

## Cognate/Professional Electives

ARIMA



Let's understand  
the heartbeat of  
ARIMA



## Cognate/Professional Electives

Past Influences the Present

The Essence of  
AR



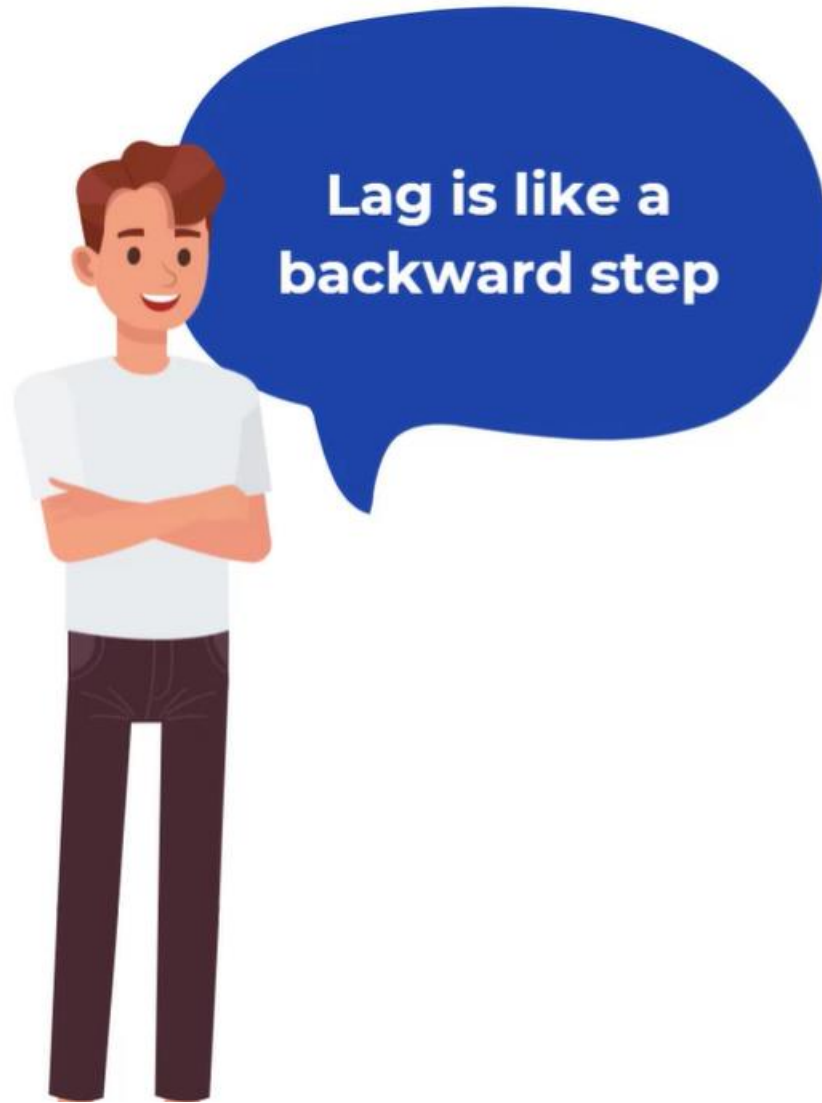
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like using past days' coffee consumption to predict tomorrow's.

The AR component predicts based on past values of your time series



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**It's All About Lags**  
(Previous data points)

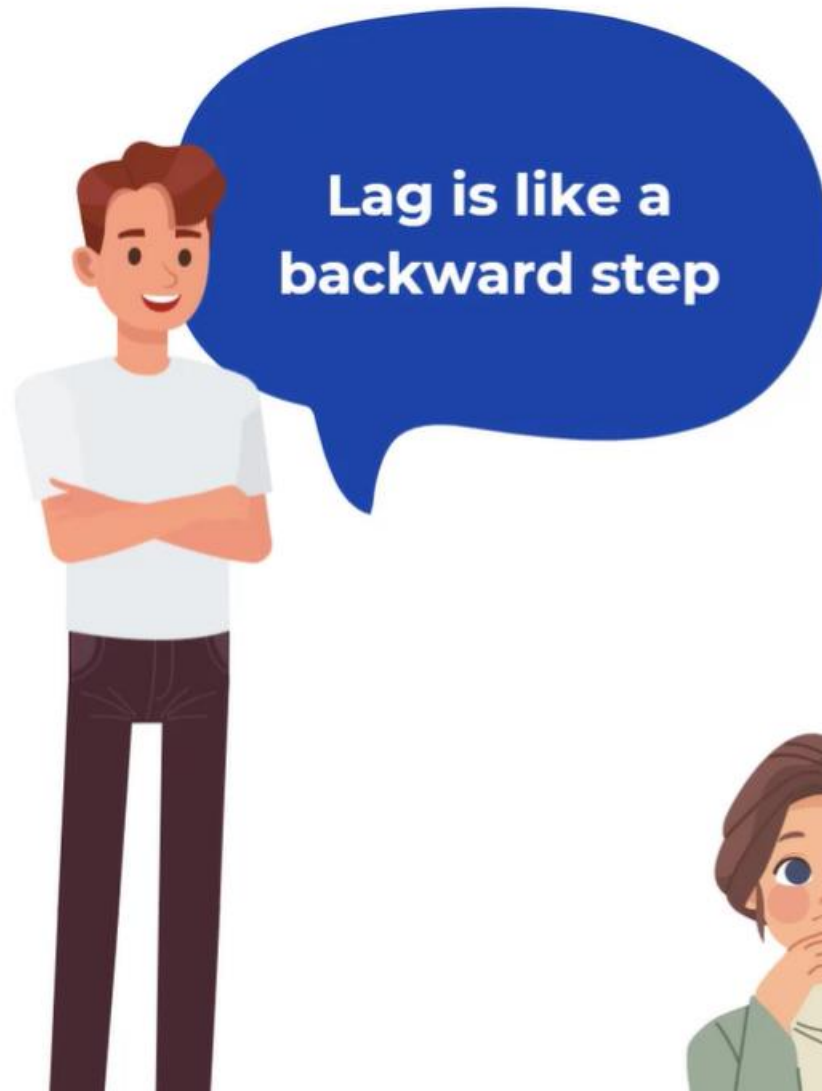
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Lag 1 means  
yesterday's coffee!



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## Cognate/Professional Electives

A R I M A

p

number of  
lagged values

The AR Part of  
ARIMA:  
A Closer Look





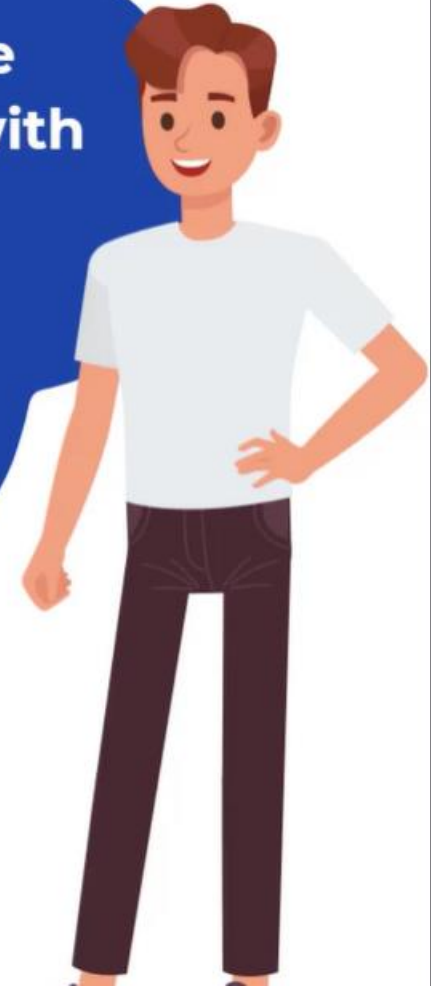
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EXAMPLE

ARIMA(2, d, q)

Today's Coffee =  $\alpha + \phi_1 * \text{Yesterday's Coffee} + \phi_2 * \text{Day Before Yesterday's Coffee} + \dots$

Now let's see how it works with the coffee example!





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EXAMPLE

$ARIMA(2, d, q)$

Today's Coffee =  $\alpha + \phi_1 * \text{Yesterday's Coffee} + \phi_2 * \text{Day Before Yesterday's Coffee} + \dots$

$\alpha = \text{constant}$

$\phi_1, \phi_2, \dots = \text{coefficients}$

Now let's see how it works with the coffee example!



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You know why  
it's cool?

- AR captures past's impact on now.

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- AR captures past's impact on now.
- AR is super powerful in such time series where patterns and trends are important.



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Wrapping Up  
the AR  
Component

It's basically using past to  
predict the future.

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A cartoon illustration of a man with brown hair, wearing a light blue t-shirt and dark brown pants. He is standing and smiling. A large yellow speech bubble is positioned to his left, containing the text 'So what is Stationarity?'.

So what is  
Stationarity?

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consistent in speed (**mean**), shake (**variance**),  
and rhythm (**covariance**) over time.

It's like an old  
train!





## Cognate/Professional Electives

consistent in speed (mean), shake (variance),  
and rhythm (covariance) over time.

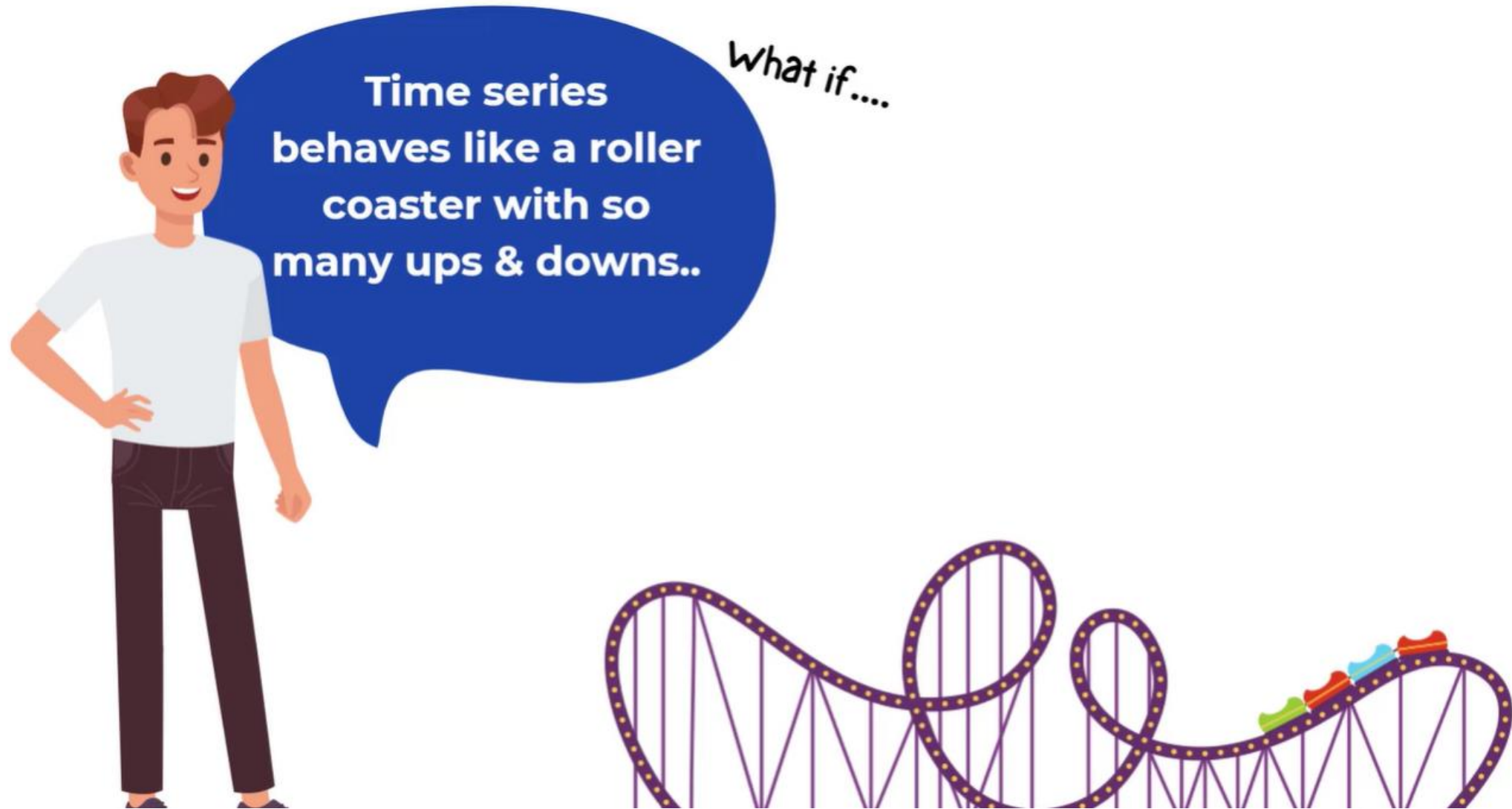
It has stable  
patterns which make  
predictions easier.



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## Cognate/Professional Electives

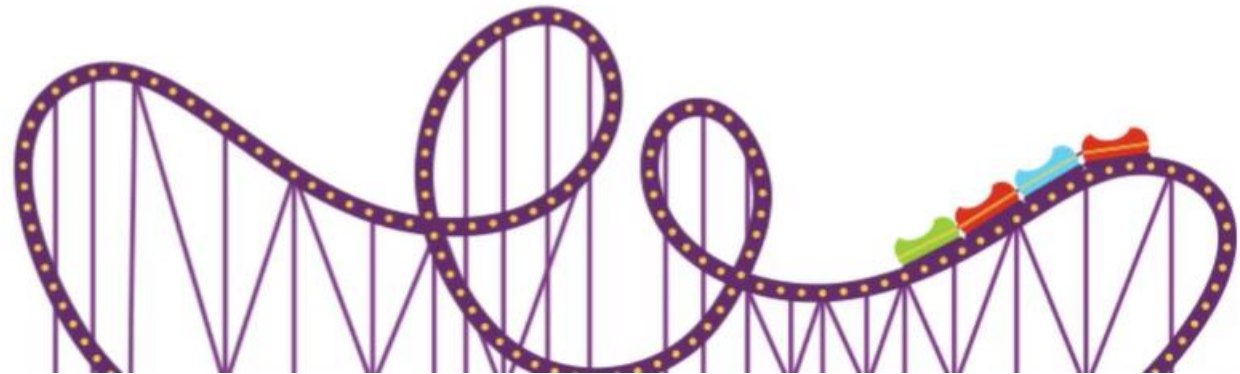


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## DIFFERENCING

Subtracting consecutive days gives a steadier, predictable series.



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It determines the needed differencing for stationarity.

The Integrated Component in ARIMA



## Cognate/Professional Electives

It determines the needed differencing for stationarity.

### EXAMPLE

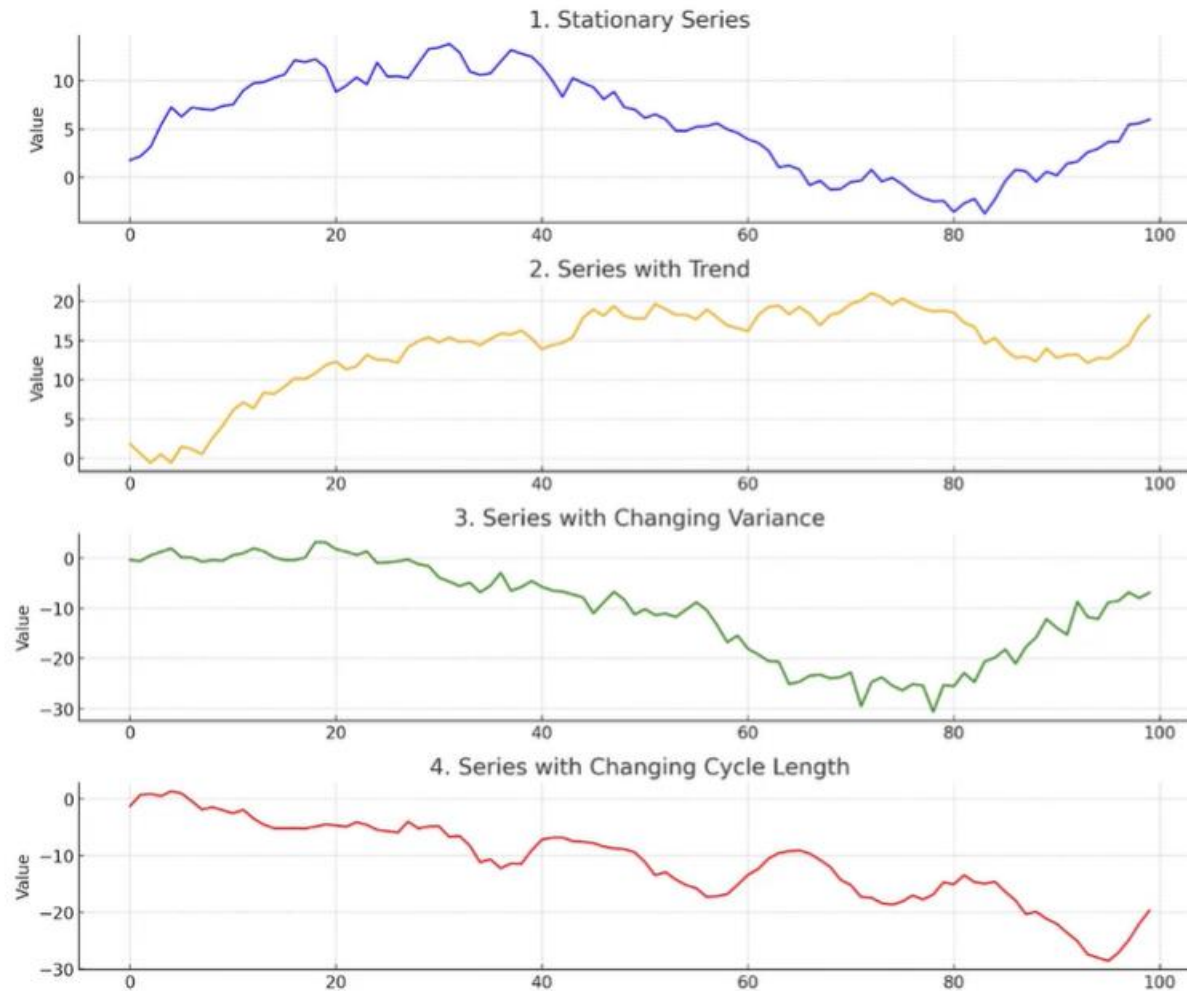
If a single differencing stabilizes our data, it's ARIMA with 'I' set at 1.

The Integrated Component in ARIMA





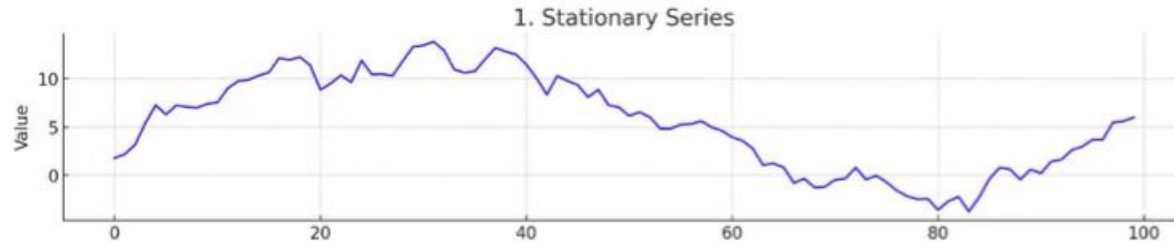
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**Stationarity in  
Action: A  
Visualization**

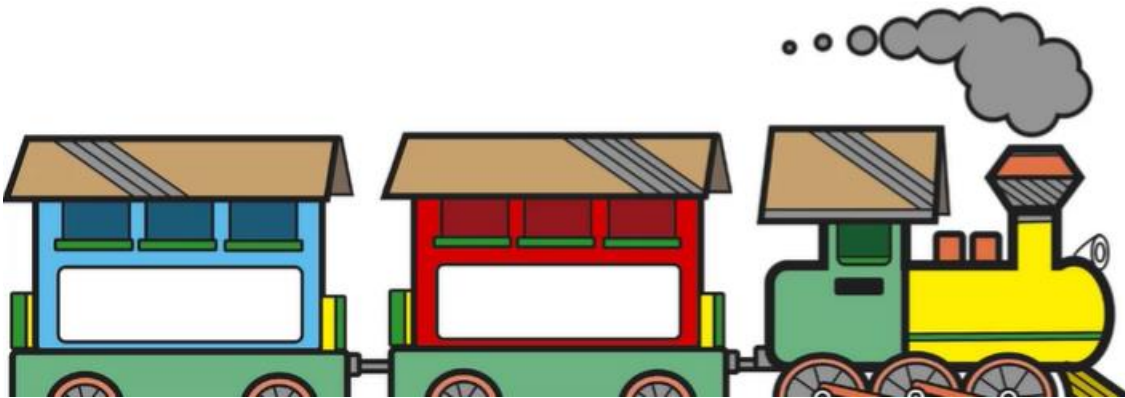


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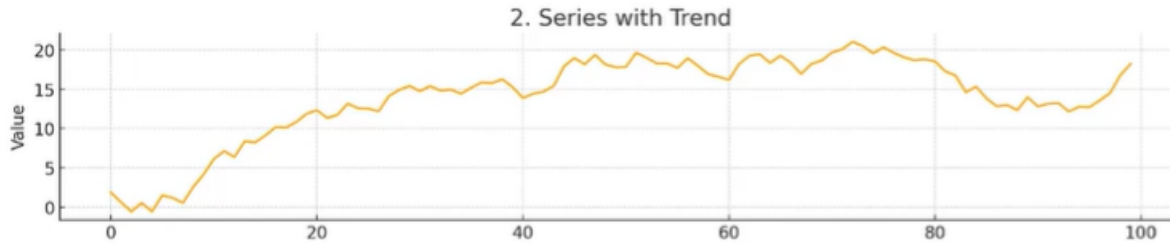


1st graph..

- Stable patterns
- Stationary



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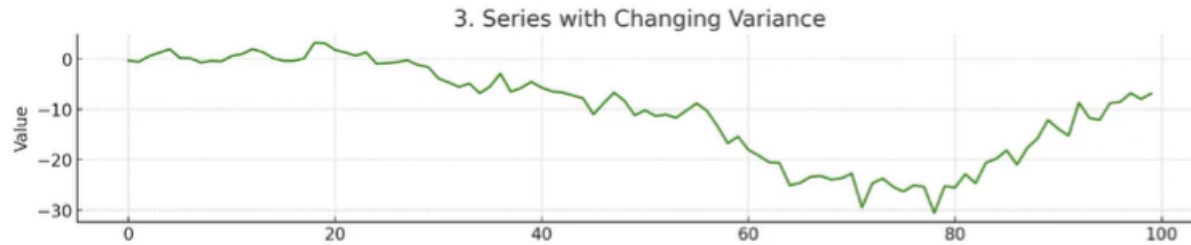


2nd graph..

- Growing mean
- Non-stationary.

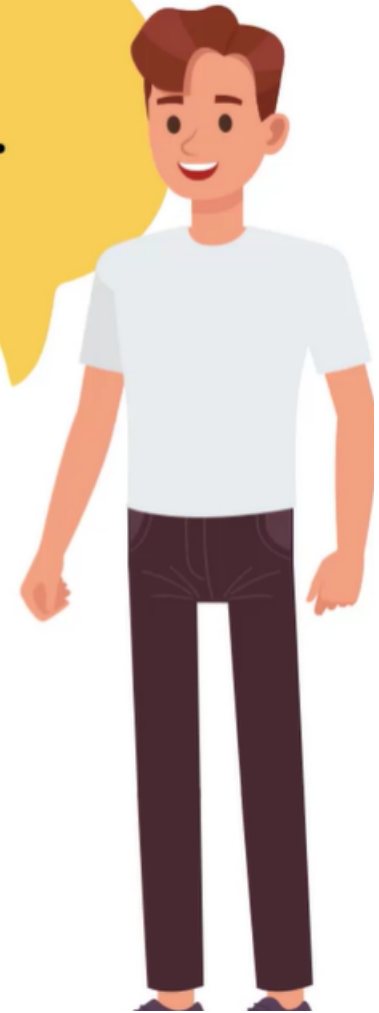


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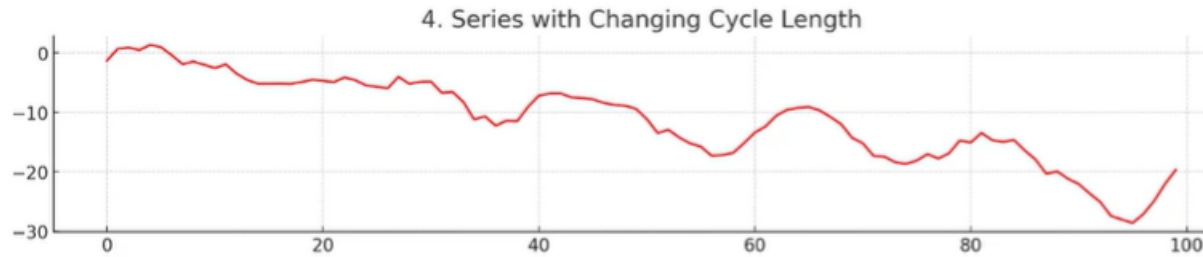


- Varying amplitudes
- Non-stationary

3rd graph..



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- Varying cycles
- Non-stationary

4th graph..

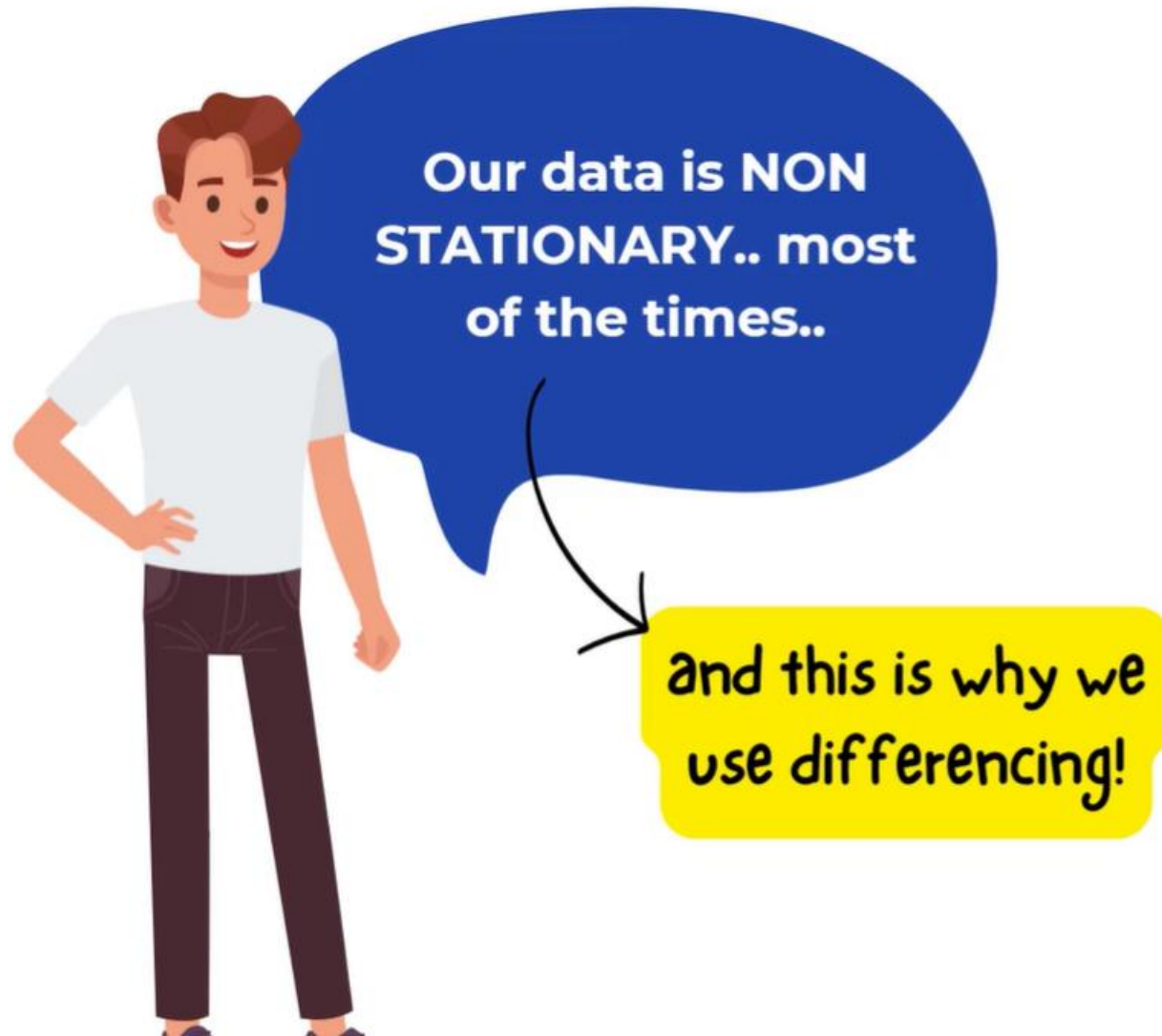


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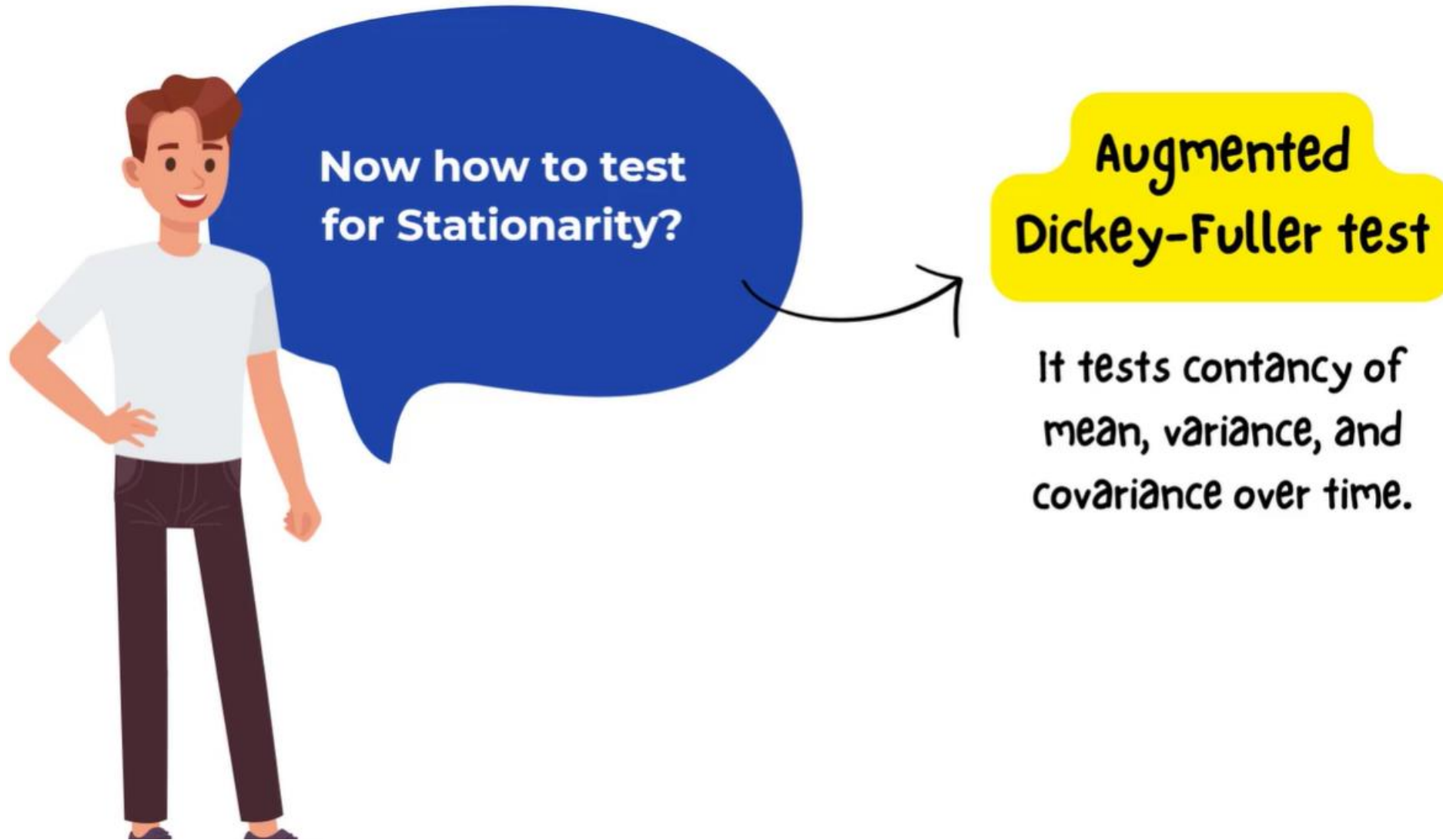




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## Cognate/Professional Electives



# Moving Average Component



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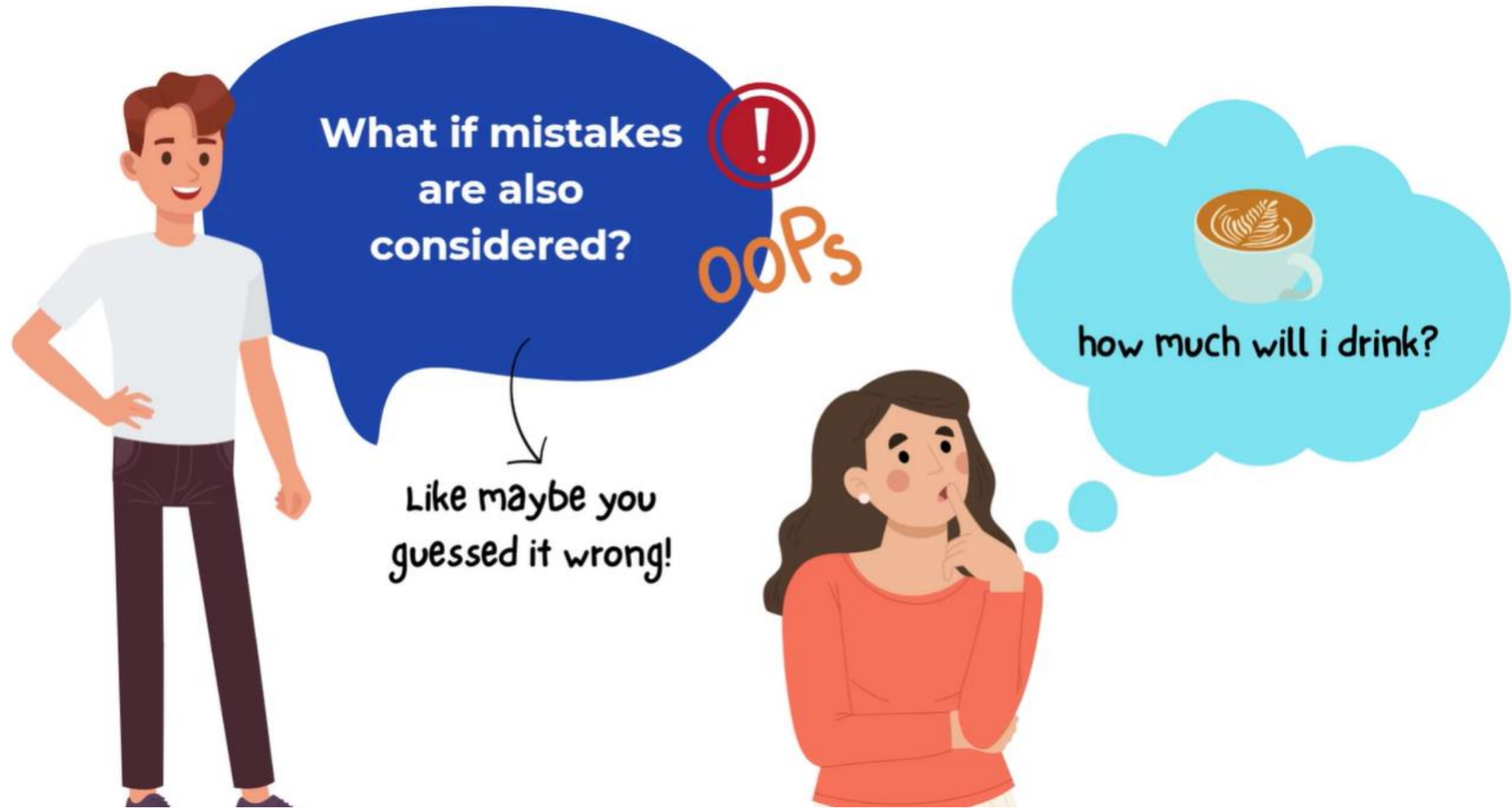


## Cognate/Professional Electives



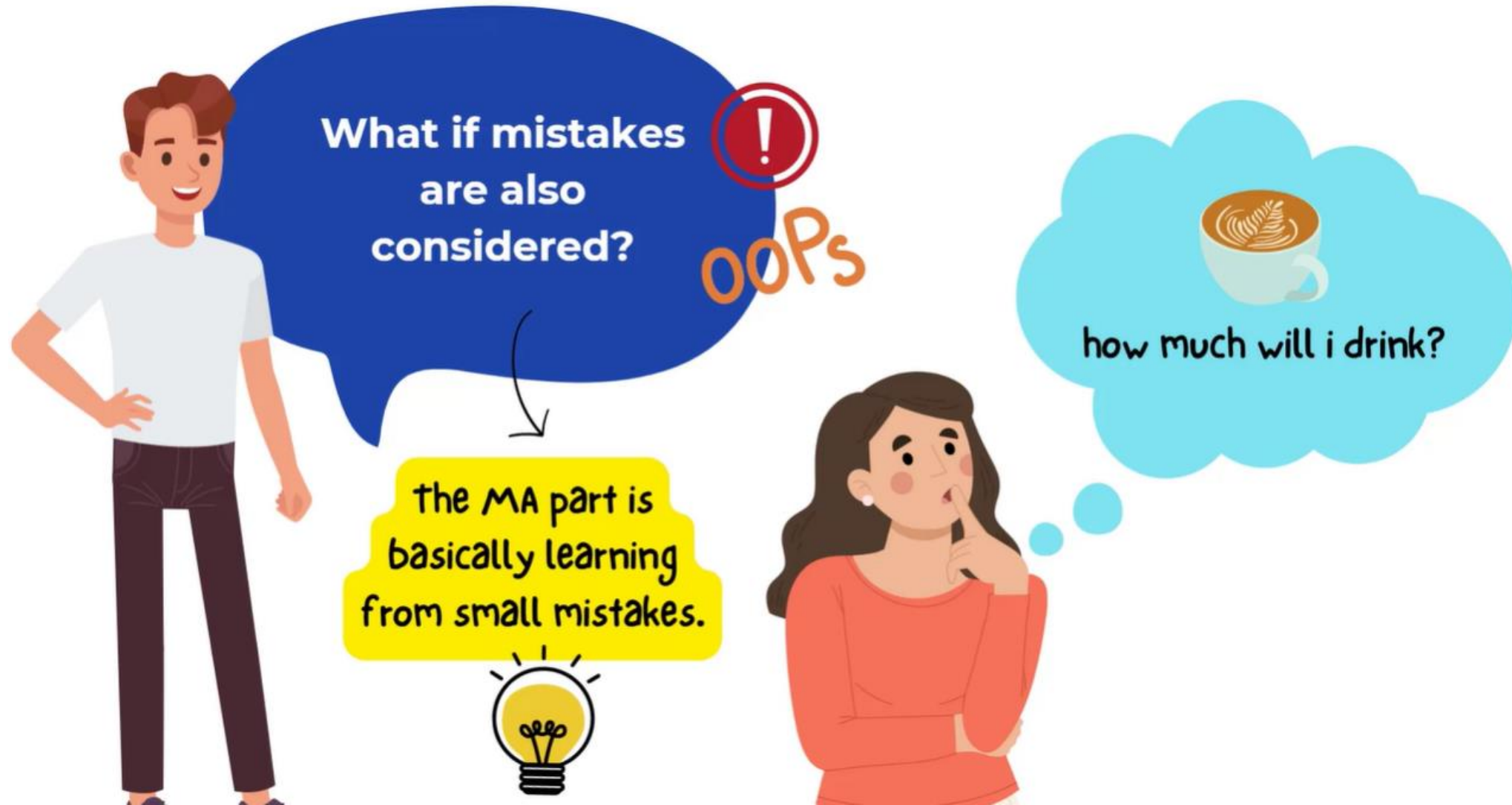


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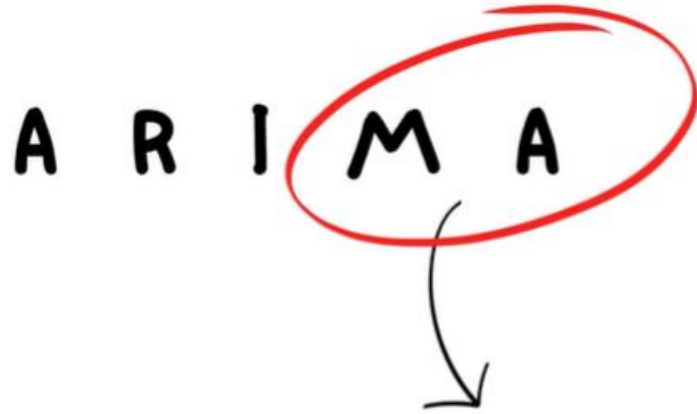


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## Cognate/Professional Electives

A R I **MA**

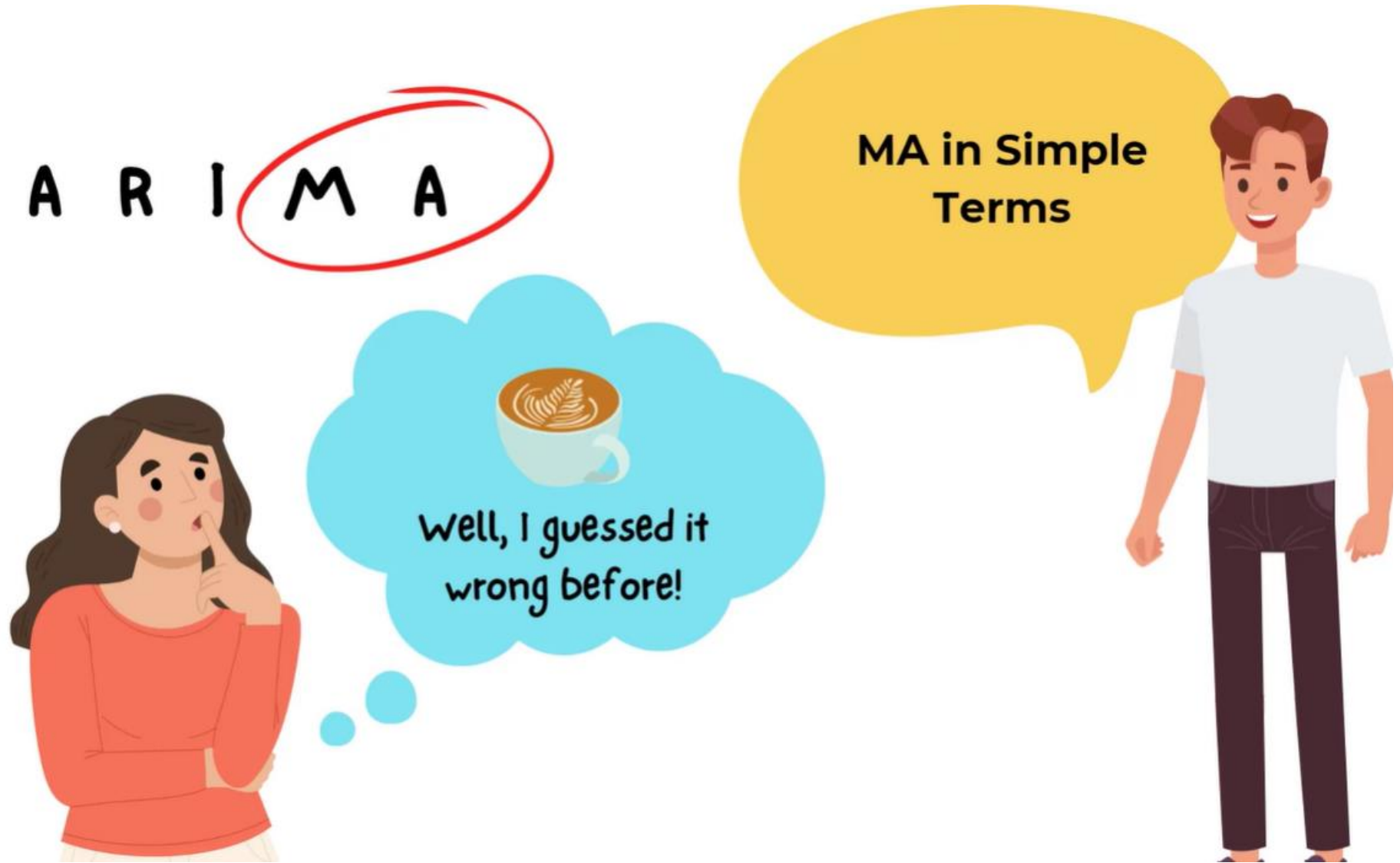
The letters 'A', 'R', 'I', 'M', and 'A' are spaced out horizontally. A red oval is drawn around the 'M' and the final 'A'. A black arrow points from the bottom of this oval down towards a yellow callout box.

examines past  
prediction errors.

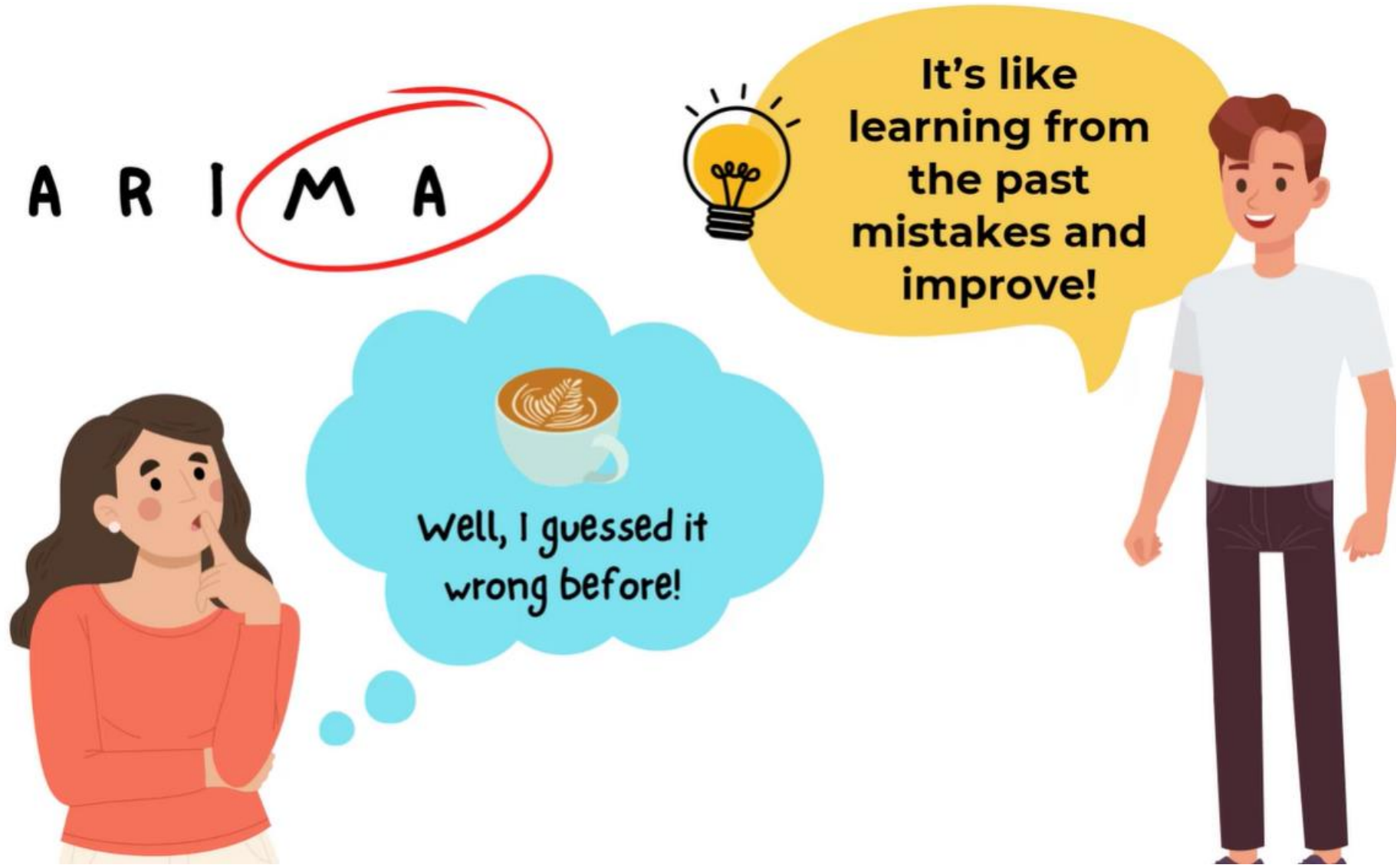
MA in Simple  
Terms



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## Cognate/Professional Electives

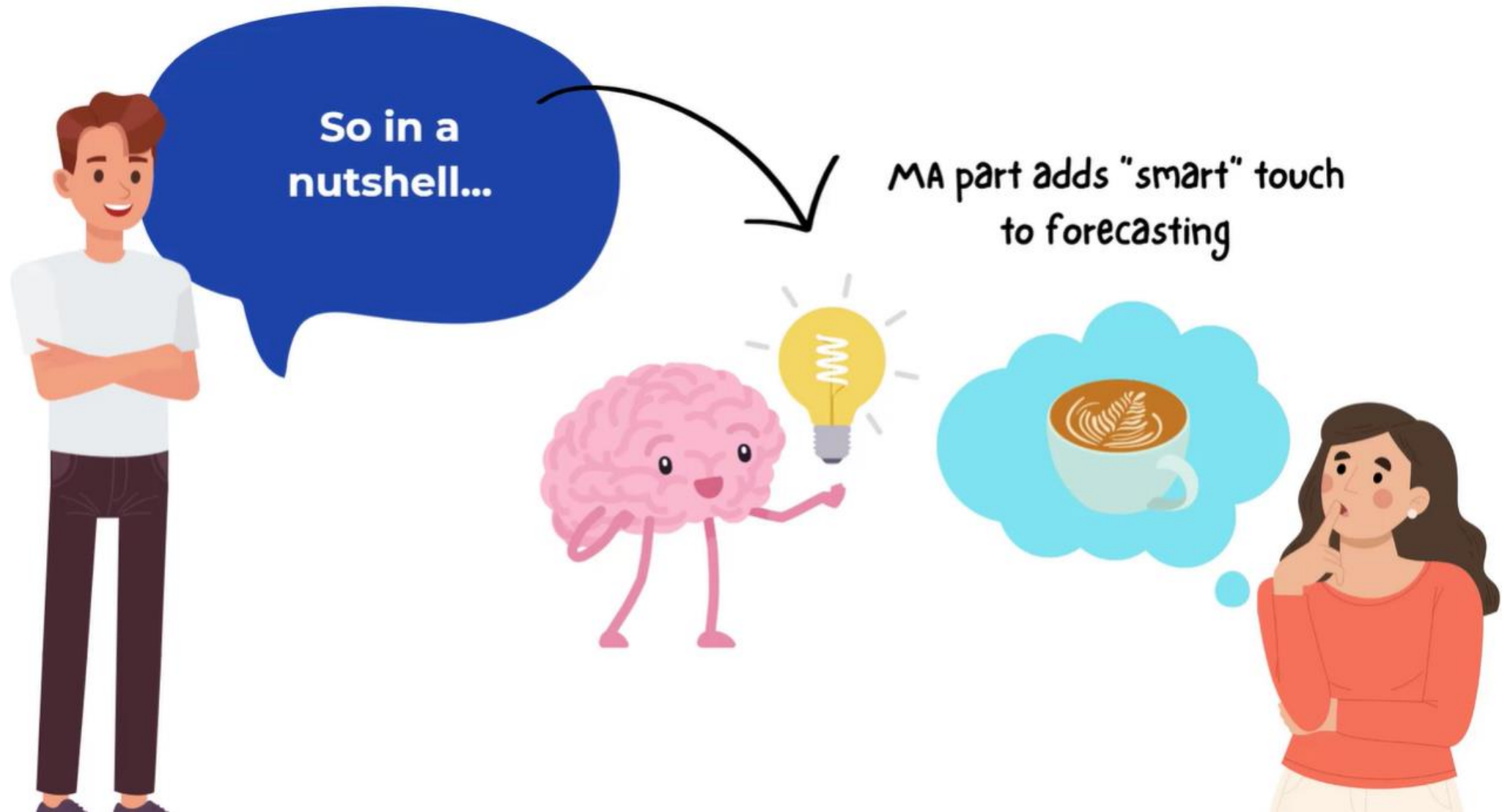


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**Thank you very much for listening.**