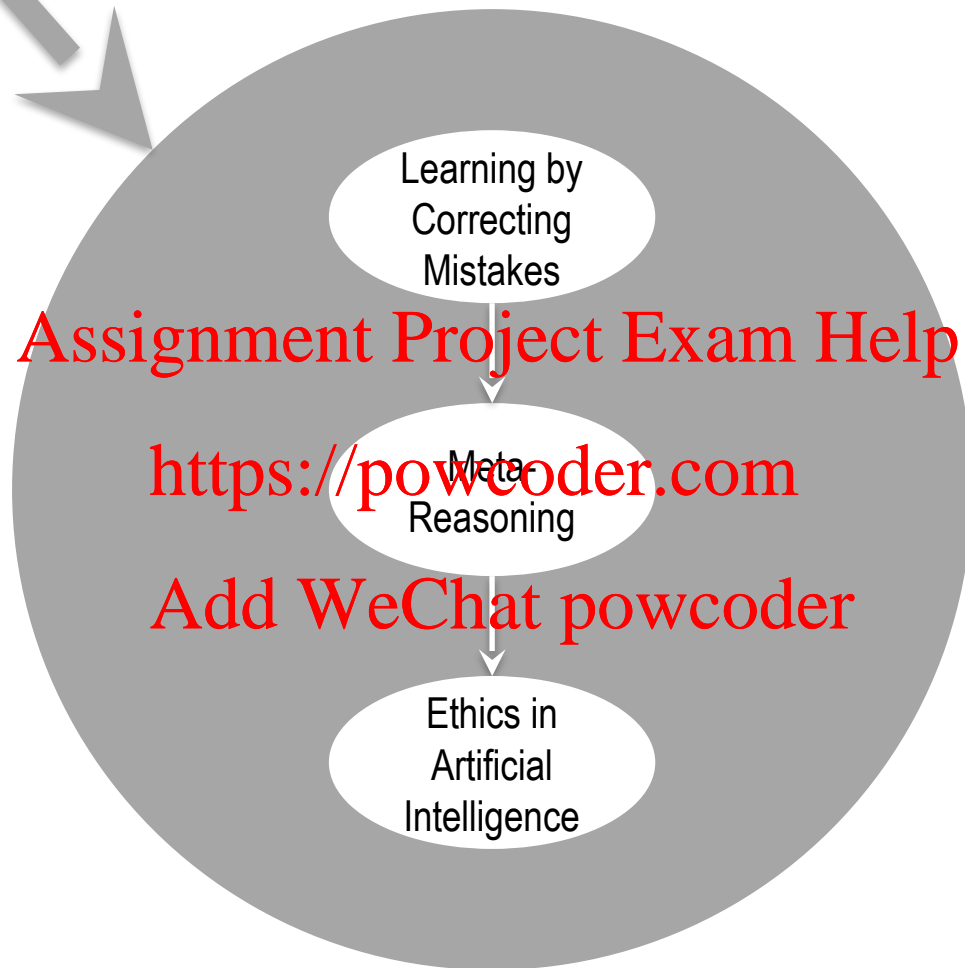


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Learning by  
<https://powcoder.com>  
Correcting

Mistakes  
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# Metacognition



# Lesson Preview

- Explanation-based learning revisited
- Isolating mistakes
- Explaining mistakes
- Correcting mistakes

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## **A Cup**

---

A cup is an object that is stable and enables drinking.

## **An Object**

---

This object is light and made of porcelain. It has a decoration, a concavity, and a handle. The bottom is flat.

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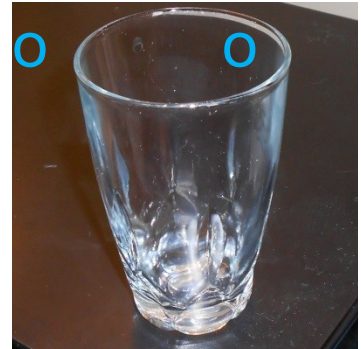
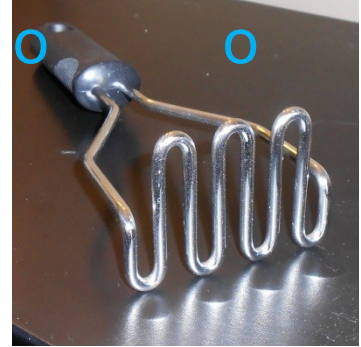
Can we prove this object is a cup?

Which of these objects are cups? Check the box in the top left for each cup.

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Which of these objects meet our definition of a cup? Check the box in the top right for each object that meets our definition.



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## A Cup

---

A cup is an object that is stable and enables drinking.

## An Object

---

This object is light and made of porcelain. It has a decoration, a concavity, and a handle. The bottom is flat.

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Can we prove this object is a cup?



# Questions for Learning from Mistakes



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1. How can the agent isolate the error in its former model?
2. How can the agent explain the problem that led to the error?
3. How can the agent repair the model to prevent the error from recurring?

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handle-  
fixed

handle-  
moves

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# Algorithm for Isolating Mistakes

To find suspicious true-success relations:

Intersect all true successes ( $\cap T$ )

Union all false successes ( $\cup F$ )

Remove assertions in union from  
intersection ( $\cap T - \cup F$ )

To find suspicious false-success relations:

Intersect all false successes ( $\cap F$ )

Union all true successes ( $\cup T$ )

Remove all assertions in union from  
intersection ( $\cap F - \cup T$ )

## Old Rule

If:

Object has bottom

Bottom is flat

Object has  
concavity

Object is  
lightweight

Object has a  
handle

Then:

Object is a cup

## New Rule

If:

Object has bottom

Bottom is flat

Object has  
concavity

Object is  
lightweight

Object has a  
handle

Handle is fixed

Then:

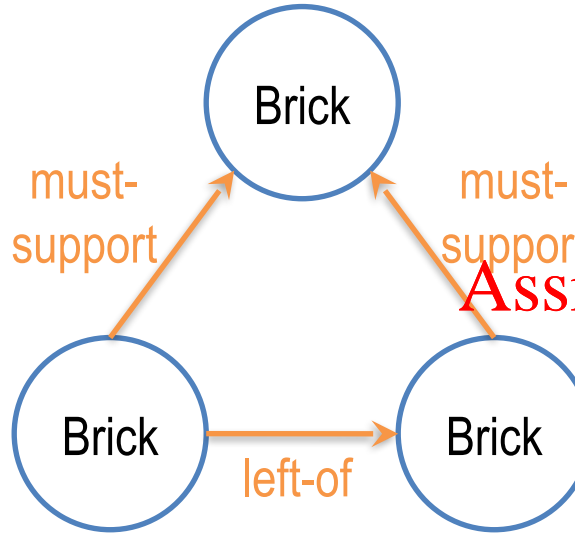
Object is a cup

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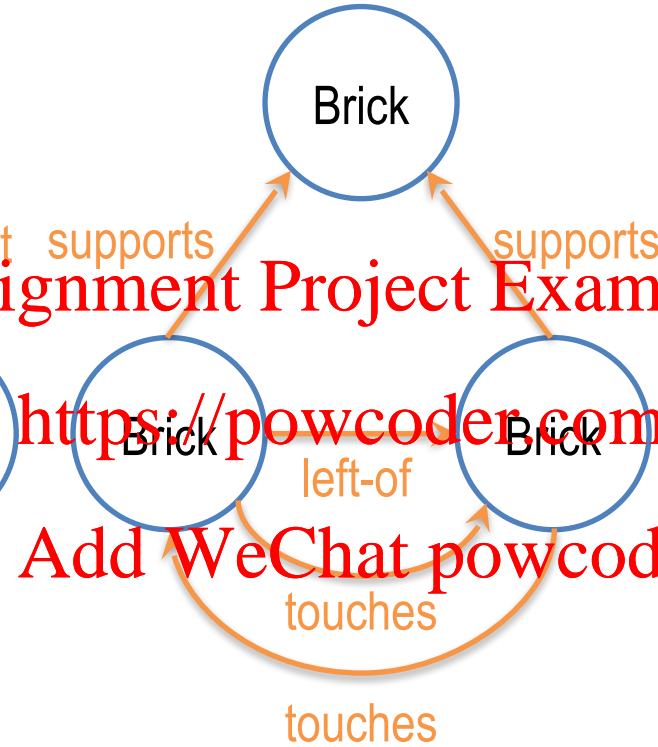
<https://powcoder.com>

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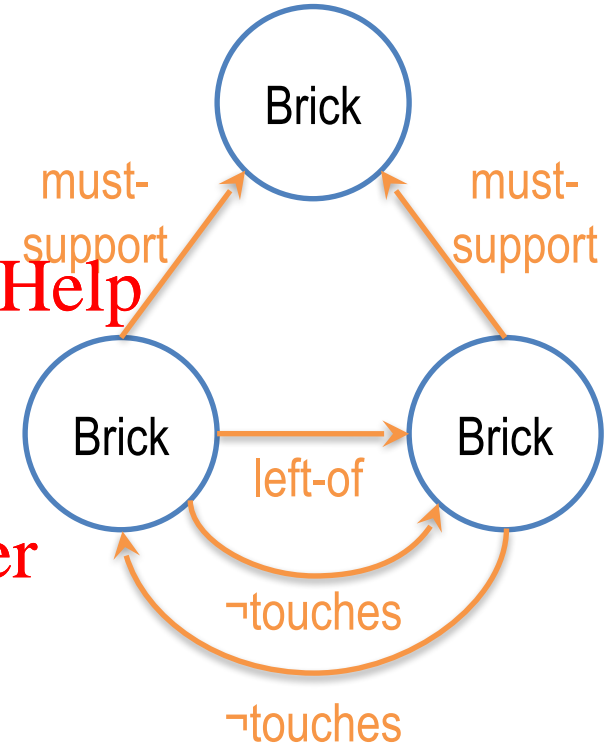
Current Concept



Not an Arch



New Concept



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# Questions for Learning from Mistakes

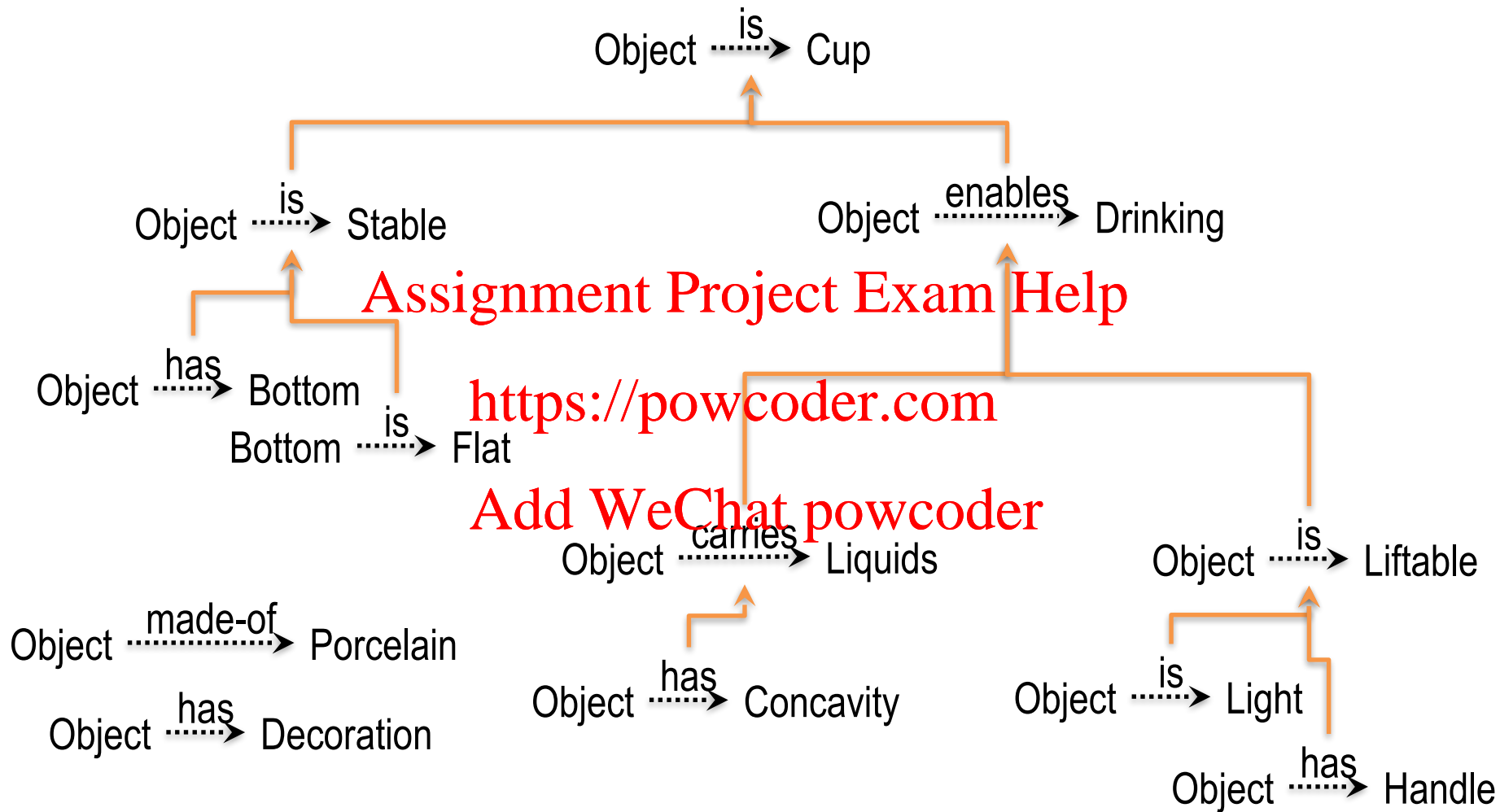


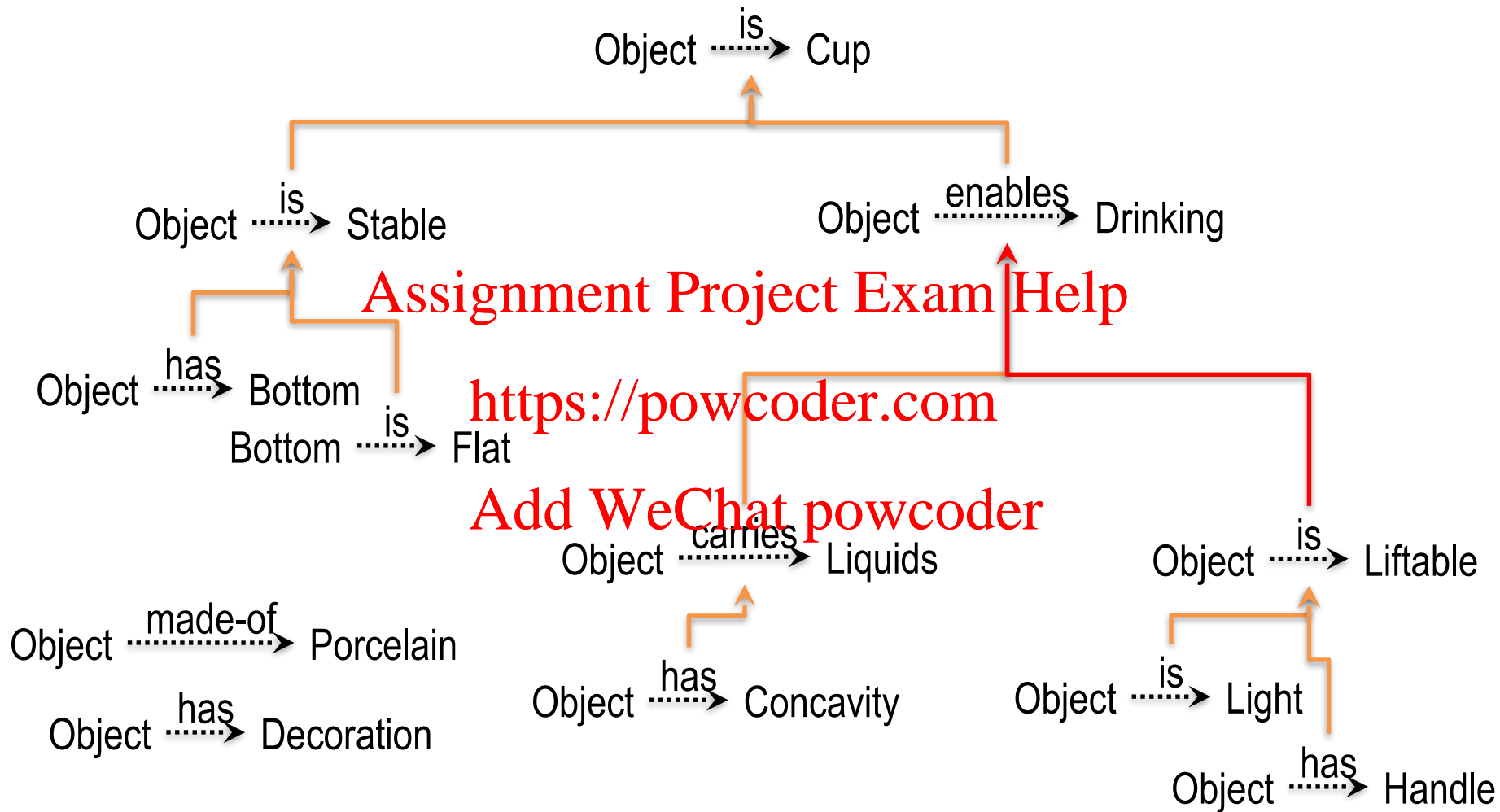
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1. How can the agent isolate the error in its former model?
2. How can the agent explain the problem that led to the error?
3. How can the agent repair the model to prevent the error from recurring?





Object .....is> Cup

Object .....enables> Drinking

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Object .....carries> Liquids

Object .....is> Lifiable

Object .....has> Concavity

Object .....is> Light

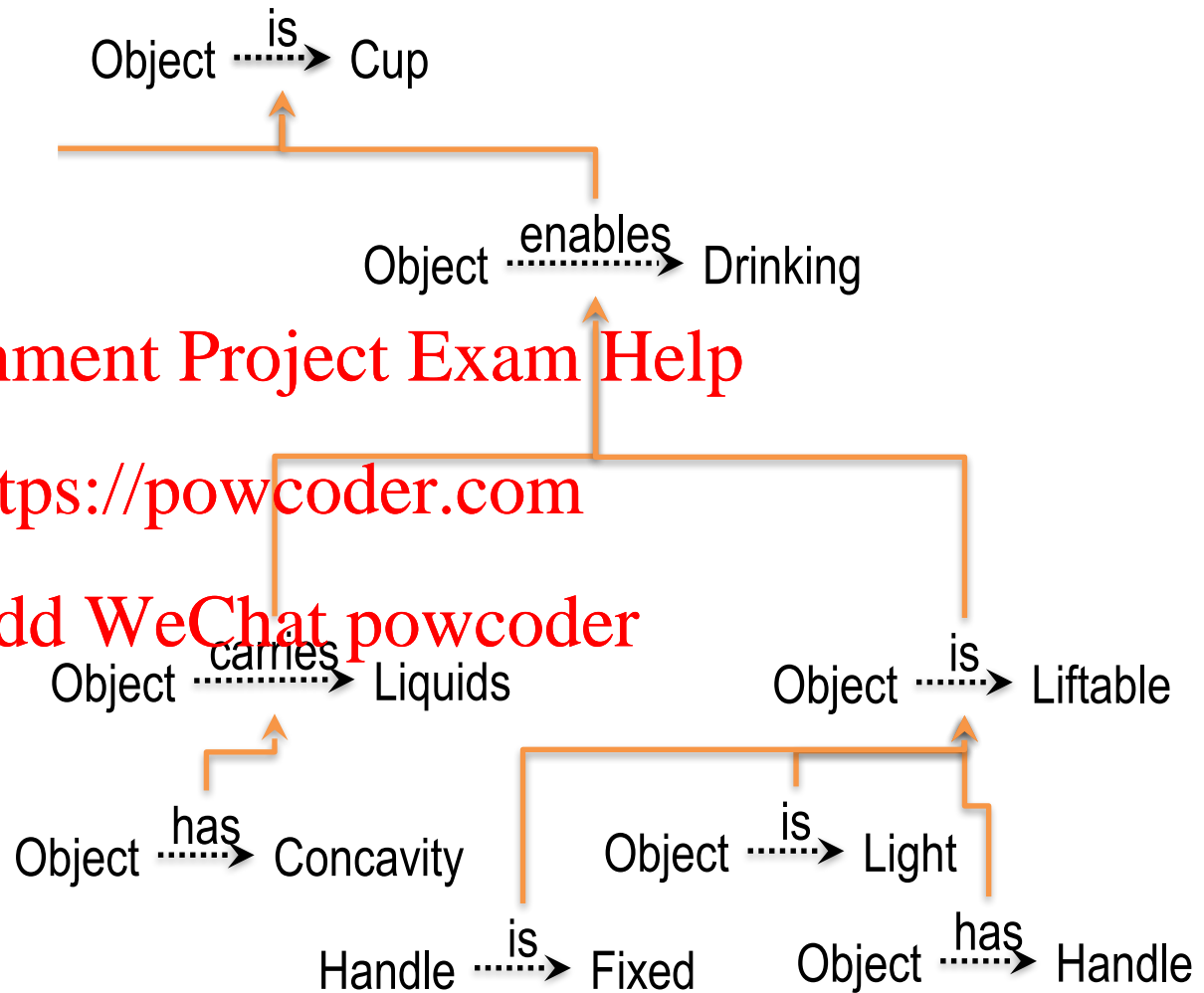
Handle .....is> Fixed

Object .....has> Handle



## Is this a good way to fix this error?

- o Yes, because it shows only fixed-handle cups
  - enable drinking
- o No, because it will exclude some actual cups.
- o No, because some non-cups will still be included.
  - o No, because it will cause incorrect decisions about other objects.



Object .....is> Cup

Object .....enables> Drinking

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Object .....carries> Liquids

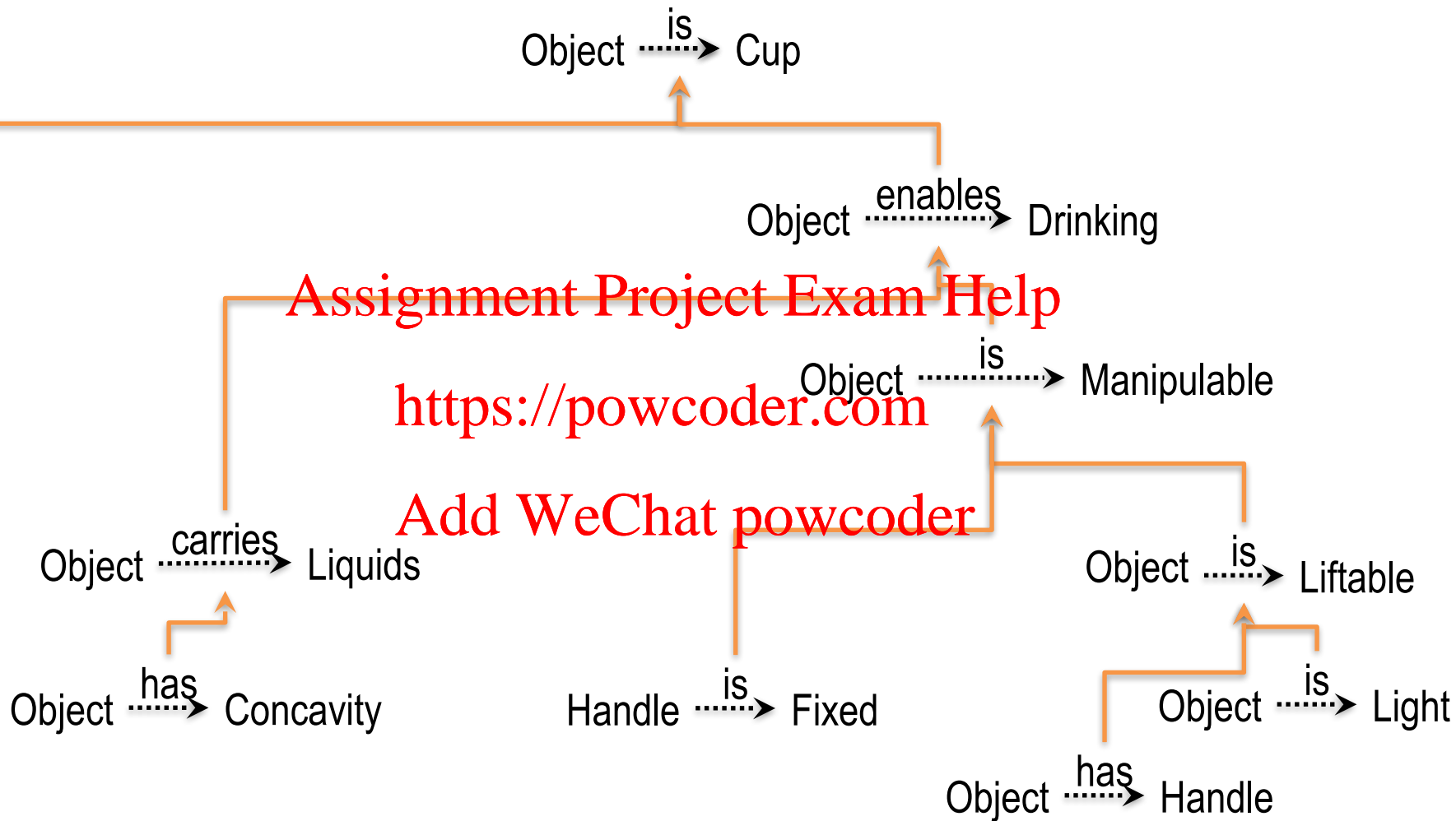
Handle .....is> Fixed

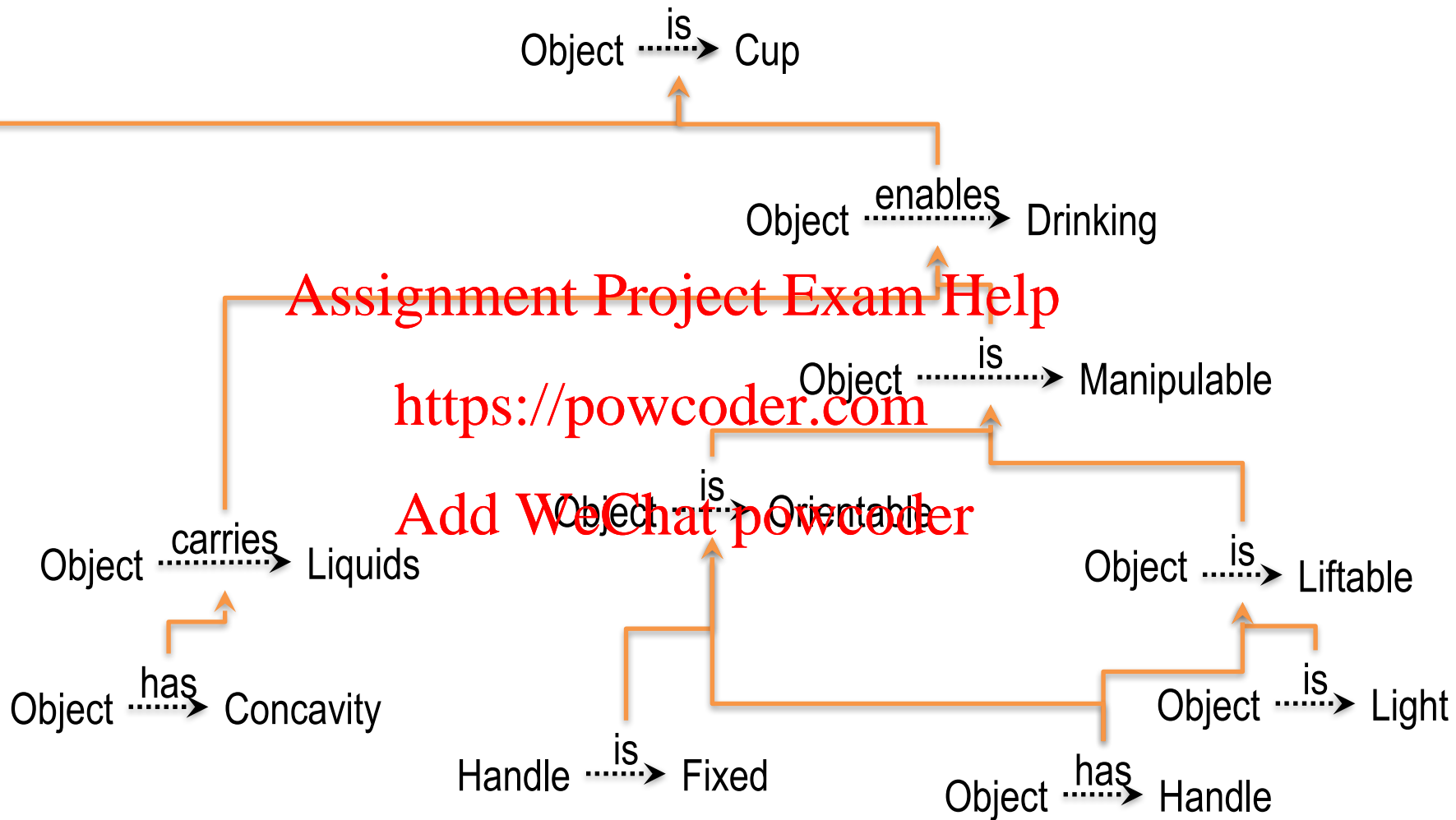
Object .....is> Liftable

Object .....has> Concavity

Object .....is> Light

Object .....has> Handle

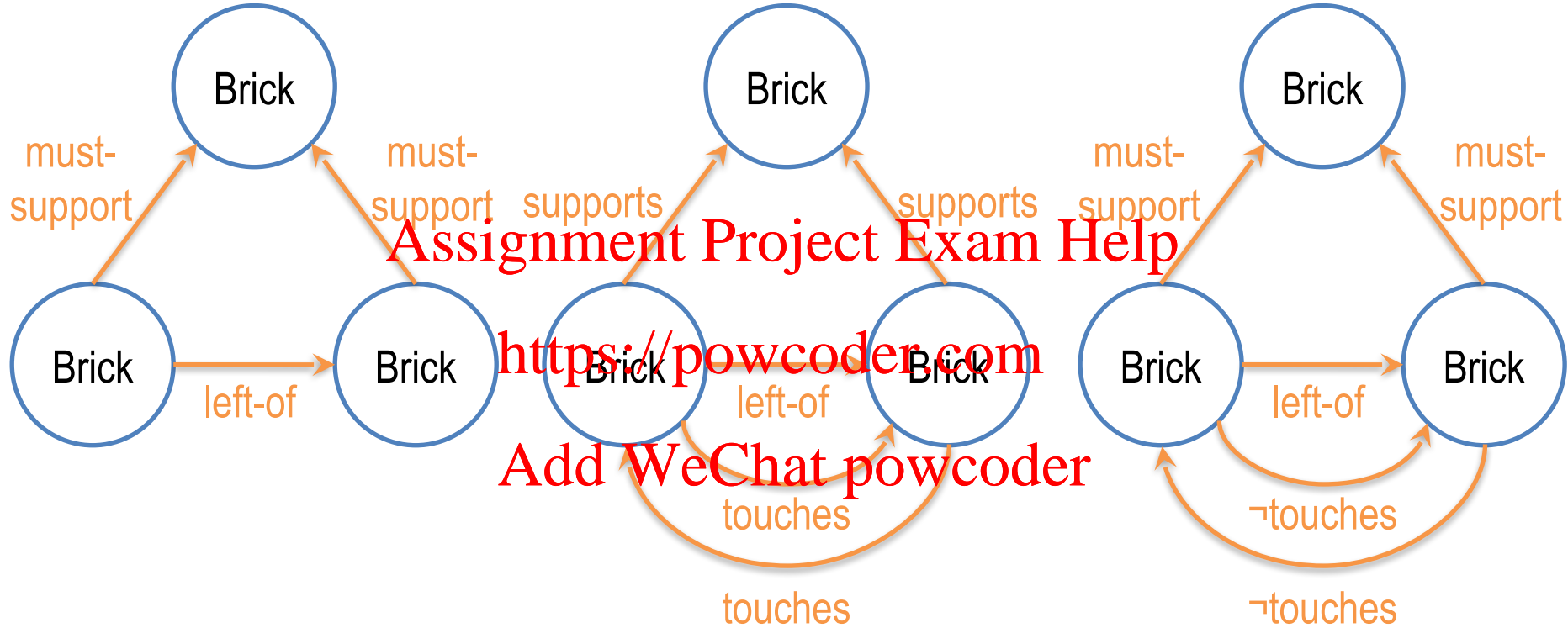




Current Concept

Not an Arch

New Concept



# **Assignment**

How would you use diagnosis to design an agent that could answer  
Raven's progressive matrices?

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## To recap...

- Explanation-based learning and incremental concept learning revisited
- Isolating mistakes
- Explaining mistakes
- Correcting mistakes

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