Perception and prediction of non-linear changes

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General paradigm

Increase

The number of dots increases in different ways

Task: viewing dots increase in a tank for 5 seconds

Questions:

Estimation: How many dots are there in the tank after 5 seconds?
Prediction: How many dots will there be in the tank in 5 more seconds?

Decrease

The number of dots decreases in different ways

Task: viewing dots decrease in a tank for 5 seconds

Questions:

Estimation: How many dots are there in the tank after 5 seconds?
Prediction: How many dots will there be in the tank in 5 more seconds?
Prediction: How many more seconds will it take for the tank to be left with only 1 dot?

Exponential changes

Decrease

Linear
\[ y = \frac{200 - 99.5}{5}x \]

Exponential convex
\[ y = 200e^{-x/1.89} \]

Exponential concave
\[ y = 201 - e^{-x/1.89} \]

Increase

Linear
\[ y = \frac{(199/5)x}{1} + 1 \]

Exponential convex
\[ y = e^{x/0.94} \]

Exponential concave
\[ y = 200(1 - e^{-x/0.94}) + 1 \]

People severely under-predict exponential convex growth in the future

People severely under-predict exponential concave decay in the future