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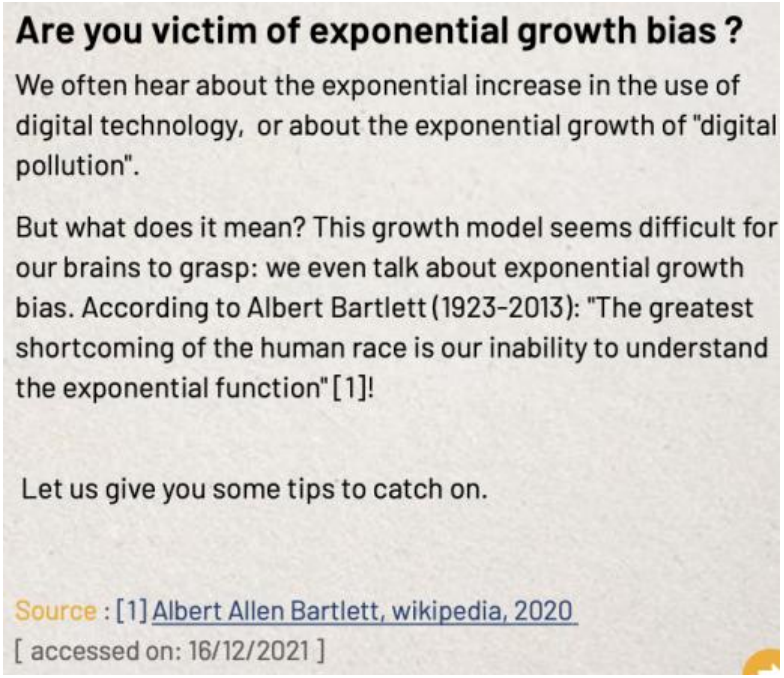
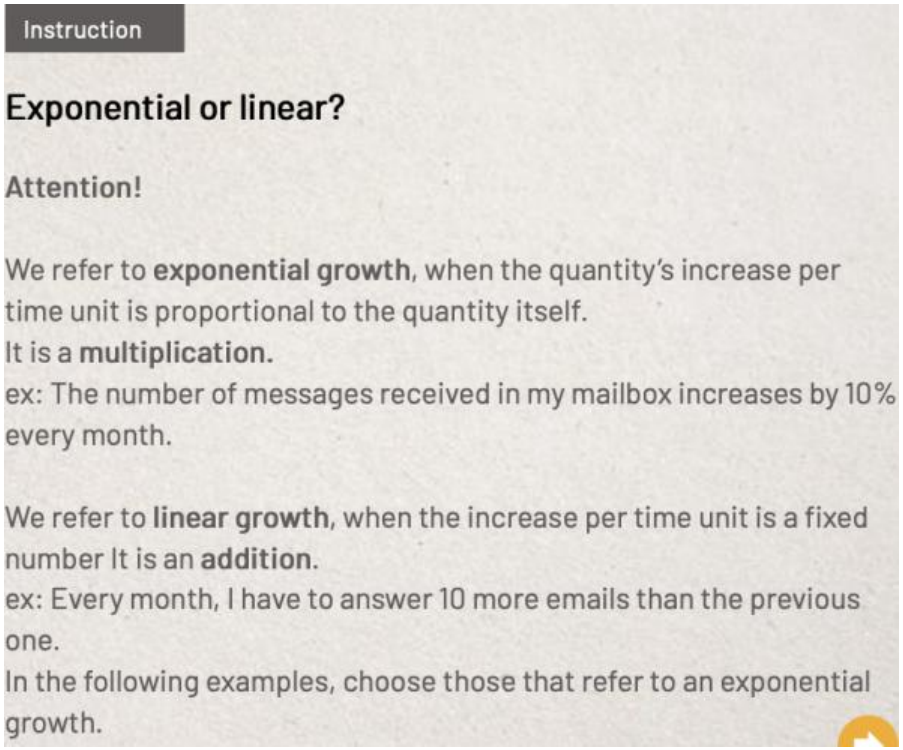
Activity 02.1 : Are you a victim of cases growth bias

Presentation of the context

In this section, we introduce you to the mathematical and computational tools that are essential for understanding and analysing indicators. They are used by scientists and the curious to know and understand, by politicians and companies to administer and govern, and by everyone to represent and communicate. It is important to master them to a certain extent in order to understand the issues and to be able to debate as an informed citizen.

On the subject of indicators, we often hear that they are increasing exponentially. We will start by familiarising ourselves with the concept of exponential growth. Then we will look at the global situation and compare different countries on two indicators, one environmental and one digital.

Capsule slide	Related text
	**Are you a victim of exponential growth bias ?** We often hear about the exponential increase in the use of digital technology, or about the exponential growth of "digital pollution". But what does it mean? This growth model seems difficult for our brains to grasp: we even talk about exponential growth bias. According to Albert Bartlett (1923-2013): "The greatest shortcoming of the human race is our inability to understand the exponential function" [1]! Let us give you some tips to catch on. Source : [1] Albert Allen Bartlett, wikipedia, 2020 [accessed on: 16/12/2021]

Capsule slide	Related text
	**Exponential or linear?** **Attention!** We refer to **exponential growth**, when the quantity's increase per time unit is proportional to the quantity itself. It is a **multiplication**. ex: The number of messages received in my mailbox increases by 10% every month. We refer to **linear growth**, when the increase per time unit is a fixed number. It is an **addition**. ex: Every month, I have to answer 10 more emails than the previous one. In the following examples, choose those that refer to an exponential growth.

Find the statements that speak of exponential growth

- GDP increased at an annual rate of 5% between 1950 and 1970. **(exponential growth)**
- Since 2010, the number of connected objects has multiplied by 10 every 5 years.Green IT, 2019 **(exponential growth)**
- The circumference of an oak tree increases by 1 to 1.5 cm per year.
- Digital technologies' contribution to global GHG emission is increasing by 6% every year. The Shift project, 2021 **(exponential growth)**
- I save 1000 more euros every year.
- The global amount of digital data doubles every 2-3 years. The conversation, 2021 **(exponential growth)**
- I keep my money in a savings account because the interest rate is 0.5% per year. The Shift project, 2021 **(exponential growth)**
- A youtuber uploads one more video on his channel every month.
- Worldwide final energy consumption by digital technologies is increasing by about 6% per year. **(exponential growth)**

	Feedback depending on the answer :

Capsule slide	Related text
You are a victim of exponential growth bias. Don't worry : you aren't the only one to struggle... Why does our brain understand nothing about the spread of Covid, of time. Remember that the exponential growth of an amount can exists in different ways : • a quantity that increases by x% per unit of time • a quantity that doubles per steady unit of time • or following geometric processing upper than 1 Therefore, a phenomenon managed by an exponential can increase extremely fast and unexpectedly, unlike a linear phenomenon.	**Feedback 1 :** *(if 4 or more answers are incorrect)* "You are a victim of exponential growth bias. "Don't worry : you aren't the only one to struggle... Pourquoi notre cerveau ne comprend rien à la propagation du coronavirus, le temps. OR **Feedback 2 :** *(if all answers are correct)* "No doubt, exponential and linear growth bias are both extremely clear for you!" OR **Feedback 3 :** *(if 2-3 or more answers are incorrect)* "You have the basics down, but there may be some gaps..." **Feedback common to all responses :** Remember that the exponential growth of an amount can exists in different ways : • a quantity that increases by x% per unit of time, • a quantity that doubles per steady unit of time, • or following geometric processing upper than 1. Therefore, a phenomenon managed by an exponential can increase extremely fast and unexpectedly, unlike a linear phenomenon.

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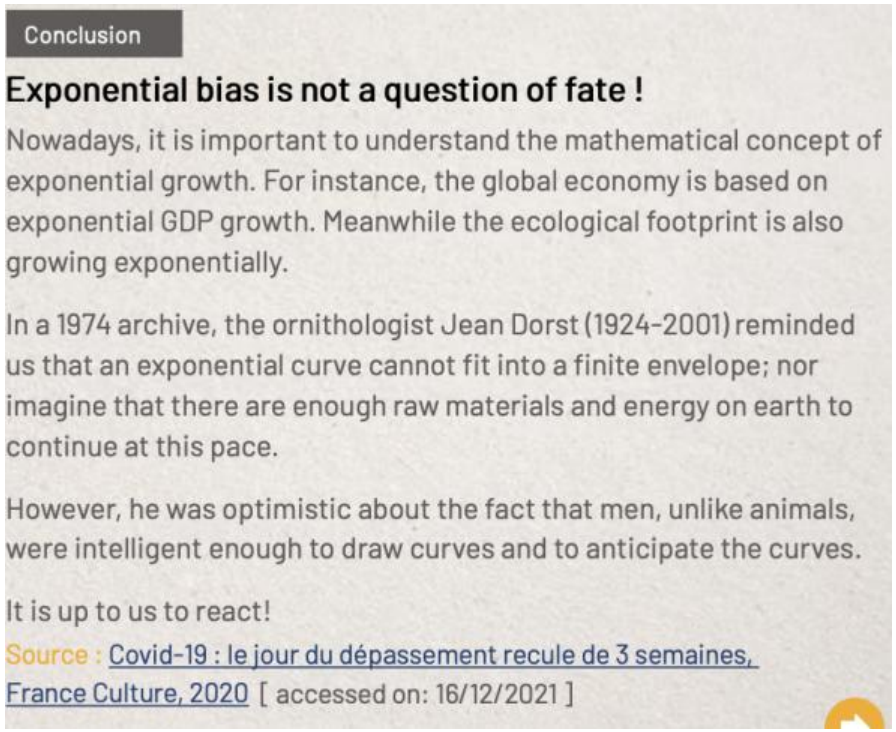	**Conclusion** **Exponential bias is not a question of fate !** Nowadays, it is important to understand the mathematical concept of exponential growth. For instance, the global economy is based on exponential GDP growth. Meanwhile the ecological footprint is also growing exponentially. In a 1974 archive, the ornithologist Jean Dorst (1924-2001) reminded us that an exponential curve cannot fit into a finite envelope; nor imagine that there are enough raw materials and energy on earth to continue at this pace. However, he was optimistic about the fact that men, unlike animals, were intelligent enough to draw curves and to anticipate the curves. It is up to us to react! Source : Covid-19 : le jour du dépassement recule de 3 semaines, France Culture, 2020 [accessed on: 16/12/2021]

If you wish to go deeper into certain concepts

The Mechanisms and limits of exponential growth explains the difference between linear and exponential growth and describes the mechanisms and limits of exponential growth.

Credits:

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