



Give a Gripping Introduction

Chen & Liang



Bonnie Bassler

“How Bacteria Talk”

Humans?





*That was one of the best explained
TED talks I've ever heard.*

HOW BACTERIA “TALK”

1

Bacteria are the oldest living organisms on the earth. They've been here for billions of years, and what they are are single-celled microscopic organisms. So they are one cell and they have this special property that they only have one piece of DNA. They have very few genes and genetic information to encode all of the traits that they carry out.

*General introduction
and genetic
information about
bacteria*

HOW BACTERIA “TALK”

2

And the way bacteria make a living is that they consume nutrients from the environment, they grow to twice their size, they cut themselves down in the middle, and one cell becomes two, and so on and so on. They just grow and divide, and grow and divide — so a kind of boring life, except that what I would argue is that you have an amazing interaction with these critters.

How bacteria grow and live a “boring life”

A “bridge”

HOW BACTERIA “TALK”

3

I know you guys think of yourself as humans, and this is sort of how I think of you. So this man is supposed to represent a generic human being, and all of the circles in that man are all of the cells that make up your body. There is about a trillion human cells that make each one of us who we are and able to do all the things that we do, but you have 10 trillion bacterial cells in you or on you at any moment in your life. So, 10 times more bacterial cells than human cells on a human being.

*A surprising fact:
bacterial cells are 10
times more than
human cells*

HOW BACTERIA “TALK”

4

And of course, it's the DNA that counts, so here's all the A, T, Gs and Cs that make up your genetic code, and give you all your charming characteristics. So you have about 30,000 genes. Well, it turns out you have 100 times more bacterial genes playing a role in you or on you all of your life.

Further surprise that relates back to the “amazing interaction”

HOW BACTERIA “TALK”

5

And so at the best, you're 10% human, but more likely about 1% human, depending on which of these metrics you like. I know you think of yourself as human beings, but I think of you as 90% or 99% bacterial. And these bacteria are not passive riders, these are incredibly important, they keep us alive. They cover us in an invisible body armor that keeps environmental insults out so that we stay healthy. They digest our food, they make our vitamins, they actually educate your immune system to keep bad microbes out.

Why bacteria are important to us regarding their benefits

HOW BACTERIA “TALK”

6

So they do all these amazing things that help us and are vital for keeping us alive, and they never get any press for that. But they get a lot of press because they do a lot of terrible things as well. So, there's all kinds of bacteria on the Earth that have no business being in you or on you at any time, and if they are, they make you incredibly sick.

Why bacteria are important to us regarding the harm they do

HOW BACTERIA “TALK”

7

And so, the question for my lab is whether you want to think about all the good things that bacteria do, or all the bad things that bacteria do.

The question we had is how could they do anything at all? I mean they're incredibly small, you have to have a microscope to see one. They live this sort of boring life where they grow and divide, and they've always been considered to be these asocial reclusive organisms. And so it seemed to us that they are just too small to have an impact on the environment if they simply act as individuals. And so we wanted to think if there couldn't be a different way that bacteria live.

*A critical question
and a hypothesis are
put forward*

HOW BACTERIA “TALK”

8

And the clue to this came from another marine bacterium, and it's a bacterium called *Vibrio fischeri*. And so what you're looking at on this slide is just a person from my lab holding a flask of a liquid culture of a bacterium, a harmless beautiful bacterium that comes from the ocean, named *Vibrio fischeri*. This bacterium has the special property that it makes light, so it makes bioluminescence, like fireflies make light. So we're not doing anything to the cells here. We just took the picture by turning the lights off in the room, and this is what we see.

A special property of a bacterium that could help answer the question

HOW BACTERIA “TALK”

9

And what was actually interesting to us was not that the bacteria made light, but *when* the bacteria made light. What we noticed is when the bacteria were alone, so when they were in dilute suspension, they made no light. But when they grew to a certain cell number all the bacteria turned on light simultaneously. The question that we had is how can bacteria, these primitive organisms, tell the difference from times when they're alone, and times when they're in a community, and then all do something together. What we've figured out is that the way they do that is that they talk to each other, and they talk with a chemical language.

The research question



HOW BACTERIA “TALK”

Quorum Sensing

群體感應



HOW BACTERIA “TALK”

How does Bassler get the audience interested in her research?

HOW BACTERIA “TALK”: **INTRO STRUCTURE**

Start with the
very basics



Use facts that
surprise and
matter to us



Remark
further
relevance



Ask a key
question to be
addressed

HOW BACTERIA “TALK”: INTRO TECHNIQUES

Easy-to-
understand
language



HOW BACTERIA “TALK”

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How bacteria make a living and how they grow and live a “boring life”



HOW BACTERIA “TALK”: INTRO TECHNIQUES

Easy-to-
understand
language

Lots of *YOU*s

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Easy-to-
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language

Lots of *YOUs*

Repetitions:
examples and
technical terms

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Bridge between
points

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Helpful
statistics

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Why bacteria are important to us regarding their benefits

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Easy-to-understand language

Lots of *YOU*s

Repetitions: examples and technical terms

Bridge between points

Helpful statistics

Clear analogy

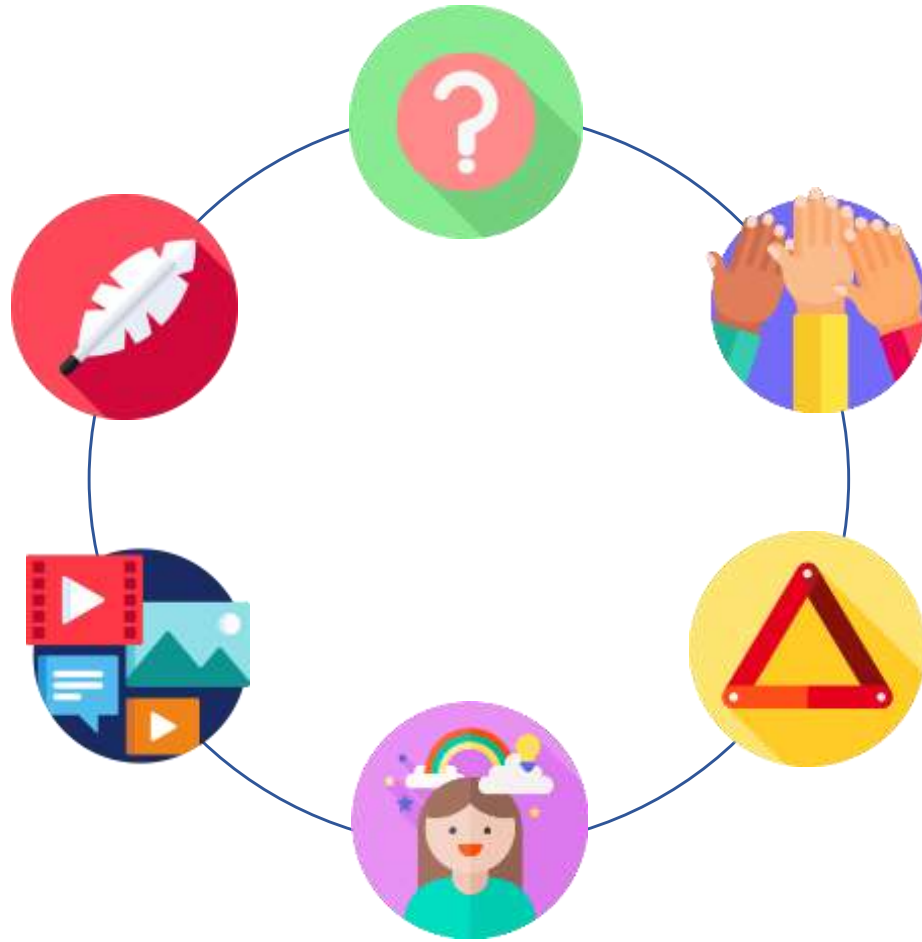
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Adding a Hook



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Raise an easy-to-answer question

Close-ended questions

Have you ever been told that your handwriting was too slow or ugly? If you have, you are not alone.

Have you ever counted how many IC chips you use every day? They don't only exist in modern cell phones and computers.

Have you ever been bitten by mosquitoes? Literally, they suck!

Adding a Hook



Raise an easy-to-answer question

Open-ended questions: Interact, or give your answer

When was the last time you had a dream?

What is the beverage you order most often when you go to a tea shop?

How does presenting to your advisor differ from presenting to your lab peers?

Adding a Hook



Make an informal survey

I have a confession to make, but first, I want you to make a little confession to me. In the past year, I want you to just raise your hand, if you have experienced relatively little stress. Anyone?

How about a moderate amount of stress?

Who has experienced a lot of stress? Yeah. Me too.

Adding a Hook



State a problem

There is actually a major health crisis today in terms of the shortage of organs. The fact is that we are living longer. Medicine has done a much better job making us live longer, and the problem is as we age, our organs tend to fail more. And so currently, there are not enough organs to go around. In fact, in the last 10 years, the number of patients requiring an organ has doubled, while at the same time, the actual number of transplants has barely gone up. So this is now a public health crisis. So that's where this field comes in – that we call the field of regenerative medicine.

“Bridge”

Adding a Hook



Imagine or picture a scene

Imagine this. You're walking through a beautiful garden. In front of you, there's a person carrying a big pair of scissors, cutting tree branches. This process is known as pruning, which means removing infected branches to protect the whole plant from further damage.

Now let's move to the human body.

Adding a Hook



Use a *visual* aid (like photo or video)

Before I begin, I'd like to show you something.

Take a look at this image and think about how it makes you feel.





Adding a Hook

Compassion Fatigue

同情疲勞

Df: The physical and mental exhaustion and emotional withdrawal experienced by those who care for sick people over an extended period of time.

Adding a Hook



Tell a story

Picture a situation where you are caring for a patient who is in the last stages of a disease and feel that you just don't care.

I remember when I began my career as a critical care nurse. I was working at a clinic with many end-stage renal disease patients. At first, I did all I could to make them comfortable; I took the time to talk and listen to them and sometimes even held their hands and sat by their sides if they were afraid or sad.

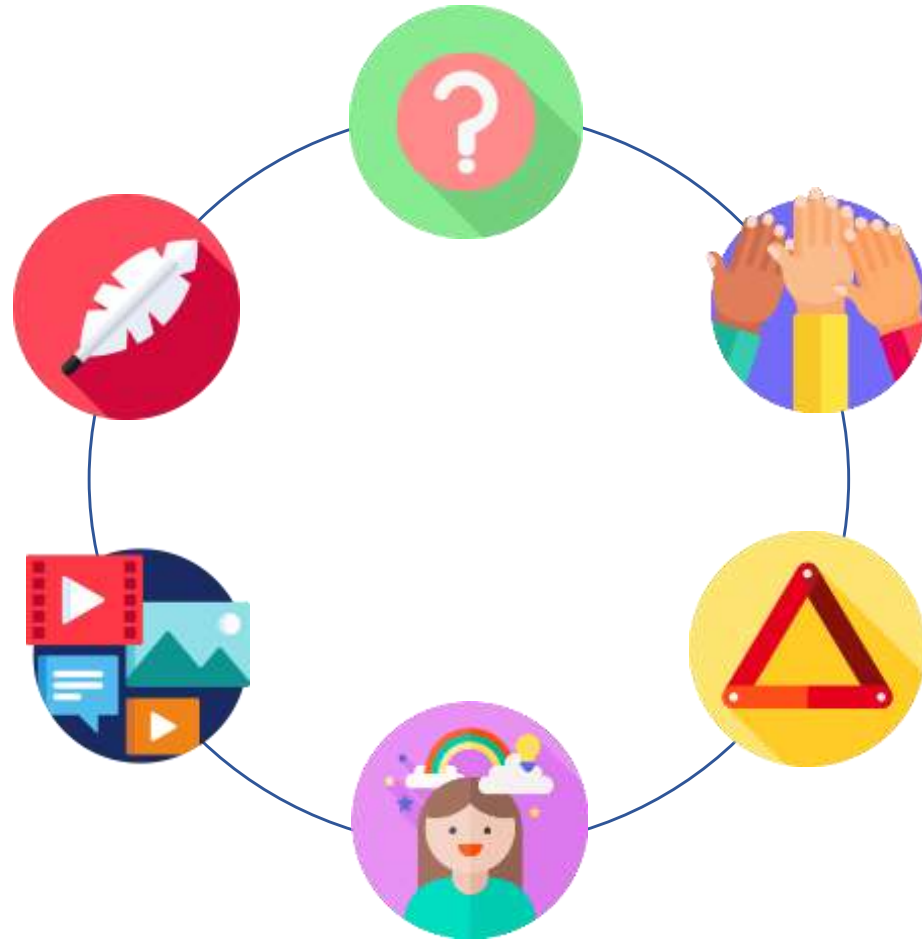
Adding a Hook



Tell a story

But all this dying took its toll on me, and before long I began losing sleep and appetite. Worse, I started to feel indifferent toward the patients, and only did what was required of my job, moving through my shifts like a robot. It turned out my problem was a common one for critical care nurses — that of compassion fatigue.

Adding a Hook



Stating Your Purpose

- My study aims to find a way to better control chromatic aberration.
- The aim of today's presentation is to examine the possibility that positive emotion can facilitate self-regulation.
- Today, I will show you how the use of this new model increases the range of flow patterns.
- In this presentation, I would like to report on an optimal waiting time at the theme park.
- In my presentation, I will argue that there is a link between cell phones and cancer.

NEXT WEEK

Revise your 1-min hook. Make the last sentence your purpose statement. Submit your revision unto NTU COOL and bring two hard copies to class.

Have fun!