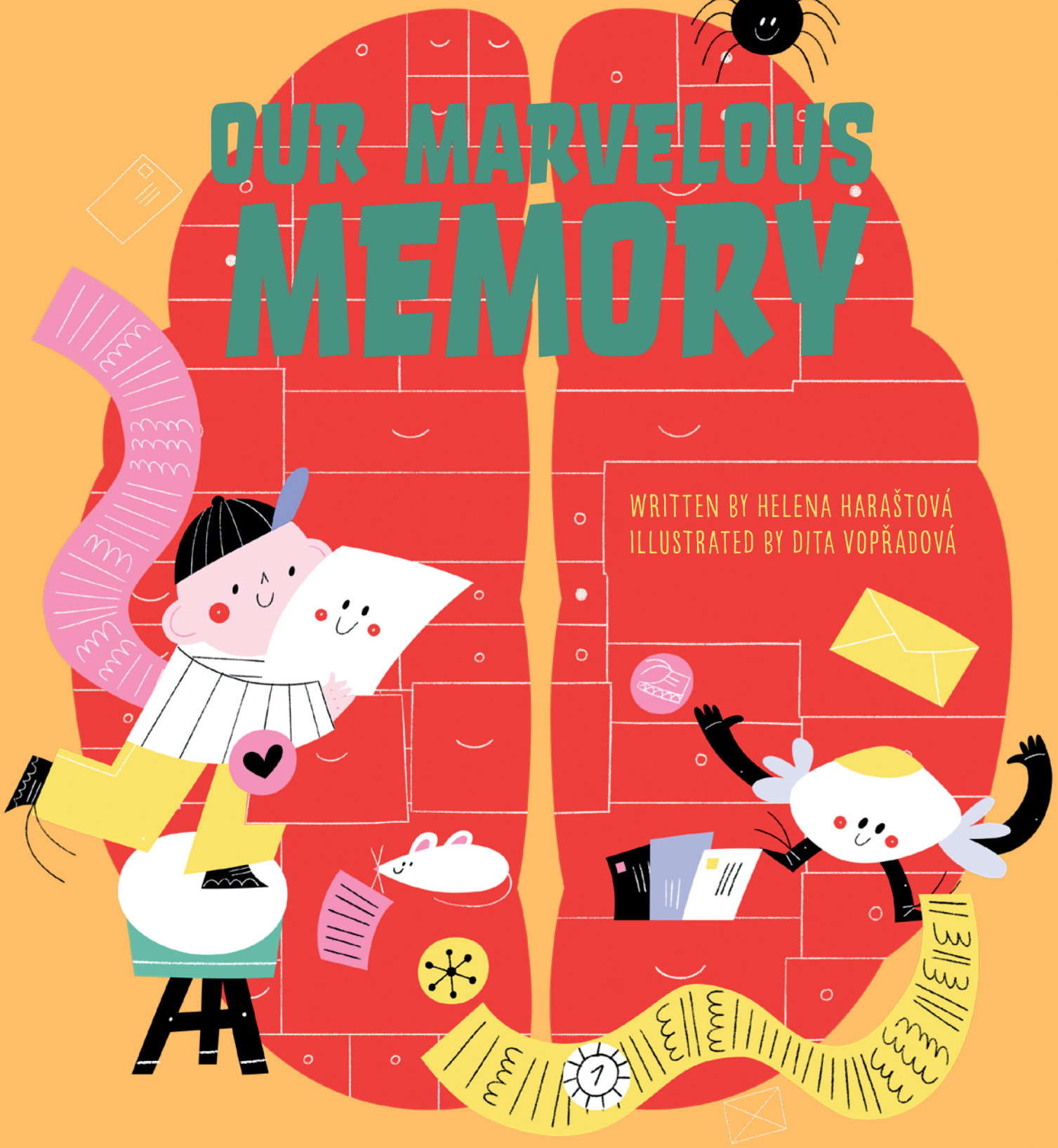
# OUR MARVELOUS MEMORY

WRITTEN BY HELENA HARAŠTOVÁ
ILLUSTRATED BY DITA VOPŘADOVÁ



## HOW YOUR BRAIN WORKS

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# WHAT IS MEMORY?

Look at this guy. Let's call him Charles. He may as well be an Oliver or an Annie. Till we know more about him, he remains a clean slate.

Think of your memory as an inner store of information about who you are. Your memory includes everything you know, learn, and experience – even things you have forgotten! All of this affects your **thinking** and **behavior**.


## WHAT FORMS US?

Have you ever wondered what makes you *you* (and not Charles or Annie)?

**MEMORY** – carefully guarded in the brain

**BODY** – what you look like and how you work

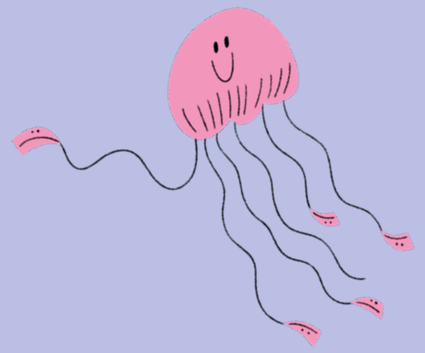
**GENES** – what you have inherited from your ancestors, giving you natural abilities

## DO ANIMALS AND PLANTS HAVE MEMORIES?

Yes and no. Every living thing learns from experience, but memory doesn't develop equally in all living things.

PLANTS HAVE MEMORIES. THEY REMEMBER EXPERIENCES OF DROUGHT, AND WHAT HELPED THEM SURVIVE IT.

DOGS HAVE AN EXCELLENT MEMORY, ESPECIALLY FOR SOUNDS AND SMELLS. THIS EXPLAINS YOUR PUP'S DELIGHT WHEN SHE HEARS YOUR CAR PULL UP.



ALTHOUGH JELLYFISH HAVE NO BRAIN, THEY REMEMBER BEHAVIOR THAT WILL BENEFIT THEM.

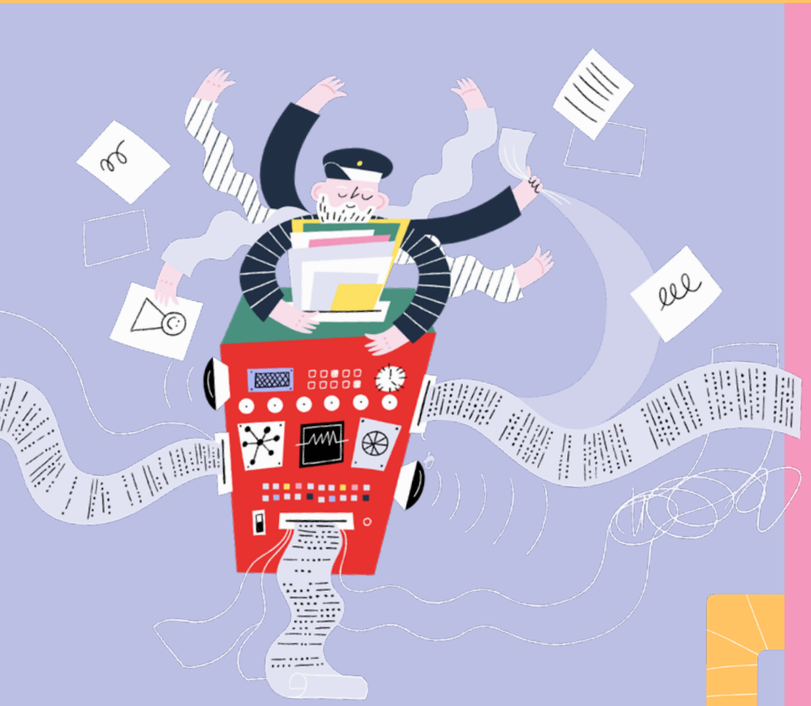


## MEMORY AS AN ARCHIVE

So, how is memory stored in the brain? Does it look in there like a museum archive, filled with cabinets, racks, and shelves? Are memories kept in drawers and folders, waiting for you to pull them out whenever you wish? Not quite. What affected you when you made the memory – sounds, colors, feelings, smells, and so on – is stored like individual parts of a complex puzzle.

When you inspect a memory, its pieces pop out from "drawers" to compose as perfect an image of the original as it can. At least one piece will be lost, however, and sometimes a piece from another, random drawer will mix in with the image . . . No memory is an exact copy of the original event.

# WHERE MEMORIES GO



## 1. ENCODING

You now know that the information that travels to your brain can affect your senses (in the form of sensory stimuli). But the brain cannot study each stimulus in depth as though no others exist: there are far too many of them for that. So the brain first encodes sensory stimuli. It is like having a device in your head that converts images into code.

## 2. PROCESSING

We have the code. Great! The hippocampus, our sea-horse friend, will read it for us. It compares and sorts data into categories, deciding which stimuli the brain will save in its long-term memory and which it will hold onto only briefly.




## 3. CONSERVATION

Memories worthy of long-term storage are kept safe in the regions of the cerebral cortex. To keep them active, you must use them regularly and often. This explains why you learn school materials better if you study for a few minutes every day rather than cramming right before a test.

## WHAT IS AN IMPRINT?

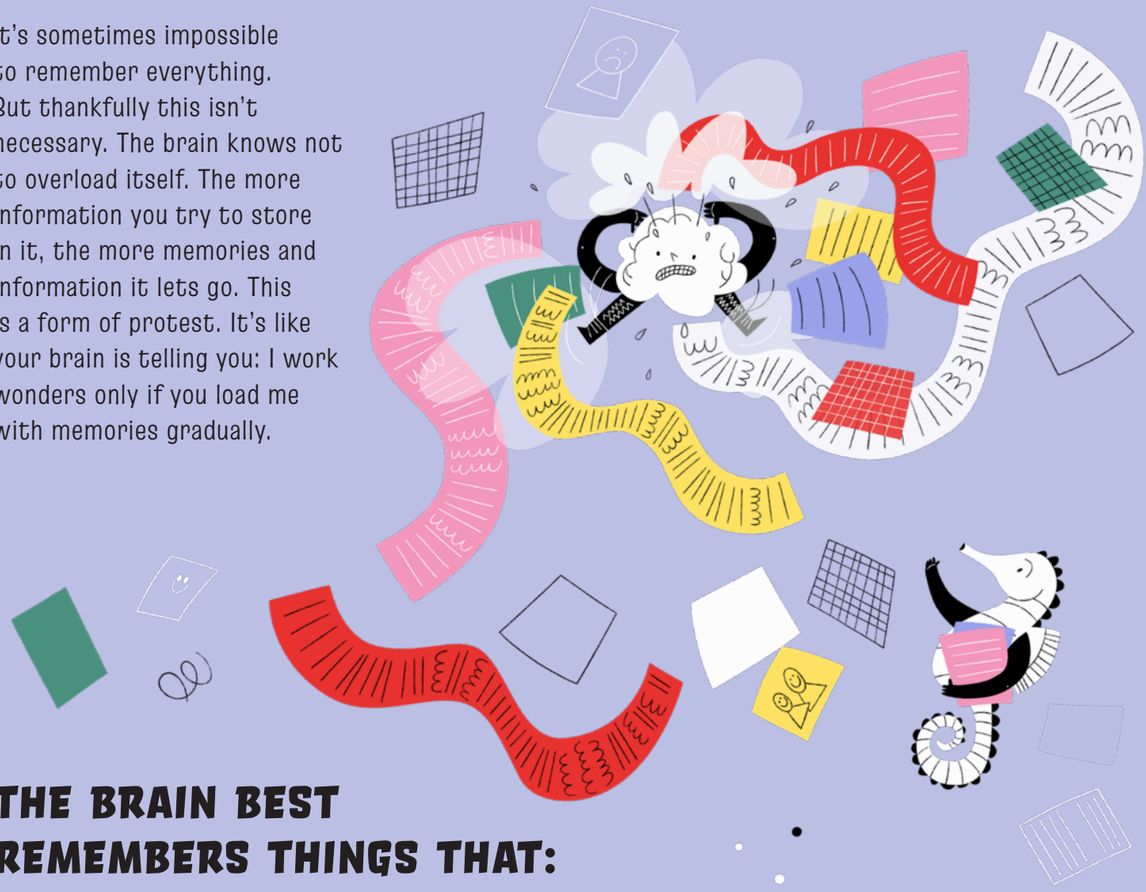
Sometimes what you experience affects your emotions. Although many experiences are unexpected and unpleasant, some come in a rush of joy. Called an **imprint**, this kind of memory stays with you your whole life. It usually refers to a major event, but it can also be something trivial (like when you mistakenly salted your grandma's cookies). What kinds of memories do you have from when you were little?

## 4. EVOKING

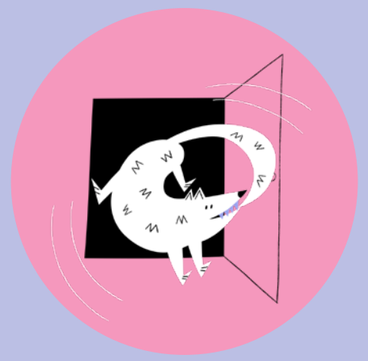
Regularly "evoking" a memory means it springs to mind quickly and easily whenever you need it. But don't forget that your brain will never create a perfect copy of an original event. A memory is always at least slightly distorted.

# WHAT YOU REMEMBER

It's sometimes impossible to remember everything. But thankfully this isn't necessary. The brain knows not to overload itself. The more information you try to store in it, the more memories and information it lets go. This is a form of protest. It's like your brain is telling you: I work wonders only if you load me with memories gradually.

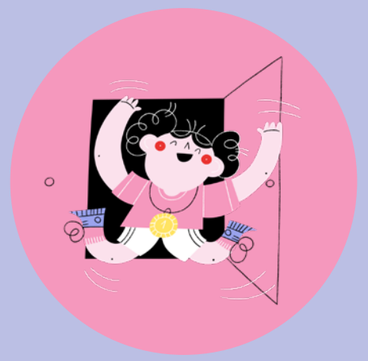


## THE BRAIN BEST REMEMBERS THINGS THAT:



– REPEAT. (BUT EVERY REPETITION REQUIRES YOU TO CONCENTRATE!)

– ARE UNUSUAL. (EVER SEEN A DANCING PIG WITH A PARASOL?)



– ARE CONNECTED WITH POWERFUL EMOTIONS. (REMEMBER HOW HAPPY YOU FELT ON THE WINNERS' PODIUM?)



## BOOST YOUR MEMORY

There are things you want and need to remember, like study materials or the present your grandma wants for her birthday. How can you help your memory?


SPEAK IT ALOUD. THIS WILL ENGAGE YOUR ECHOIC MEMORY.

EAT AND DRINK WELL, AND GET LOTS OF REST. THIS WILL KEEP YOUR MEMORY IN GOOD SHAPE!

KEEP A PICTORIAL RECORD. THE HUMAN BRAIN LOVES PICTURES.

WRITING INFORMATION DOWN MAKES IT EASIER TO REMEMBER.

USE MNEMONICS. THERE ARE RHYMES THAT CAN HELP YOU REMEMBER HOW TO TIE YOUR SHOELACES.

## MEMORY TRACKS

You don't have to be a detective to follow memory tracks. Sometimes they get left behind. Everyone knows what it's like to head for the kitchen, reach it, then forget what you went there for.

AS TONY WALKED INTO THE KITCHEN, HE REALIZED HE'D FORGOTTEN WHY HE'D GONE THERE.

SO HE WENT BACK TO HIS ROOM, WHERE HE'D BEEN PLAYING.

OF COURSE! HE'D WANTED TO FEED THE PARROT AND HE NEEDED A BOX OF BIRDSEED.

We have recently learned, for instance, that neurons in the brain react specifically to individuals. The reaction happens every time we see a certain person, hear their name, or see their image.

**Although the brain remains largely unexplored, scientists come up with new discoveries every year.**

We also now know that very strong memories (like those related to trauma) are hereditary – meaning they're passed from one generation to the next. We don't know yet how this happens . . .

Are you interested in the memory and how it works in the brain? Who knows? One day you might be a scientist yourself – and solve some of its mysteries . . .

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5. května 1746/22, Prague 4, Czech Republic
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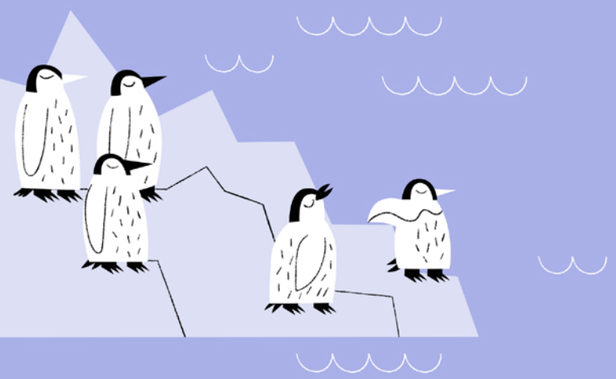
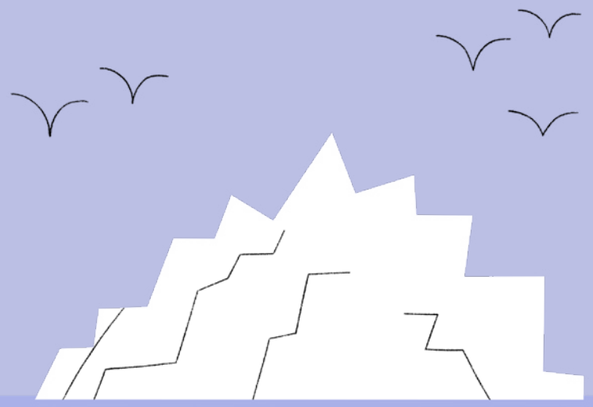
Translator: Andrew Oakland
Editor: Scott Alexander Jones




Graphics and typesetting: Martin Urbánek

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## ABOUT THE AUTHOR

Helena is neither a psychologist nor a neuroscientist, although she has secretly dreamed of such professions since childhood. Eventually, however, life guided her to the editorial office of a publishing house. As a result, her brain now deals with new, unexplored topics every day, and she enjoys it immensely! Her greatest inspiration for writing is when she can watch her five-year-old son and seven-year-old daughter play, talk, think, and simply grow (while their brains grow, too).

## WANT TO LEARN MORE?

- *Your Fantastic Elastic Brain: A Growth Mindset Book for Kids to Stretch and Shape Their Brains* by JoAnn Deak, PhD
- *Big Brain Book: How It Works and All Its Quirks* by Leanne Boucher Gill, PhD
- *Neurology for Kids: A Fun Picture Book About the Nervous System for Children* by Betty Nguyen and Brandon Pham
- *Hidden Brain* podcast from NPR

## A DEEPER UNDERSTANDING:

- **Amygdala** – A small but important part of the brain responsible for creating strong emotions (anger, rage, fear, etc.) and for storing memories associated with emotions.
- **Association** – A connection between two or more thoughts, feelings, or moods, based on a common element (i.e., a similarity).
- **Cerebellum** – A part of the brain responsible for maintaining balance and coordinating movements, it functions subconsciously.
- **Cortex** – The uppermost and youngest part of the human brain, which is very important because it is the seat of our consciousness.
- **Genes** – The basic units of heredity, found inside cells and to some extent determining our characteristics, temperament, appearance, etc.
- **Hippocampus** – One of the older parts of the brain, responsible for long-term memory and also for orientation in space.
- **Memory trace** – A specific imprint of a memory stored in our mind, which is in fact a reflection of reality in our consciousness.
- **Neuron** – A nerve cell, the basic unit of the nervous system, which is able to receive a signal, process it, and send it on.

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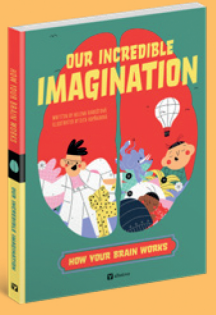
Have you ever wondered why it's a piece of cake for your brain to memorize some information, while it fails to remember others? And why is it that we don't remember what it was like when we were babies, but old people can often recall in detail experiences that are, say, eighty years old?

Come peek inside the fascinating world of the human brain and uncover the secrets of memory. The witty illustrations and simple texts in this book will help you understand why memory is so important to each of us, how it changes and develops over the course of a lifetime, and what we can do to make it as strong and reliable as possible.

Check out the other title in this series:




ISBN 978-80-00-07451-1
51695
9 788000 074511

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$16.95
Printed in China
by Leo Paper Group Ltd.
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