go to [http://ab.co/1WA2r2S](http://ab.co/1WA2r2S) to check all the clues!