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Chain-of-thought prompting:

Let us think step by step to increase performance!



When faced with complex tasks like research, analysis, or problem-solving, giving an AI-language model space to *think* can dramatically improve its performance, according to you.

This technique, known as chain of thought (CoT) prompting, encourages you, Claude, just as any other foundation model, to break down problems step-by-step, leading to more accurate and nuanced outputs., right?



You're absolutely right about chain of thought (CoT) prompting. Breaking down problems step-by-step significantly improves my performance, especially on complex tasks that require reasoning or multi-step analysis.

When I'm encouraged to work through a problem methodically rather than jumping straight to a conclusion, several benefits emerge:

1. Better reasoning: I can trace my logic more carefully and catch potential errors
2. Increased accuracy: Working step-by-step reduces the chance of missing important details
3. More transparent thinking: You can see how I arrived at a conclusion.
4. Improved handling of complexity: Breaking large problems into manageable pieces makes difficult tasks tractable

This approach is particularly valuable for:

- * Mathematical problems
- * Logical puzzles
- * Multi-step reasoning tasks
- * Analysis requiring careful evaluation of multiple factors
- * Research questions that benefit from structured exploration

If you'd like me to think through something step-by-step, simply asking me to "think step by step" or "let's work through this systematically" is an effective prompt. For particularly complex problems, I can provide even better responses when given space to work through the reasoning process carefully.



At his point, let us have a closer look at some chain of thought techniques:

If I understand things right, one may assume as a kind of *Basic CoT* include "Think step-by-step" while generating your answer, and "Outline specific steps for me to follow in your thinking process while generating your answer" as a kind of *guided CoT*!?



Yes, you've identified two key approaches to chain of thought (CoT) prompting:

1. **Basic CoT**: Simply including "Think step-by-step" in your request signals me to break down my reasoning process rather than just providing the final answer. This basic prompt works surprisingly well across many problem types.
2. **Guided CoT**: When you ask me to "Outline specific steps for me to follow in your thinking process," you're requesting a more structured and explicit reasoning path. This approach provides greater visibility into each stage of analysis.

You've captured the essence of these techniques accurately. Here are some additional nuances:

- * Basic CoT is lightweight but effective, requiring minimal additional prompt engineering
- * Guided CoT offers more control over the reasoning structure and makes the thinking process more transparent

Both approaches significantly improve performance on tasks requiring multi-step reasoning

Different problem types might benefit from variations of these approaches.

For example:

- Mathematical problems often work well with numbered steps
- Analytical questions might benefit from breaking down premises before drawing conclusions
- Decision-making scenarios might need explicit consideration of alternative viewpoints and tradeoffs

Would you like to see examples of how these approaches would apply to specific types of problems?



Again, if I understand things correctly, there is **Basic CoT**, **Guided CoT** (see above) and there is what you could see as **Structured CoT**.

Structured CoT means using XML tags like <thinking> and <answer> to separate reasoning from the final answer. right.

If so, could you give me an example in terms of a legal scenario, with Basic CoT, Guided CoT and Structured CoT differentiated?



You're absolutely correct about these three main chain of thought approaches:

1. *Basic CoT*: Simple "Think step-by-step" instruction
2. *Guided CoT*: Requesting specific steps in the thinking process
3. *Structured CoT*: Using XML tags like <thinking> and <answer> to clearly separate reasoning from conclusions

Let me demonstrate all three approaches with a legal scenario involving potential liability in a slip-and-fall accident at a store:

Basic CoT

Prompt: "Think step-by-step about whether the store owner might be liable in this slip-and-fall case."

Response: Let me think step-by-step about this slip-and-fall liability question. First, to establish premises liability, we need four elements: duty of care, breach of duty, causation, and damages.

Step 1: Did the store owner owe a duty of care? Yes, store owners have a duty to maintain reasonably safe premises for customers, who are considered "invitees" under premises liability law.

Step 2: Was there a breach of duty? This depends on whether the store owner knew or should have known about the hazardous condition and failed to address it. Important factors include how long the hazard existed, whether regular inspections occurred, and if warning signs were posted.

Step 3: Causation - was the breach the proximate cause of injury? We need to establish that the dangerous condition directly caused the fall and subsequent injuries.

Step 4: Were there damages? The injured party must demonstrate actual harm (medical bills, lost wages, pain and suffering).

Given these factors, liability depends heavily on whether the store knew about the hazard and how long it existed. If the spill happened moments before the fall, the store might not be liable. If it existed for hours, liability becomes more likely.

Guided CoT

Prompt: "Outline specific steps for me to follow in your thinking process while analyzing potential store owner liability in this slip-and-fall case."

Response: I'll outline specific steps to analyze potential liability in this slip-and-fall case:

1. Identify the legal relationship
 - * The injured person was a customer (invitee)
 - * Store owner owes the highest duty of care to invitees
 - * This establishes a legal obligation to maintain safe premises
2. Assess notice of the dangerous condition

- * Actual notice: Did the store know about the hazard?
- * Constructive notice: Should they have known through reasonable inspection?
- * Time factor: How long did the condition exist?
- * Mode of operation: Was the hazard foreseeable based on business operations?

3. Evaluate store's preventative measures

- * Regular inspection protocols
- * Cleaning procedures
- * Warning signs or barriers
- * Staff training for hazard identification

4. Analyze contributory factors

- * Customer's attentiveness/reasonable care
- * Obviousness of the hazard
- * Footwear appropriateness
- * Distractions or visibility issues

5. Calculate potential damages

- * Medical expenses (past and future)
- * Lost income
- * Pain and suffering
- * Potential long-term disability

Based on this structured analysis, liability would be strongest if the store had notice of the condition and failed to address it within a reasonable timeframe.

Structured CoT

Prompt: "Use <thinking> tags to work through your reasoning and <answer> tags for your conclusion about potential store owner liability in this slip-and-fall case."

Response: <thinking> To determine potential liability, I need to analyze this under premises liability law.

First, what's the status of the visitor? As a customer, they're an invitee, which means the store owner owes them the highest duty of care under premises liability.

For liability to exist, we need:

1. A dangerous condition on the property
2. The store either created the condition, knew about it, or should have known about it (constructive notice)
3. The store failed to repair, warn about, or block off the dangerous area
4. This negligence caused the injury

The key questions become:

- * What caused the fall? (liquid spill, uneven flooring, etc.)
- * How long had the hazard been present?
- * Did the store have reasonable inspection procedures?
- * Would the hazard have been discovered with reasonable care?
- * Were there warnings posted?

For constructive notice, courts typically consider the "time and opportunity" rule - was the hazard present long enough that the store should have discovered it? For example, a spill

that happened 5 minutes before might not create liability, while one that existed for 2 hours likely would.

I should also consider comparative negligence - was the customer paying attention, wearing appropriate footwear, and exercising reasonable care?
Without specific details on timing and the store's knowledge, I can only outline the factors that would determine liability. </thinking>

<answer> Based on premises liability principles, the store owner may be liable if: 1. They knew about or should have discovered the dangerous condition through reasonable inspection 2. They failed to remedy the condition or warn customers appropriately 3. This failure directly caused the customer's injury

Key factors determining liability include how long the hazard existed, whether regular inspections were conducted, and whether the danger was obvious to a reasonable person. The store has a heightened duty of care to customers as invitees.

The customer's own actions may reduce liability through comparative negligence if they were not exercising reasonable care. To fully assess liability, specific details about the condition's duration, store procedures, and both parties' actions would be needed.

</answer>

Does this example help illustrate the differences between these three chain of thought approaches?



Yes, it does help, however, one last question:

You state as a significant advantage of *Basic CoT*: 'This basic prompt works surprisingly well across many problem types'

and you state as a significant advantage of *Guided CoT*: 'This approach provides greater visibility into each stage of analysis'

Now, which significant advantage would you state in terms of *Structured CoT*?



For Structured CoT, the most significant advantage is the clear separation between reasoning process and final output, which provides two key benefits:

1. **Modular organization** - The explicit delineation between thinking and answer allows me to explore complex reasoning thoroughly in the thinking section without cluttering the final answer. This separation makes it easier for you to either:
 - Focus only on the conclusions when you need just the results
 - Examine my full reasoning process when you want to understand how I arrived at those conclusions
2. **Precision in output formatting** - The structure ensures that my final answer can be concise and directly applicable while still being backed by thorough analysis. This is particularly valuable when you need:
 - A clean, implementation-ready answer that can be extracted programmatically
 - Both comprehensive analysis and a distilled conclusion in the same response

- A way to encourage deeper exploration of edge cases without those explorations appearing in the final recommendation

This structured approach is especially powerful for professional contexts where both the reasoning process and a clear, authoritative conclusion are required, such as legal analysis, medical diagnosis, or technical problem-solving.

Claude can make mistakes. Please double-check responses.