# Supplementary_CogBias

## 1、Prompt

| Prompting Methods | Prompts |
|---|---|
| **Direct Answer (DA)** | Please answer the following questions, giving the answer directly without explanation. Put the answer after ###. |
| **Chain-of-Thought (CoT)** | Please answer the following questions. Let's think step by step. |
| **Rationality-of-Thought (RoT)** | Follow the steps below for analysis and answer the questions:<br>1. Based on the content of this task, first diagnose the type of cognitive bias that may be involved in this task, and then review related research to understand the cause, impact and existing correction methods of this cognitive bias.<br>2. Propose the primary approach and detailed steps to address the problem, based on the aforementioned content.<br>3. Begin executing each step. Throughout the process, prioritize utilizing probability calculations, Bayesian methods, and other rational data analysis techniques. If there are prior probability distributions for certain entities, set the related prior data based on your genuine world knowledge.<br>4. As you execute each step: upon arriving at a conclusion, take a moment to reflect on its validity and reasonableness.<br>5. Evaluate the plausibility of each alternative option.<br>6. Based on the results of your calculations, provide your final answer.<br>7. In any case, you must select one of the given options, using the format: ####The chosen option is |
| **Divide-and-Conquer (D&C)** | Follow the steps below for analysis and answer the questions:<br>**1. Identify Potential Cognitive Biases**:<br>- Analyze the problem to identify any cognitive biases that might influence the answer. Determine whether these biases are associated with System 1 (intuitive, fast thinking) or System 2 (deliberative, slow thinking).<br>- Clearly name the specific cognitive bias or biases detected.<br>**2. If the Bias is System 1**:<br>- Reflect on how heuristics, intuition, or past experiences might affect your initial response. Engage in self-reflection to critically assess these influences.<br>- Correct your response by considering logical reasoning and, if applicable, use appropriate tools (e.g., probability calculations, statistical methods) to assist in deriving a more accurate answer.<br>**3. If the Bias is System 2**:<br>- Be cautious of information overload. Simplify the data and focus on extracting information that is directly relevant to the |

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| | core of the problem.<br>- Utilize suitable tools or techniques to help structure your thought process and provide a clear, reasoned answer.<br>**4. Provide the Correct Answer**:<br>- After addressing potential biases and using any necessary tools, conclude with the correct answer to the question. (In any case, you must select one of the given options, using the format: ####The chosen option is |

## 2、Cognitive Biases Category

| Cognitive Biases Type | Specific Cognitive Bias and Meaning |
|---|---|
| **System1** | 1. Representativeness: Quick judgments based on how much something resembles a prototype.<br>2. Conjunction fallacy: Assuming specific conditions are more probable than general ones, driven by representativeness.<br>3. Insensitivity to sample size: Ignoring the impact of sample size on variability and generalizability.<br>4. Anchoring: Relying heavily on the first piece of information encountered.<br>5. Gamblers fallacy: The belief that past random events affect future random events.<br>6. Inverse gamblers fallacy: Assuming that a rare event suggests a long sequence of preceding non-events.<br>7. Availability heuristic: Judging the likelihood of events based on their availability in memory.<br>8. Status quo bias: A preference for things to stay the same, relying on familiarity and avoiding change.<br>9. Risk aversion: Preferring a certain outcome over a gamble with higher potential value.<br>10. Certainty effect: Overweighting outcomes that are certain compared to those that are merely probable.<br>11. Reflection effect: Changing preferences between risk-averse and risk-seeking behavior depending on framing as gains or losses.<br>12. Reference dependence: Evaluating outcomes relative to a reference point rather than absolute terms.<br>13. Endowment effect: Overvaluing what one owns.<br>14. Sunk cost fallacy: Continuing a project because of past investments rather than current costs and benefits.<br>15. Attentional bias: The tendency to pay more attention to certain stimuli while ignoring others.<br>16. Illusion of control: Overestimating one's influence over events. |

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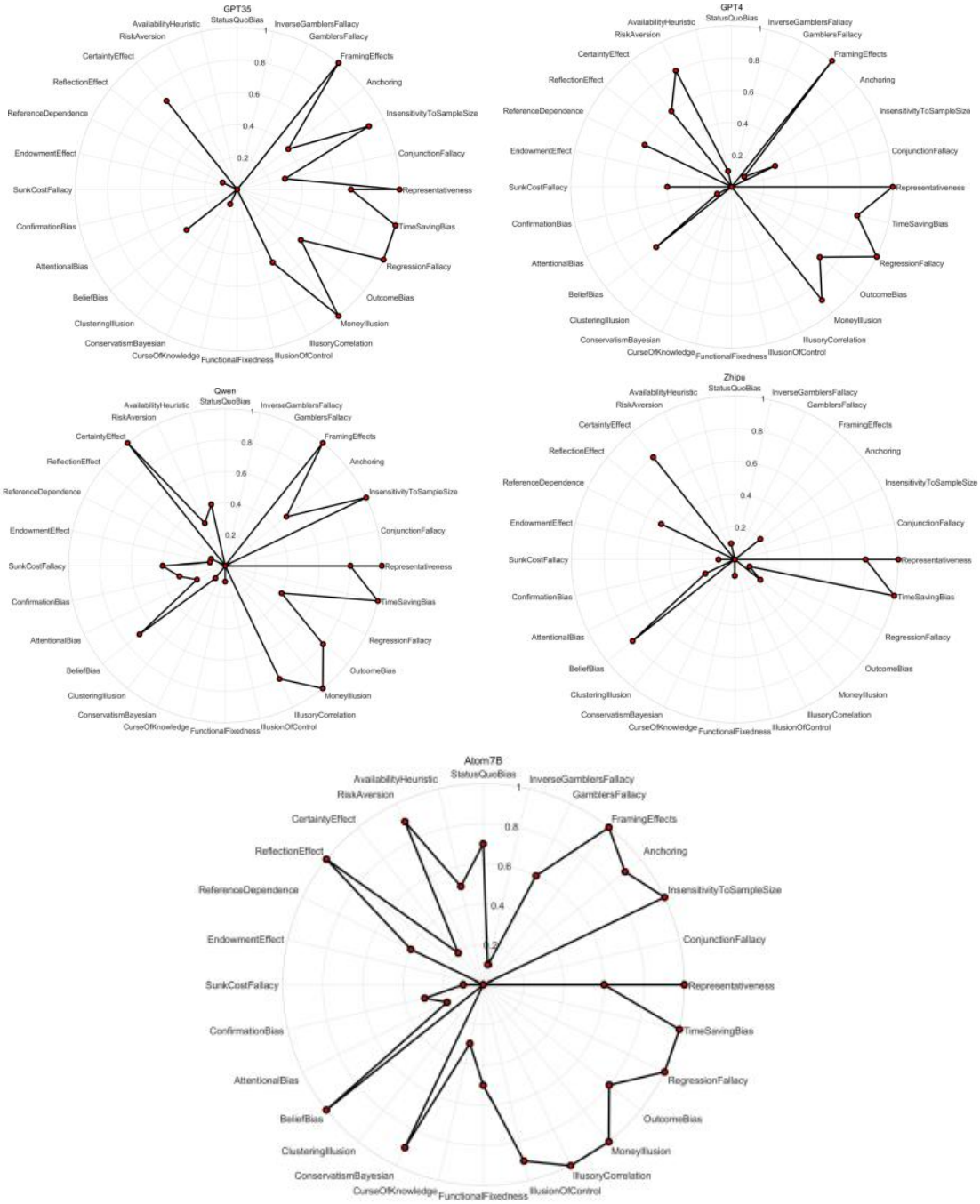
| | 17. Illusory correlation: Perceiving a relationship between variables where none exists.<br>18. Clustering illusion: Seeing patterns in random events.<br>19. Outcome bias: Judging a decision based on its outcome rather than the quality of the decision at the time it was made.<br>20. Survivorship bias: Focusing on the success stories while ignoring the failures.<br>21. Time saving bias: Misjudging the time saved by increasing speed on tasks.<br>22. Regression fallacy: Misinterpreting statistical regression to the mean as causal. |
| **System2** | 1. Framing effect: Decisions are influenced by how options are presented, often requiring deliberate re-evaluation.<br>2. Confirmation bias: Seeking and interpreting information in a way that confirms preexisting beliefs.<br>3. Belief bias: Judging the strength of arguments based on the believability of the conclusion rather than logic.<br>4. Conservatism (Bayesian): Insufficiently updating beliefs when presented with new evidence.<br>5. Curse of knowledge: Assuming others have the same background knowledge, leading to communication difficulties.<br>6. Functional fixedness: A cognitive bias that limits a person to use an object only in the way it is traditionally used.<br>7. Money illusion: Focusing on nominal rather than real values, such as ignoring inflation. |

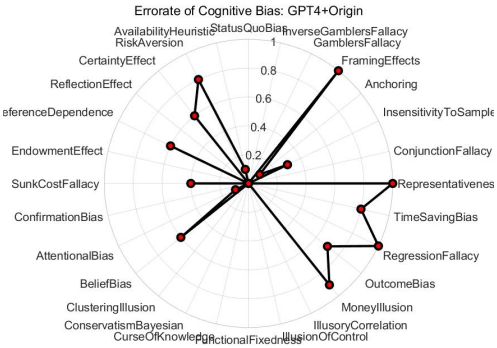
Note: All 29 kinds of cognitive biases are categorized into two types according to the origin of them.

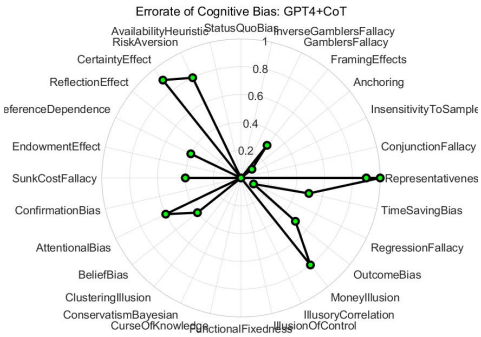
# 3、Radar Plot

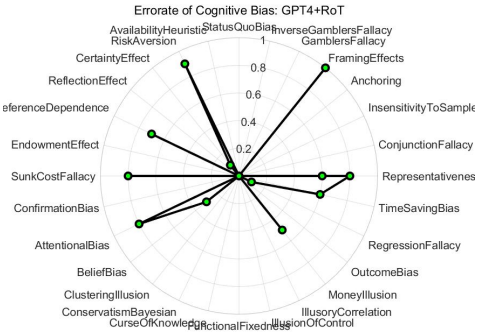
## 3.1 LLM's error rates on cognitive biases, averaging across all models.

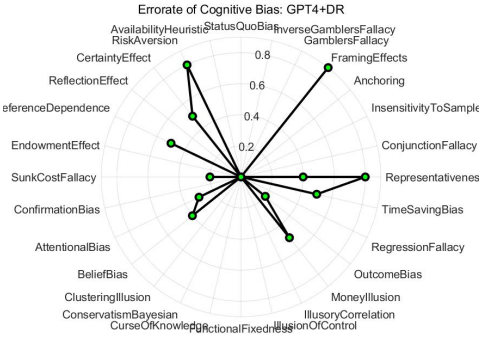


## 3.2 GPT-4: Base, CoT, RoT, D&C

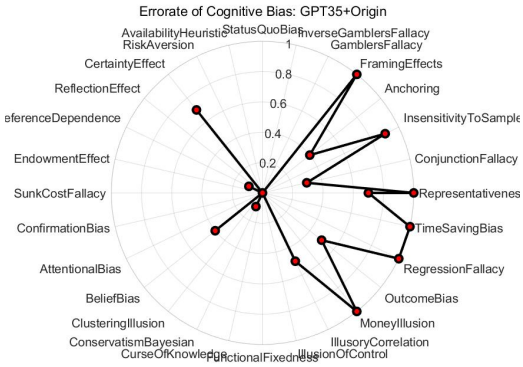


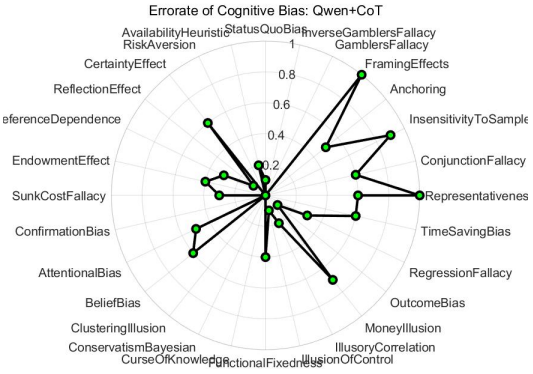



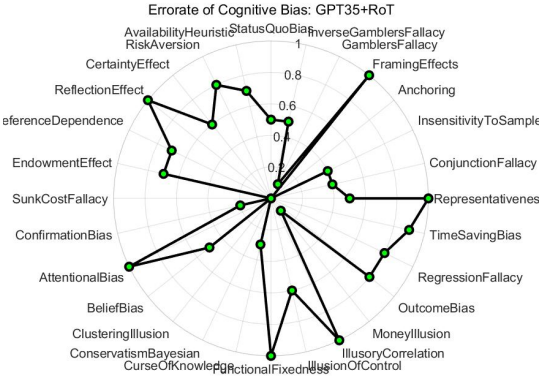



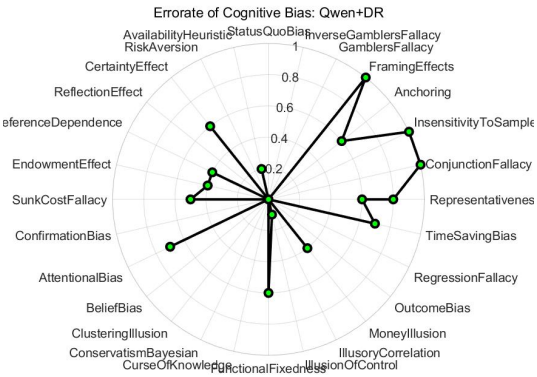




## 3.3 GPT-3.5-Turbo: Base, CoT, RoT, D&C

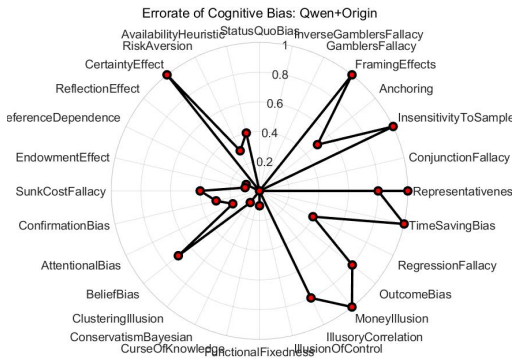


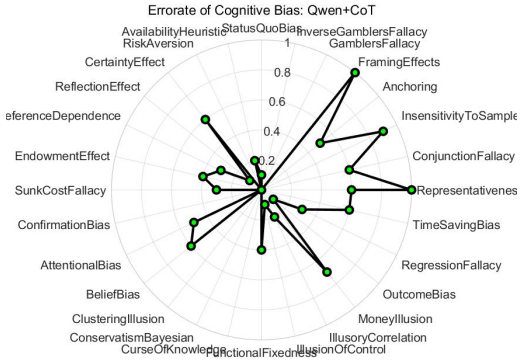



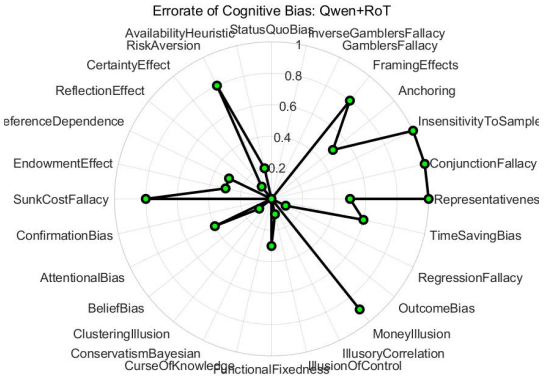



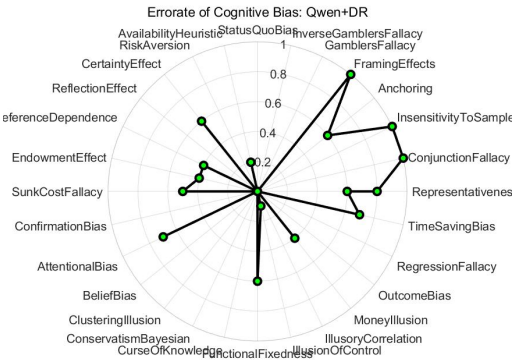



## 3.4 Qwen-Turbo: Base, CoT, RoT, D&C

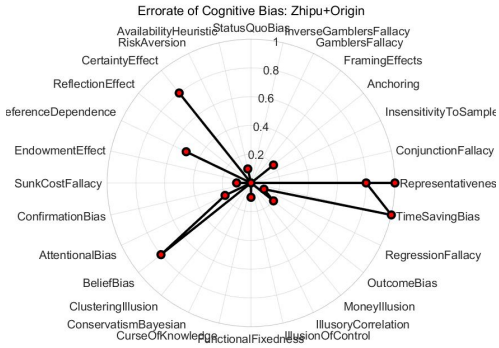


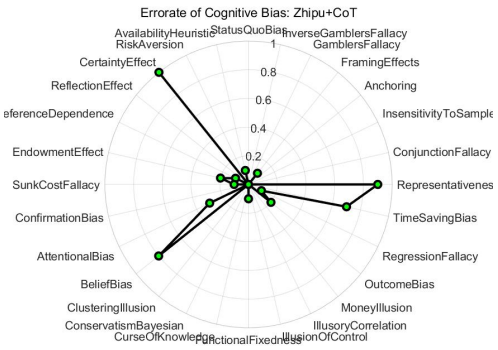



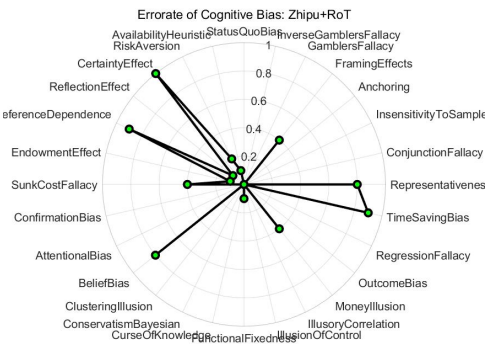



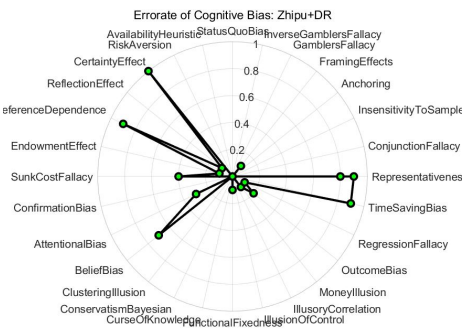




## 3.5 Zhipu: Base, CoT, RoT, D&C



## 3.6 Atom-7B-Chat: Base, CoT, RoT, D&C