

Human Being As Circuit Board, Human Being As Dictionary

Using the resource and Inventive podcast

This resource is based on the [Inventive podcast](#). The podcast mixes engineering fact with fiction. Each podcast features an interview with an engineer. That interview was used as inspiration by a variety of authors and poets to create a piece of fiction.

These resources make use of those pieces of writing to support the teaching of English.

Audio clips from the podcast provides context and can be played during a lesson. Students may wish to listen to the whole podcast in their own time. All resources can be accessed using the QR code below.

This English lesson resource supports students in:

Reading:

- read a wide range of challenging fiction including poetry
- draw on knowledge of the purpose and context of the writing to inform evaluation
- seek evidence in the text to support a point of view.

Writing

- select and organise ideas, facts and key points, citing

Additional context and careers resources

Audio clips from Inventive podcast

- **Clip 1: Miniaturisation** - Shrouk describes the process of miniaturisation of an ESR machine.
- **Clip 2: Shrouk's life and work**
- **Clip 3: Tania Intro** - Tania describes how she used the interview with Shrouk to write a story.

For other resources including posters and more information about Shrouk:



nustem.uk/inventive/#shrouk

Meet the engineer



Shrouk El-Attar

Electronics Design

Engineer

Shrouk arrived in the UK as an asylum seeker. She is now an electronics design engineer, activist and belly dancer. She currently works to design technology products which make women's lives better.

Meet the author



Image: Naomi Woddis

Tania Hershman
Human Being as Circuit Board, Human Being as Dictionary

Tania is a poet, writer, teacher and editor based in Manchester. She was a science journalist for 13 years, but then decided to write fiction and poetry instead.

The table provides an outline of the resource activities, and suggests approximate timings for each activity. You may wish to adapt these to suit your students' needs.

You may wish to listen to the whole podcast with your students. However, shorter clips are available which could be used instead.

This story and resource pack contain references which some students may find difficult, including refugees, and sexuality. This may need to be handled sensitively in class.

1	Meet the Engineer (pg 4)	30 min	<p>Listen to Clip 2 where Shrouk talks about her life, work and education. She also describes some of the technology that she is working on.</p> <p>As they listen, students should create a spider diagram of the challenges that Shrouk overcame to become an engineer.</p> <p>There is also a written summary that students could use for this.</p>
2	Developing inference skills (pg 5)	15 min	<p>Listen to Clip 3: Tania Intro</p> <p>Analyse the title: Human Being As Circuit Board, Human Being As Dictionary</p> <p>In pairs students discuss their initial thoughts.</p> <p>A series of key questions are provided which will allow a guided discussion about the engineer and the writing.</p>
3	Textual analysis - Opening (pg 6)	15 min	<p>Read the opening paragraph.</p> <p>Use the prompt questions to analyse the use of language and the key points which are raised.</p>
4	Stereotypes: Engineers (pg 7)	10 min	<p>Explain what is meant by the term 'stereotype'.</p> <p>If you wish you could show the students what an image search for 'engineer' produces. This will often involve hard-hats, high vis jackets and male engineers.</p> <p>The sheet provides a range of different, more diverse engineers and engineering careers.</p> <p>Discuss the prompt questions, and link the images to Shrouk's life.</p>

Teacher Information

Resource Activity Overview continued

5	Textual Analysis - Metaphor (pg 8)	20 min	Read the next section of the story. Explain (recall) what a metaphor is, and why it is used. Use the prompt questions to help students understand the use of metaphor in the story. You might wish to model suitable answer with the class.
6	What is this magic (pg 9)	10 min	A short activity which includes the next section of the story. Draw attention to the change of words in the refrain of the story. Help students to consider how this change links to Shrouk's story.
7	Challenging stereotypes (pg 10 - 11)	30 min	Read the next section of the story. Referring back to the images and stereotypes of engineers, students are asked to consider how Shrouk and the story challenge stereotypes. This could be used as a more extended writing task.
8	Closing the circuit (pg 12)	15 min	The final section of the story makes use of more metaphors. Students answer the prompt questions to help them consider these metaphors in more detail.
9	Review question (pg 13)	30 min	Extended writing opportunity "Explain how Hershman uses the image of a circuit board to connect Shrouk's love of circuit boards with the challenges she faced to become an engineer." Some prompts are provided to help students structure their answers.

Human Being As Circuit Board, Human Being As Dictionary. ©Tania Hershman For educational use only.

© 2022 Salford University & Northumbria University. Licensed under a Creative Commons Attribution 4.0 International license / CC BY-4.0 <https://creativecommons.org/licenses/by/4.0/>

Shrouk El-Attar

Electronic design engineer

In 2018 Shrouk was chosen by the BBC as one of the 100 Most Influential Women in the World. In 2021 she was selected by the Institute of Engineering and Technology as the Young Woman Engineer of the Year.

However, Shrouk's journey to success has not been easy.

Shrouk was a refugee. She arrived in the UK in 2007 with her family. They were quickly relocated to Wales, a place Shrouk knew nothing about; "I thought Wales was an animal" she explains.

Shrouk was always interested in how things work. Even as a small child she would take things apart and was fascinated by the circuit boards. They did not realise that this was engineering: if they had done, they would have been put off, "the term engineer screams I don't belong" explains Shrouk.

When Shrouk realised they wanted to be an engineer, she researched the subjects she would need to study, and applied to engineering at university because she wanted to study "this magic at university". However, because she was an asylum seeker she couldn't go. She joined a campaign to allow asylum seekers access to higher education.

In 2012 Shrouk was staying overnight at a friend's house. While she was there her home was raided and family deported. She was the only family member left in a strange country.

The asylum process took 6 years. As soon as they received asylum Shrouk applied for a place at university to study engineering, and was accepted into Cardiff University.

Shrouk continues to campaign. She challenges the stereotypes that surround engineering. She explains that the stereotype of an engineer in a hard hat is outdated and that engineers can work in "heels" and a "floaty dress".

In her spare time Shrouk continues to campaign and challenge stereotypes. She is an active member of the LGBTQ community, identifying as queer. She is a belly dancer, she dances in a beard campaigning for the rights of the LGBT+ community in her home country of Egypt.

Shrouk currently works in femtech, developing products in women's health, she explains this is often a taboo subject we don't talk about.



"Honestly, being an engineer is superpower because I get to do whatever I want. ... I've built a machine that can detect cancer, right now I'm transforming people's lives for a living."

Listen to Shrouk's podcast



nustem.uk/inventive/#shrouk

Human Being as Circuit Board, Human Being as Dictionary

When we read a text, we make inferences about it. Inference means to look at the evidence we have and make a prediction about what is going to happen next.

Use Clip 3 (Tania Introduction) and listen to Tania Hershman describe how she used Shrouk's interview to write the story.

Look at the title of the story.

We will make some predictions about the story based on the title.

Think about:

- What do you think the title is about?
- Why do you think the title miss the word 'A' out of both parts of the title?
- How can a human being be a circuit board or dictionary? What does this make you think of?
- What questions do you have about the story, or Shrouk?

Human Being as Circuit Board, Human Being as Dictionary

Tania Hershman

Read the opening of the story, and then answer the questions about it.

1. Why do you think the story starts with the repetition of these words? What impression does the repetition of the sounds give?

2. What do you think the circuit board is an analogy of?

Resistor, capacitor, current, drag. Resistor, capacitor, current, drag.

There is a child sitting in the middle of a **circuit board**, a child **formed** in **Egypt but not of Egypt, not of anywhere**.

What are you doing? we ask the child, who is very busy.
Making something, the child mumbles.
What are you making?
The child lifts her head, looks us straight in the eye.
An engineer, she says.

4. The phrase "in Egypt but not of Egypt, not of anywhere" suggests a lack of belonging. How does this link to the background of the engineer?

3. 'formed' is an unusual choice of word. Why do you think the author chose it?

5. An engineer is made. What do you think about this?

4. Stereotypes: Engineers

A **stereotype** is a fixed expectation people have about a person or group of people. By stereotyping we infer (make assumptions) that a person has a range of characteristics or abilities we assume are common for all members of the group.

Within engineering there are often gender stereotypes: people assume that engineers are men. Shrouk disputes this and says, "the stereotype of an engineer is outdated."

Tania Hershman includes Shrouk's passion to challenge stereotype into the story she created by creating a vivid description of an engineer.



Credit: Rolls Royce PLC



Credit: This Is Engineering



Credit: This Is Engineering



Credit: This is Engineering



Credit: BP

Discuss:

- What is an engineer?
- Who can be an engineer?
- Why does Shrouk believe the stereotypes of engineers are outdated?
- How does Shrouk's life story challenge the stereotype of an engineer?

5. Textual analysis - Metaphor

Human Being as Circuit Board, Human Being as Dictionary

continued

Resistor, capacitor, current, drag. Resistor, capacitor, current, drag.

On the video, the young woman with the face piercings, glasses and the enormous hair, is sitting, soldering, in a lab. I design circuits, she says, for things like massive robots that provide measurements for the aerospace industry, all the way to tiny encoders that can measure to a nanometer. The young woman looks amazed. That's sixty thousand times smaller than a single hair, she says.

Resistor, capacitor, current, drag. Resistor, capacitor, current, drag.

The child does not look at us. In her lap is a large box marked PAIN and three smaller boxes labelled MOTHER, BROTHER, SISTER. Slowly she places the smaller boxes inside the larger one. She closes the lid, and sends the larger box spinning to the corner of the circuit board, then turns away.

Will you tell us...? We whisper.

The child covers her eyes with one hand, her mouth with another, shaking her head.

Resistor, capacitor, current, drag. Resistor, capacitor, current, drag.

On the video, the young woman in the sleeveless flowered dress with tattoos on her left arm is talking, talking, of asylum, of flight from one place to another, of Wales, the country which is not a fish. She tells how, when she happened to be out, her mother, brother and sister were taken in the middle of the night to a detention centre. Her mother tried to kill herself, she says. The three of them were deported. A few months later, the young woman herself is allowed to stay. Despite the circumstances, it was still amazing, because..., she says, but stops, stands there, stands there, then walks off.

A few minutes later, to applause, to cheering, she comes back and finishes her talk. It was amazing because I was offered a place at Cardiff University to do electrical engineering, says this young woman in the sleeveless flowered dress with the tattoos on her left arm. I love it, she says.

A **metaphor** is something that is a representation, or is symbolic of something else.

Hershman uses metaphors throughout her story to describe Shrouk's life and journey to become an engineer.

1. Why does Hershman use the image of a circuit board in the story?
2. What is the box a metaphor for?
3. Why is the box closed and pushed to the corner of the circuit board?

6. What is this magic?

Human Being as Circuit Board, Human Being as Dictionary

continued

Resistor, capacitor, current, drag. Resistor, capacitor, current, drag.

If the circuit is closed, the connection is complete and electric current flows.

If the circuit is open, the connection is broken.

We watch the child sitting in the middle of the circuit board, making.

How do you know what you're doing? we ask. The child looks up.

Let me tell you a story, says the child. There once was a child who thought that what happened inside the television was magic. She thought there were tiny magic people inside. Imagine! She became obsessed, starting taking everything apart: the remote control, the phone. When she put things back together, they never really worked.

But, says our child, pushing her hair back from her grinning face, if you had told her that it wasn't magic, if you had said "science", if you had said "engineering", she would have been switched off. She would have thought, Not for me, not for those who look like me, sound like me. She would have heard: You can't.

Resistor, capacitor, current, drag. Resistor, capacitor, magic, drag.

4. Why do you think the word magic is now added to the refrain 'Resistor, capacitor, current, drag.'?

5. Why is this important in Shrouk's story?

Human Being as Circuit Board, Human Being as Dictionary

continued

My name is Shrouk, the young woman in the flowered sleeveless dress tells the audience. It means 'sunrise' in Arabic. Like most people, she says, I was assigned a gender at birth, and with that come gender roles. She was introduced to homosexuality in Islamic class at school, she says, where the teacher said anyone who practices it belongs to a really scary place called hell. Honestly, says the young woman, that's what they tell nine-year-olds. I never thought about sexuality until that point, I mean, everyone likes girls, right? Right? The audience laughs. Oh my god, I'm a homosexual! It hit me like a bullet! I didn't want to be that person my teacher talked about.

Applying for asylum as a queer person, says the young woman with the face piercings, you have to prove your sexuality. How does someone prove that they're queer?

Resistor, capacitor, current, drag. Resistor, capacitor, magic, drag.

The child is storming around the circuit board, muttering to herself. She flicks a switch. Nothing happens. She heads to another corner, makes adjustments, turns and solders, alters and shifts. She flicks the switch again. Nothing happens, again.

The child walks round and round, tugging at her hair, talking to herself. We think maybe she is crying but when we try and help, when we want to put our arms around her, she shrinks away. Leave it, she says. Leave it! It's not working. Nothing's working. Everything, says the child, is dark.

If the circuit is closed, the connection is complete and electric current flows.

If the circuit is open, the connection is broken.

Resistor, capacitor, current, drag. Resistor, capacitor, magic, drag.

I realised that as an asylum seeker, says the young woman in the video - explaining why, when she was accepted to every university she applied to, she would have been charged sky-high fees – you get treated as an international student, someone who travels to seek education. I travelled to seek safety, she says. So she had to turn down the university places. It takes the life out of you, says the young woman.

When finally she is granted asylum, sitting in electronics class, she looks at the ceiling. This was not just the ceiling, says the young woman slowly, trying not to cry, this is the ceiling of a place I was barred to go to for seven years.

The young woman does not just seize her university place and carry on. This young woman isn't the kind of person who does only that. She campaigns - for Equal Access, for all asylum seekers to have the chance for education. I think it's a dream we can achieve, she says in a video entitled "Young Woman of the Year 2018".

Resistor, capacitor, current, drag. Resistor, capacitor, magic, drag.

There is someone with the child standing in the middle of the circuit board. It seems to be a woman in a bikini. We look closer. It is a woman with a beard, and we think of Hatshepsut, the female Pharaoh. And we see it is not a bikini, not for lounging on a beach, it is the sort of outfit worn by belly dancers. The child, still upset, will not look at the young bearded woman, who is holding out her hand. The young woman waits. The child flicks her switch again, on and off, on and off. Again, nothing happens. The young woman waits.

7. Challenging stereotypes continued

Human Being as Circuit Board, Human Being as Dictionary

continued

Resister, capacitor, magic, drag.

Resistor.

Capacitor.

Magic.

Drag

Basically, says the young woman in the video, I belly dance in drag. And I do it in protest at my country's treatment of LGBT+ people. In the film inside the video the young woman is in costume, on the stage. This is my revolution! she cries. And she doesn't just dance, she raises funds to help people imprisoned for their sexuality, because their only crime, she says, was to fall in love with someone of their own gender. I wouldn't be alive, the young woman says, if I was living the same way I am living now and trying to live it in Egypt.

In the story Hershman challenges stereotypes of gender, sexuality and identity. She links this to Shrouk's campaign to help the lesbian, gay, bisexual, and transgender (LGBT+) community in Egypt.

It is reported that Egyptian police often arrest LGBT+ people and systematically subject them to ill-treatment.

Through her dancing Shrouk challenges this and compaigns for fair treatment of the LGBT+ community in Egypt.

Writing task:

Discuss how Shrouk, and the story Hershman has written, challenge stereotypes of engineers. Give examples from the story to support your answer.

8. Closing the circuit

The final paragraph of the story is filled with metaphors.
Read the paragraph and answer the questions.

1. Why is it important that Shrouk's child and current self connect?

2. Light and new life are often connected.
Explain the use of the phrase "Everything is filled with light"

Standing in the centre of the circuit board, the **young woman with the beard holds her hand out to the child**. Finally, the child takes it. The young woman holds out her other hand, and as their fingers meet, the board bursts into life. **Everything is filled with light**. We watch as the child and the young woman dance, faster and faster. We think we hear them laugh. We listen as they dance and laugh until the light is so bright we cannot see them any more.

If the circuit is open, the connection is broken.

If the circuit is closed, the connection is complete and electric current flows.

3. The metaphor of the circuit closing is used to illustrate Shrouk's early life.
Why is it important that the circuit has closed?

“In traditional terms I don’t belong”

Shrouk El-Attar

Shrouk’s story is one of triumph over adversity and striving for equality, in engineering and in wider society.

Explain how Hershman uses the image of a circuit board to connect Shrouk’s love of circuit boards with the challenges she faced to become an engineer.

Points to consider	
How was Shrouk’s story one of triumph over adversity? Explain the challenges she faced to become an engineer.	
Explain how Shrouk challenges stereotypes.	
How does Tania Hershman use the metaphor of the circuit board to show Shrouk’s challenges.	
Use some examples from the story to show the metaphors the author uses to describe Shrouk’s challenges.	