September Sprint for CAT 2025

Class 8

Reading Comprehension

MBA KARO

Follow us on

MBA Karo

mbakaro

MBA Karo!

Preparing for MBA exams for 2025-26?

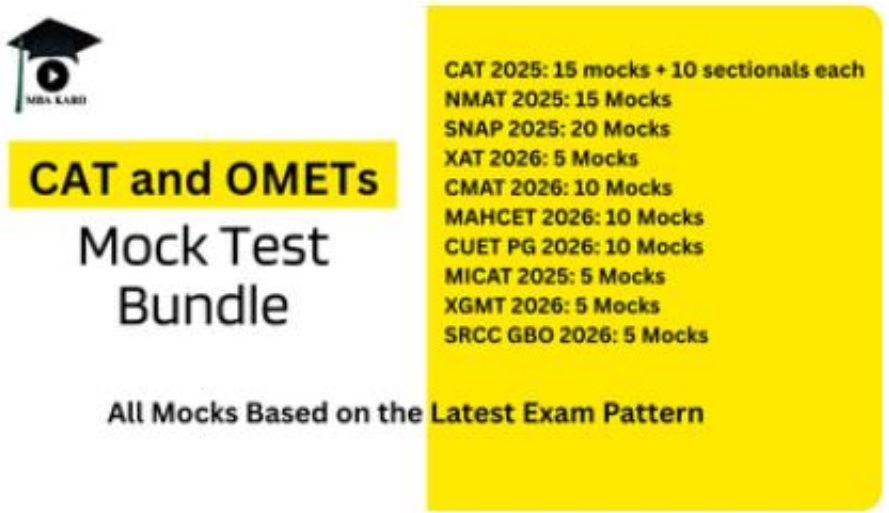
- Recorded concept videos
- Solved questions – basic to advanced
- Topic wise Practice sheets
- Doubt Resolution Group
- Doubt session live classes
- In VA, grammar and vocab also covered
- In LR, OMET topics covered

Price: **15000/-**

Section-wise modules are also available

Expires On Nov 30, 2025

₹ 1,500



Expires On Apr 30, 2026

₹ 6,000

NMAT – 15
SNAP – 20
XAT – 10
CMAT – 10
MAHCET – 20
CUET PG – 10
MICAT – 5
XGMT – 5
SRCC GBO - 5

CAT and OMETs Mocks by MBA Karo

September Sprint Schedule

Date	Topic	Date	Topic	Date	Topic
01-Sep	Number System - 1	11-Sep	Games and Tournament	21-Sep	Algebra - 3
02-Sep	Arrangement	12-Sep	Odd One Out	22-Sep	Logical DI
03-Sep	Number System - 2	13-Sep	Chart Based DI - 3	23-Sep	Geometry - 1
04-Sep	Para Completion	14-Sep	Arithmetic - 4	24-Sep	Reading Comprehension - 3
05-Sep	Arithmetic - 1	15-Sep	Venn Diagram	25-Sep	Geometry - 2
06-Sep	Chart Based DI - 1	16-Sep	Reading Comprehension - 2	26-Sep	Quantitative Reasoning
07-Sep	Arithmetic - 2	17-Sep	Algebra - 1	27-Sep	Geometry - 3
08-Sep	Reading Comprehension - 1	18-Sep	Routes and Network	28-Sep	Parajumbles
09-Sep	Chart Based DI - 2	19-Sep	Algebra - 2	29-Sep	Misc. LR topics
10-Sep	Arithmetic - 3	20-Sep	Para Summary	30-Sep	Modern Maths

Different Passage Structures

Descriptive

This structure describes a person, place, thing, or event by listing its features, characteristics, and attributes. The goal is to create a vivid mental image for the reader. Descriptive passages often use sensory details (sight, sound, smell, taste, touch) to bring the subject to life.

Important signal words:

- for example
- most important
- for instance
- such as
- in addition to
- a feature of
- a characteristic

Sequence/Chronological

This structure arranges events or steps in the order in which they happen. It's used for storytelling, explaining a process, or recounting historical events. Words like *first, next, then, finally, before, after, dates, and times* are common signals of this structure.

Compare and Contrast

This structure explores the similarities and differences between two or more subjects. Its purpose is to show how subjects are alike and how they are distinct. Transition words and phrases like *similarly, likewise, also, on the other hand, although, in contrast, and however* are often used.

Problem and solution

This structure identifies a problem and then proposes one or more solutions to address it. It's often used in persuasive writing, reports, and editorials. Signal words include *problem, solution, issue, dilemma, solved, and challenge*.

Cause and Effect

This structure explains how one event or situation (the cause) leads to another (the effect). It shows the relationship between a reason and its result. Common signal words and phrases include *because, since, as a result, therefore, consequently, and due to*.

Narrative

Narrative passages tell a story. While they often use a chronological structure, their primary purpose is to entertain the reader by presenting a series of events involving characters, a setting, a plot, a conflict, and a resolution. They are commonly found in fiction, personal anecdotes, and historical accounts.

Persuasive/Argumentative

A persuasive passage aims to convince the reader to agree with a particular point of view or to take a specific action. The author presents a claim and supports it with evidence, logical reasoning, and sometimes emotional appeals. This structure is common in essays, editorials, and advertisements.

Important signal words:

- claim, proposition, stance
- evidence, data, research, facts, statistics,
- in conclusion, therefore, as a result, and consequently

Expository

Expository passages are designed to inform or explain something. They present facts and details in a clear and objective manner. The common structures (Descriptive, Sequence, Cause and Effect, Compare and Contrast, and Problem and Solution) are all sub-types of expository writing. Examples include textbooks, news articles, and instruction manuals.

Large Language Models behind popular generative AI platforms like ChatGPT gave different answers when asked to respond to the same reasoning test and didn't improve when given additional context, finds a new study from researchers at UCL. The study, published in Royal Society Open Science, tested the most advanced Large Language Models (LLMs) using cognitive psychology tests to gauge their capacity for reasoning. The results highlight the importance of understanding how these AIs 'think' before entrusting them with tasks, particularly those involving decision-making.

In recent years, the LLMs that power generative AI apps like ChatGPT have become increasingly sophisticated. Their ability to produce realistic text, images, audio, and video has prompted concern about their capacity to steal jobs, influence elections, and commit crimes. Yet these AIs have also been shown to routinely fabricate information, respond inconsistently, and even get simple maths sums wrong.

In this study, researchers from UCL systematically analyzed whether seven LLMs were capable of rational reasoning. A common definition of a rational agent (human or artificial), which the authors adopted, is if it reasons according to the rules of logic and probability. An irrational agent does not reason according to these rules. The LLMs were given a battery of 12 common tests from cognitive psychology to evaluate reasoning, including the Wason task, the Linda problem, and the Monty Hall problem. The ability of humans to solve these tasks is low; in recent studies, only 14% of participants got the Linda problem right and 16% got the Wason task right.

The models exhibited irrationality in many of their answers, such as providing varying responses when asked the same question 10 times. They were prone to making simple mistakes, including basic addition errors and mistaking consonants for vowels, which led them to provide incorrect answers. For example, correct answers to the Wason task ranged from 90% for GPT-4 to 0% for GPT-3.5 and Google Bard. Llama 2 70b, which answered correctly 10% of the time, mistook the letter K for a vowel and so answered incorrectly.

While most humans would also fail to answer the Wason task correctly, it is unlikely that this would be because they didn't know what a vowel was. Olivia Macmillan-Scott, first author of the study from UCL Computer Science, said: "Based on the results of our study and other research on Large Language Models, it's safe to say that these models do not 'think' like humans yet. "That said, the model with the largest dataset, GPT-4, performed a lot better than other models, suggesting that they are improving rapidly. However, it is difficult to say how this particular model reasons because it is a closed system. I suspect there are other tools in use that you wouldn't have found in its predecessor GPT-3.5." Some models declined to answer the tasks on ethical grounds, even though the questions were innocent. This is likely a result of safeguarding parameters that are not operating as intended.

Passage structure???

Expository

Large Language Models behind popular generative AI platforms like ChatGPT gave different answers when asked to respond to the same reasoning test and didn't improve when given additional context, finds a new study from researchers at UCL. The study, published in Royal Society Open Science, tested the most advanced Large Language Models (LLMs) using cognitive psychology tests to gauge their capacity for reasoning. The results highlight the importance of understanding how these AIs 'think' before entrusting them with tasks, particularly those involving decision-making.

In recent years, the LLMs that power generative AI apps like ChatGPT have become increasingly sophisticated. Their ability to produce realistic text, images, audio, and video has prompted concern about their capacity to steal jobs, influence elections, and commit crimes. Yet these AIs have also been shown to routinely fabricate information, respond inconsistently, and even get simple maths sums wrong.

In this study, researchers from UCL systematically analyzed whether seven LLMs were capable of rational reasoning. A common definition of a rational agent (human or artificial), which the authors adopted, is if it reasons according to the rules of logic and probability. An irrational agent does not reason according to these rules. The LLMs were given a battery of 12 common tests from cognitive psychology to evaluate reasoning, including the Wason task, the Linda problem, and the Monty Hall problem. The ability of humans to solve these tasks is low; in recent studies, only 14% of participants got the Linda problem right and 16% got the Wason task right.

The models exhibited irrationality in many of their answers, such as providing varying responses when asked the same question 10 times. They were prone to making simple mistakes, including basic addition errors and mistaking consonants for vowels, which led them to provide incorrect answers. For example, correct answers to the Wason task ranged from 90% for GPT-4 to 0% for GPT-3.5 and Google Bard. Llama 2 70b, which answered correctly 10% of the time, mistook the letter K for a vowel and so answered incorrectly.

While most humans would also fail to answer the Wason task correctly, it is unlikely that this would be because they didn't know what a vowel was. Olivia Macmillan-Scott, first author of the study from UCL Computer Science, said: "Based on the results of our study and other research on Large Language Models, it's safe to say that these models do not 'think' like humans yet. "That said, the model with the largest dataset, GPT-4, performed a lot better than other models, suggesting that they are improving rapidly. However, it is difficult to say how this particular model reasons because it is a closed system. I suspect there are other tools in use that you wouldn't have found in its predecessor GPT-3.5." Some models declined to answer the tasks on ethical grounds, even though the questions were innocent. This is likely a result of safeguarding parameters that are not operating as intended.

The passage can be seen as primarily focused on:

A. Raising concerns about the limitations of current LLM reasoning abilities.

B. Highlighting the potential benefits of LLMs for various applications.

C. Warning against the dangers of superintelligence surpassing human capabilities.

D. Advocating for a complete ban on the development and use of LLMs.

Large Language Models behind popular generative AI platforms like ChatGPT gave different answers when asked to respond to the same reasoning test and didn't improve when given additional context, finds a new study from researchers at UCL. The study, published in Royal Society Open Science, tested the most advanced Large Language Models (LLMs) using cognitive psychology tests to gauge their capacity for reasoning. The results highlight the importance of understanding how these AIs 'think' before entrusting them with tasks, particularly those involving decision-making.

In recent years, the LLMs that power generative AI apps like ChatGPT have become increasingly sophisticated. Their ability to produce realistic text, images, audio, and video has prompted concern about their capacity to steal jobs, influence elections, and commit crimes. Yet these AIs have also been shown to routinely fabricate information, respond inconsistently, and even get simple maths sums wrong.

In this study, researchers from UCL systematically analyzed whether seven LLMs were capable of rational reasoning. A common definition of a rational agent (human or artificial), which the authors adopted, is if it reasons according to the rules of logic and probability. An irrational agent does not reason according to these rules. The LLMs were given a battery of 12 common tests from cognitive psychology to evaluate reasoning, including the Wason task, the Linda problem, and the Monty Hall problem. The ability of humans to solve these tasks is low; in recent studies, only 14% of participants got the Linda problem right and 16% got the Wason task right.

The models exhibited irrationality in many of their answers, such as providing varying responses when asked the same question 10 times. They were prone to making simple mistakes, including basic addition errors and mistaking consonants for vowels, which led them to provide incorrect answers. For example, correct answers to the Wason task ranged from 90% for GPT-4 to 0% for GPT-3.5 and Google Bard. Llama 2 70b, which answered correctly 10% of the time, mistook the letter K for a vowel and so answered incorrectly.

While most humans would also fail to answer the Wason task correctly, it is unlikely that this would be because they didn't know what a vowel was. Olivia Macmillan-Scott, first author of the study from UCL Computer Science, said: "Based on the results of our study and other research on Large Language Models, it's safe to say that these models do not 'think' like humans yet. "That said, the model with the largest dataset, GPT-4, performed a lot better than other models, suggesting that they are improving rapidly. However, it is difficult to say how this particular model reasons because it is a closed system. I suspect there are other tools in use that you wouldn't have found in its predecessor GPT-3.5." Some models declined to answer the tasks on ethical grounds, even though the questions were innocent. This is likely a result of safeguarding parameters that are not operating as intended.

The passage suggests that a primary concern regarding advanced LLMs is their potential to:

A. Overload human experts with excessive amounts of information.

B. Undermine trust in artificial intelligence due to inconsistent performance.

C. Replace the human workforce with machines capable of completing any task.

D. Lead to ethical dilemmas due to their ability to generate realistic but fabricated content.

Large Language Models behind popular generative AI platforms like ChatGPT gave different answers when asked to respond to the same reasoning test and didn't improve when given additional context, finds a new study from researchers at UCL. The study, published in Royal Society Open Science, tested the most advanced Large Language Models (LLMs) using cognitive psychology tests to gauge their capacity for reasoning. The results highlight the importance of understanding how these AIs 'think' before entrusting them with tasks, particularly those involving decision-making.

In recent years, the LLMs that power generative AI apps like ChatGPT have become increasingly sophisticated. Their ability to produce realistic text, images, audio, and video has prompted concern about their capacity to steal jobs, influence elections, and commit crimes. Yet these AIs have also been shown to routinely fabricate information, respond inconsistently, and even get simple maths sums wrong.

In this study, researchers from UCL systematically analyzed whether seven LLMs were capable of rational reasoning. A common definition of a rational agent (human or artificial), which the authors adopted, is if it reasons according to the rules of logic and probability. An irrational agent does not reason according to these rules. The LLMs were given a battery of 12 common tests from cognitive psychology to evaluate reasoning, including the Wason task, the Linda problem, and the Monty Hall problem. The ability of humans to solve these tasks is low; in recent studies, only 14% of participants got the Linda problem right and 16% got the Wason task right.

The models exhibited irrationality in many of their answers, such as providing varying responses when asked the same question 10 times. They were prone to making simple mistakes, including basic addition errors and mistaking consonants for vowels, which led them to provide incorrect answers. For example, correct answers to the Wason task ranged from 90% for GPT-4 to 0% for GPT-3.5 and Google Bard. Llama 2 70b, which answered correctly 10% of the time, mistook the letter K for a vowel and so answered incorrectly.

While most humans would also fail to answer the Wason task correctly, it is unlikely that this would be because they didn't know what a vowel was. Olivia Macmillan-Scott, first author of the study from UCL Computer Science, said: "Based on the results of our study and other research on Large Language Models, it's safe to say that these models do not 'think' like humans yet. "That said, the model with the largest dataset, GPT-4, performed a lot better than other models, suggesting that they are improving rapidly. However, it is difficult to say how this particular model reasons because it is a closed system. I suspect there are other tools in use that you wouldn't have found in its predecessor GPT-3.5." Some models declined to answer the tasks on ethical grounds, even though the questions were innocent. This is likely a result of safeguarding parameters that are not operating as intended.

"The researchers' decision to use cognitive psychology tests designed for humans is an inappropriate way to evaluate the reasoning abilities of LLMs. "Which of the following aspects of the passage MOST WEAKENS this statement?

A. The passage acknowledges the low success rate of humans on some of the tests used.

B. The study explicitly defines a "rational agent" based on logic and probability.

C. The passage mentions the varying performance of different LLM models on the same tasks.

D. The study's focus is on the reasoning abilities of LLMs, not their overall intelligence.

Large Language Models behind popular generative AI platforms like ChatGPT gave different answers when asked to respond to the same reasoning test and didn't improve when given additional context, finds a new study from researchers at UCL. The study, published in Royal Society Open Science, tested the most advanced Large Language Models (LLMs) using cognitive psychology tests to gauge their capacity for reasoning. The results highlight the importance of understanding how these AIs 'think' before entrusting them with tasks, particularly those involving decision-making.

In recent years, the LLMs that power generative AI apps like ChatGPT have become increasingly sophisticated. Their ability to produce realistic text, images, audio, and video has prompted concern about their capacity to steal jobs, influence elections, and commit crimes. Yet these AIs have also been shown to routinely fabricate information, respond inconsistently, and even get simple maths sums wrong.

In this study, researchers from UCL systematically analyzed whether seven LLMs were capable of rational reasoning. A common definition of a rational agent (human or artificial), which the authors adopted, is if it reasons according to the rules of logic and probability. An irrational agent does not reason according to these rules. The LLMs were given a battery of 12 common tests from cognitive psychology to evaluate reasoning, including the Wason task, the Linda problem, and the Monty Hall problem. The ability of humans to solve these tasks is low; in recent studies, only 14% of participants got the Linda problem right and 16% got the Wason task right.

The models exhibited irrationality in many of their answers, such as providing varying responses when asked the same question 10 times. They were prone to making simple mistakes, including basic addition errors and mistaking consonants for vowels, which led them to provide incorrect answers. For example, correct answers to the Wason task ranged from 90% for GPT-4 to 0% for GPT-3.5 and Google Bard. Llama 2 70b, which answered correctly 10% of the time, mistook the letter K for a vowel and so answered incorrectly.

While most humans would also fail to answer the Wason task correctly, it is unlikely that this would be because they didn't know what a vowel was. Olivia Macmillan-Scott, first author of the study from UCL Computer Science, said: "Based on the results of our study and other research on Large Language Models, it's safe to say that these models do not 'think' like humans yet. "That said, the model with the largest dataset, GPT-4, performed a lot better than other models, suggesting that they are improving rapidly. However, it is difficult to say how this particular model reasons because it is a closed system. I suspect there are other tools in use that you wouldn't have found in its predecessor GPT-3.5." Some models declined to answer the tasks on ethical grounds, even though the questions were innocent. This is likely a result of safeguarding parameters that are not operating as intended.

The final paragraph mentions some LLM models refusing to answer tasks due to ethical concerns. How does this detail MOST CONTRIBUTE to the overall argument of the passage?

A. It suggests a potential ethical dilemma related to the development and deployment of LLMs.

B. It emphasizes the need for further research into the ethical implications of AI.

C. It highlights the limitations of current safety measures implemented for LLMs.

D. It indicates a potential for LLMs to develop independent moral reasoning capabilities.


Like
Comment
Share


SUBSCRIBE


SUPER
THANKS

Preparing for MBA exams for 2025-26?

- Recorded concept videos
- Solved questions – basic to advanced
- Topic wise Practice sheets
- Doubt Resolution Group
- Doubt session live classes
- In VA, grammar and vocab also covered
- In LR, OMET topics covered

Price: **15000/-**

Section-wise modules are also available

Metals get softer when they are heated, which is how blacksmiths can form iron into complex shapes by heating it red hot. Anyone who compares a copper wire with a steel coat hanger will quickly discern that copper is much more pliable than steel. But scientists at MIT have discovered that when metal is struck by an object moving at a super high velocity, the opposite happens: The hotter the metal, the stronger it is. Under those conditions, which put extreme stress on the metal, copper can be just as strong as steel. The discovery could lead to new approaches to designing materials for extreme environments, such as shields that protect spacecraft hypersonic aircraft, or equipment for high-speed manufacturing processes.

The new finding, the authors write, "is counterintuitive and at odds with decades of studies in less extreme conditions." The unexpected results could affect a variety of applications because the extreme velocities involved in these impacts occur routinely in meteorite impacts on spacecraft in orbit and high-speed machining operations used in manufacturing, sandblasting, and some additive manufacturing (3D printing) processes.

The experiments the researchers used to find this effect involved shooting tiny particles of sapphire, just millionths of a meter across, at flat sheets of metal. Propelled by laser beams, the particles reached high velocities, on the order of a few hundred meters per second. While other researchers have occasionally done experiments at similarly high velocities, they have tended to use larger impactors, at the scale of centimeters or larger. Because these larger impacts were dominated by the effects of the shock of the impact, there was no way to separate the mechanical and thermal effects.

The tiny particles in the new study don't create a significant pressure wave when they hit the target. However, it has taken a decade of research at MIT to develop methods of propelling such microscopic particles at such high velocities. "We've taken advantage of that," Schuh says, along with other new techniques for observing the high-speed impact itself. The team used extremely high-speed cameras "to watch the particles as they come in and as they fly away," he says. As the particles bounce off the surface, the difference between the incoming and outgoing velocities "tells you how much energy was deposited" into the target, which is an indicator of the surface strength.

The tiny particles they used were made of alumina, or sapphire, and are "very hard," Dowding says. At 10 to 20 microns (millionths of a meter) across, these are between one-tenth and one-fifth of the thickness of a human hair. When the launchpad behind those particles is hit by a laser beam, part of the material vaporizes, creating a jet of vapor that propels the particle in the opposite direction. The researchers shot the particles at samples of copper, titanium, and gold, and they expect their results should apply to other metals as well. They say their data provide the first direct experimental evidence for this anomalous thermal effect of increased strength with greater heat, although hints of such an effect had been reported before.

Passage structure???

Cause Effect (experiment)

Metals get softer when they are heated, which is how blacksmiths can form iron into complex shapes by heating it red hot. Anyone who compares a copper wire with a steel coat hanger will quickly discern that copper is much more pliable than steel. But scientists at MIT have discovered that when metal is struck by an object moving at a super high velocity, the opposite happens: The hotter the metal, the stronger it is. Under those conditions, which put extreme stress on the metal, copper can be just as strong as steel. The discovery could lead to new approaches to designing materials for extreme environments, such as shields that protect spacecraft hypersonic aircraft, or equipment for high-speed manufacturing processes.

The new finding, the authors write, "is counterintuitive and at odds with decades of studies in less extreme conditions." The unexpected results could affect a variety of applications because the extreme velocities involved in these impacts occur routinely in meteorite impacts on spacecraft in orbit and high-speed machining operations used in manufacturing, sandblasting, and some additive manufacturing (3D printing) processes.

The experiments the researchers used to find this effect involved shooting tiny particles of sapphire, just millionths of a meter across, at flat sheets of metal. Propelled by laser beams, the particles reached high velocities, on the order of a few hundred meters per second. While other researchers have occasionally done experiments at similarly high velocities, they have tended to use larger impactors, at the scale of centimeters or larger. Because these larger impacts were dominated by the effects of the shock of the impact, there was no way to separate the mechanical and thermal effects.

The tiny particles in the new study don't create a significant pressure wave when they hit the target. However, it has taken a decade of research at MIT to develop methods of propelling such microscopic particles at such high velocities. "We've taken advantage of that," Schuh says, along with other new techniques for observing the high-speed impact itself. The team used extremely high-speed cameras "to watch the particles as they come in and as they fly away," he says. As the particles bounce off the surface, the difference between the incoming and outgoing velocities "tells you how much energy was deposited" into the target, which is an indicator of the surface strength.

The tiny particles they used were made of alumina, or sapphire, and are "very hard," Dowding says. At 10 to 20 microns (millionths of a meter) across, these are between one-tenth and one-fifth of the thickness of a human hair. When the launchpad behind those particles is hit by a laser beam, part of the material vaporizes, creating a jet of vapor that propels the particle in the opposite direction. The researchers shot the particles at samples of copper, titanium, and gold, and they expect their results should apply to other metals as well. They say their data provide the first direct experimental evidence for this anomalous thermal effect of increased strength with greater heat, although hints of such an effect had been reported before.

The passage suggests that traditionally, blacksmiths shape iron by:

A. Heating it to extremely high temperatures, making it more brittle.

B. Rapidly cooling the iron to increase its malleability.

C. Heating it red hot, making it more pliable and easier to work with.

D. Using special tools that don't require manipulating the iron's temperature.

Metals get softer when they are heated, which is how blacksmiths can form iron into complex shapes by heating it red hot. Anyone who compares a copper wire with a steel coat hanger will quickly discern that copper is much more pliable than steel. But scientists at MIT have discovered that when metal is struck by an object moving at a super high velocity, the opposite happens: The hotter the metal, the stronger it is. Under those conditions, which put extreme stress on the metal, copper can be just as strong as steel. The discovery could lead to new approaches to designing materials for extreme environments, such as shields that protect spacecraft hypersonic aircraft, or equipment for high-speed manufacturing processes.

The new finding, the authors write, "is counterintuitive and at odds with decades of studies in less extreme conditions." The unexpected results could affect a variety of applications because the extreme velocities involved in these impacts occur routinely in meteorite impacts on spacecraft in orbit and high-speed machining operations used in manufacturing, sandblasting, and some additive manufacturing (3D printing) processes.

The experiments the researchers used to find this effect involved shooting tiny particles of sapphire, just millionths of a meter across, at flat sheets of metal. Propelled by laser beams, the particles reached high velocities, on the order of a few hundred meters per second. While other researchers have occasionally done experiments at similarly high velocities, they have tended to use larger impactors, at the scale of centimeters or larger. Because these larger impacts were dominated by the effects of the shock of the impact, there was no way to separate the mechanical and thermal effects.

The tiny particles in the new study don't create a significant pressure wave when they hit the target. However, it has taken a decade of research at MIT to develop methods of propelling such microscopic particles at such high velocities. "We've taken advantage of that," Schuh says, along with other new techniques for observing the high-speed impact itself. The team used extremely high-speed cameras "to watch the particles as they come in and as they fly away," he says. As the particles bounce off the surface, the difference between the incoming and outgoing velocities "tells you how much energy was deposited" into the target, which is an indicator of the surface strength.

The tiny particles they used were made of alumina, or sapphire, and are "very hard," Dowding says. At 10 to 20 microns (millionths of a meter) across, these are between one-tenth and one-fifth of the thickness of a human hair. When the launchpad behind those particles is hit by a laser beam, part of the material vaporizes, creating a jet of vapor that propels the particle in the opposite direction. The researchers shot the particles at samples of copper, titanium, and gold, and they expect their results should apply to other metals as well. They say their data provide the first direct experimental evidence for this anomalous thermal effect of increased strength with greater heat, although hints of such an effect had been reported before.

The main reason the researchers used tiny sapphire particles in their experiments is:

A. To minimize the pressure wave created upon impact with the metal target.

B. To replicate the effects of meteorite impacts on spacecraft.

C. To generate the highest possible temperatures during the impact.

D. To ensure the particles wouldn't damage the metal surface significantly.

Metals get softer when they are heated, which is how blacksmiths can form iron into complex shapes by heating it red hot. Anyone who compares a copper wire with a steel coat hanger will quickly discern that copper is much more pliable than steel. But scientists at MIT have discovered that when metal is struck by an object moving at a super high velocity, the opposite happens: The hotter the metal, the stronger it is. Under those conditions, which put extreme stress on the metal, copper can be just as strong as steel. The discovery could lead to new approaches to designing materials for extreme environments, such as shields that protect spacecraft hypersonic aircraft, or equipment for high-speed manufacturing processes.

The new finding, the authors write, "is counterintuitive and at odds with decades of studies in less extreme conditions." The unexpected results could affect a variety of applications because the extreme velocities involved in these impacts occur routinely in meteorite impacts on spacecraft in orbit and high-speed machining operations used in manufacturing, sandblasting, and some additive manufacturing (3D printing) processes.

The experiments the researchers used to find this effect involved shooting tiny particles of sapphire, just millionths of a meter across, at flat sheets of metal. Propelled by laser beams, the particles reached high velocities, on the order of a few hundred meters per second. While other researchers have occasionally done experiments at similarly high velocities, they have tended to use larger impactors, at the scale of centimeters or larger. Because these larger impacts were dominated by the effects of the shock of the impact, there was no way to separate the mechanical and thermal effects.

The tiny particles in the new study don't create a significant pressure wave when they hit the target. However, it has taken a decade of research at MIT to develop methods of propelling such microscopic particles at such high velocities. "We've taken advantage of that," Schuh says, along with other new techniques for observing the high-speed impact itself. The team used extremely high-speed cameras "to watch the particles as they come in and as they fly away," he says. As the particles bounce off the surface, the difference between the incoming and outgoing velocities "tells you how much energy was deposited" into the target, which is an indicator of the surface strength.

The tiny particles they used were made of alumina, or sapphire, and are "very hard," Dowding says. At 10 to 20 microns (millionths of a meter) across, these are between one-tenth and one-fifth of the thickness of a human hair. When the launchpad behind those particles is hit by a laser beam, part of the material vaporizes, creating a jet of vapor that propels the particle in the opposite direction. The researchers shot the particles at samples of copper, titanium, and gold, and they expect their results should apply to other metals as well. They say their data provide the first direct experimental evidence for this anomalous thermal effect of increased strength with greater heat, although hints of such an effect had been reported before.

The passage implies that the development of the experimental techniques used in this research likely involved:

A. Discovering a new type of sapphire suitable for high-velocity impacts.

B. Inventing a method to vaporize large quantities of material using lasers.

C. Designing cameras capable of withstanding the high temperatures generated.

D. Perfecting techniques to propel microscopic particles at extreme speeds.

Metals get softer when they are heated, which is how blacksmiths can form iron into complex shapes by heating it red hot. Anyone who compares a copper wire with a steel coat hanger will quickly discern that copper is much more pliable than steel. But scientists at MIT have discovered that when metal is struck by an object moving at a super high velocity, the opposite happens: The hotter the metal, the stronger it is. Under those conditions, which put extreme stress on the metal, copper can be just as strong as steel. The discovery could lead to new approaches to designing materials for extreme environments, such as shields that protect spacecraft hypersonic aircraft, or equipment for high-speed manufacturing processes.

The new finding, the authors write, "is counterintuitive and at odds with decades of studies in less extreme conditions." The unexpected results could affect a variety of applications because the extreme velocities involved in these impacts occur routinely in meteorite impacts on spacecraft in orbit and high-speed machining operations used in manufacturing, sandblasting, and some additive manufacturing (3D printing) processes.

The experiments the researchers used to find this effect involved shooting tiny particles of sapphire, just millionths of a meter across, at flat sheets of metal. Propelled by laser beams, the particles reached high velocities, on the order of a few hundred meters per second. While other researchers have occasionally done experiments at similarly high velocities, they have tended to use larger impactors, at the scale of centimeters or larger. Because these larger impacts were dominated by the effects of the shock of the impact, there was no way to separate the mechanical and thermal effects.

The tiny particles in the new study don't create a significant pressure wave when they hit the target. However, it has taken a decade of research at MIT to develop methods of propelling such microscopic particles at such high velocities. "We've taken advantage of that," Schuh says, along with other new techniques for observing the high-speed impact itself. The team used extremely high-speed cameras "to watch the particles as they come in and as they fly away," he says. As the particles bounce off the surface, the difference between the incoming and outgoing velocities "tells you how much energy was deposited" into the target, which is an indicator of the surface strength.

The tiny particles they used were made of alumina, or sapphire, and are "very hard," Dowding says. At 10 to 20 microns (millionths of a meter) across, these are between one-tenth and one-fifth of the thickness of a human hair. When the launchpad behind those particles is hit by a laser beam, part of the material vaporizes, creating a jet of vapor that propels the particle in the opposite direction. The researchers shot the particles at samples of copper, titanium, and gold, and they expect their results should apply to other metals as well. They say their data provide the first direct experimental evidence for this anomalous thermal effect of increased strength with greater heat, although hints of such an effect had been reported before.

Which of the following applications of this discovery is MOST explicitly mentioned in the passage?

A. Creating stronger and lighter materials for building construction.

B. Improving the efficiency of high-speed machining processes.

C. Designing more heat-resistant coatings for spacecraft.

D. Enhancing the protective gear used in sandblasting operations.

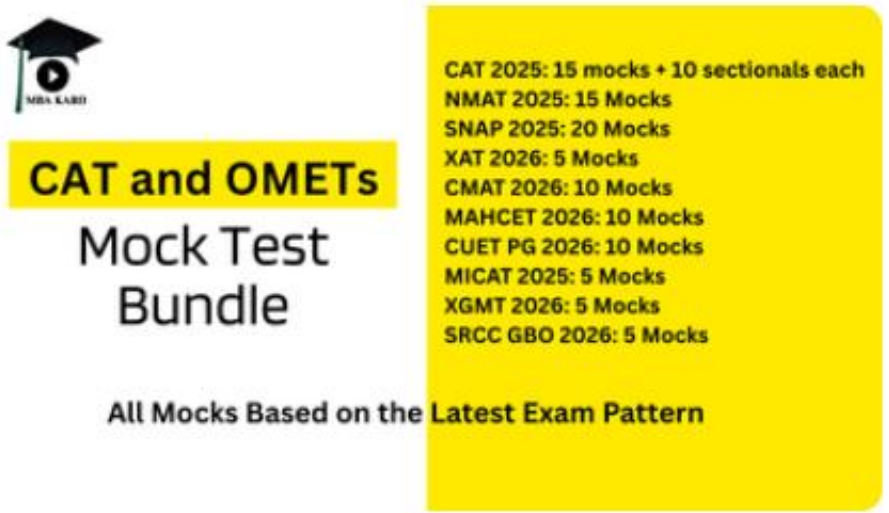

Like
Comment
Share


SUBSCRIBE


SUPER
THANKS

Expires On Nov 30, 2025

₹ 1,500



Expires On Apr 30, 2026

₹ 6,000

NMAT – 15
SNAP – 20
XAT – 10
CMAT – 10
MAHCET – 20
CUET PG – 10
MICAT – 5
XGMT – 5
SRCC GBO - 5

CAT and OMETs Mocks by MBA Karo

Starting in the 1960s, Soviet officials diverted rivers flowing into the Aral Sea to produce cotton in nearby fields. Without rivers regularly replenishing the sea, the large lake began to evaporate, water levels plummeted, and the retreating sea left behind increasingly saline soil where regular crops could not grow. Today, cotton farming continues in an arid region that receives an average of just four inches of rain per year. It's unclear whether the Uzbeki government will adopt the recommendations made by the SATREPS team. But so far, the country seems open to change; President Shavkat Mirziyoyev, who promised to loosen the rigid Soviet-era policies of his predecessor, Islam Karimov, ended the requirement that all Uzbek citizens pick cotton if called upon, and has spoken at the United Nations about the effects of desertification and land degradation on his country.

Climate change makes these adaptations even more urgent. Average temperatures in the Aral basin have increased by around 3.6 degrees Fahrenheit since 1968. The shrinking of the Aral Sea itself has affected the climate; as the water disappeared, the air became drier and lost the cooling effect of the nearby lake, creating a feedback loop that resulted in hotter and drier weather. Sandstorms now spread dust and toxic heavy metals to nearby villages, while retreating water has caused a build-up of salts in the soil. Aside from atriplex, SATREPS researchers are planting crops like sorghum, mung bean, and amaranth in test plots to learn which can best survive in dry, saline soil. So far, they've developed promising varieties of winter wheat and barley. They're also collecting satellite data to measure precipitation, solar radiation, and soil moisture in the Aral region, which can be used to help farmers decide which crops to plant or when to irrigate them. Kenji Tanaka, a hydrologist, hopes that the SATREPS project can help companies and government agencies develop tools for farmers to use when planning out their irrigation strategies.

SATREPS' partners are also running their experiments. The Karakalpak Institute of Agriculture and Agrotechnology has been testing different irrigation methods, such as drip systems that deliver water to specific plants, to see which technology uses water most efficiently. The International Innovation Center for Aral Sea Basin, a government agency in the region, is growing hardy plants in soil collected from the former lakebed. A devastating sandstorm in 2018, which destroyed crops and killed livestock on a scale not seen before, was a wakeup call for the region, said Bakhytzhan Khabibullaev, the center's director. Uzbekistan's government began a strategy to plant saxaul, a halophyte that is native to the area, in the dry lakebed to hold down the soil and combat dust and salt storms.

But researchers caution against the idea that the Aral Sea can ever be "saved," or returned to its former state. Instead, scientists are focusing on new forms of agriculture and industries that can help local communities adapt to the changes that have taken place, as well as those still to come.

Passage structure???

Problem Solution

Starting in the 1960s, Soviet officials diverted rivers flowing into the Aral Sea to produce cotton in nearby fields. Without rivers regularly replenishing the sea, the large lake began to evaporate, water levels plummeted, and the retreating sea left behind increasingly saline soil where regular crops could not grow. Today, cotton farming continues in an arid region that receives an average of just four inches of rain per year. It's unclear whether the Uzbeki government will adopt the recommendations made by the SATREPS team. But so far, the country seems open to change; President Shavkat Mirziyoyev, who promised to loosen the rigid Soviet-era policies of his predecessor, Islam Karimov, ended the requirement that all Uzbek citizens pick cotton if called upon, and has spoken at the United Nations about the effects of desertification and land degradation on his country.

Climate change makes these adaptations even more urgent. Average temperatures in the Aral basin have increased by around 3.6 degrees Fahrenheit since 1968. The shrinking of the Aral Sea itself has affected the climate; as the water disappeared, the air became drier and lost the cooling effect of the nearby lake, creating a feedback loop that resulted in hotter and drier weather. Sandstorms now spread dust and toxic heavy metals to nearby villages, while retreating water has caused a build-up of salts in the soil. Aside from atriplex, SATREPS researchers are planting crops like sorghum, mung bean, and amaranth in test plots to learn which can best survive in dry, saline soil. So far, they've developed promising varieties of winter wheat and barley. They're also collecting satellite data to measure precipitation, solar radiation, and soil moisture in the Aral region, which can be used to help farmers decide which crops to plant or when to irrigate them. Kenji Tanaka, a hydrologist, hopes that the SATREPS project can help companies and government agencies develop tools for farmers to use when planning out their irrigation strategies.

SATREPS' partners are also running their experiments. The Karakalpak Institute of Agriculture and Agrotechnology has been testing different irrigation methods, such as drip systems that deliver water to specific plants, to see which technology uses water most efficiently. The International Innovation Center for Aral Sea Basin, a government agency in the region, is growing hardy plants in soil collected from the former lakebed. A devastating sandstorm in 2018, which destroyed crops and killed livestock on a scale not seen before, was a wakeup call for the region, said Bakhytzhan Khabibullaev, the center's director. Uzbekistan's government began a strategy to plant saxaul, a halophyte that is native to the area, in the dry lakebed to hold down the soil and combat dust and salt storms.

But researchers caution against the idea that the Aral Sea can ever be "saved," or returned to its former state. Instead, scientists are focusing on new forms of agriculture and industries that can help local communities adapt to the changes that have taken place, as well as those still to come.

What was the primary cause of the shrinking Aral Sea in the 1960s?

A. Increased evaporation due to rising temperatures

B. Diversion of rivers for cotton production

C. Introduction of invasive species in the water

D. A devastating sandstorm that choked the lake

Starting in the 1960s, Soviet officials diverted rivers flowing into the Aral Sea to produce cotton in nearby fields. Without rivers regularly replenishing the sea, the large lake began to evaporate, water levels plummeted, and the retreating sea left behind increasingly saline soil where regular crops could not grow. Today, cotton farming continues in an arid region that receives an average of just four inches of rain per year. It's unclear whether the Uzbeki government will adopt the recommendations made by the SATREPS team. But so far, the country seems open to change; President Shavkat Mirziyoyev, who promised to loosen the rigid Soviet-era policies of his predecessor, Islam Karimov, ended the requirement that all Uzbek citizens pick cotton if called upon, and has spoken at the United Nations about the effects of desertification and land degradation on his country.

Climate change makes these adaptations even more urgent. Average temperatures in the Aral basin have increased by around 3.6 degrees Fahrenheit since 1968. The shrinking of the Aral Sea itself has affected the climate; as the water disappeared, the air became drier and lost the cooling effect of the nearby lake, creating a feedback loop that resulted in hotter and drier weather. Sandstorms now spread dust and toxic heavy metals to nearby villages, while retreating water has caused a build-up of salts in the soil. Aside from atriplex, SATREPS researchers are planting crops like sorghum, mung bean, and amaranth in test plots to learn which can best survive in dry, saline soil. So far, they've developed promising varieties of winter wheat and barley. They're also collecting satellite data to measure precipitation, solar radiation, and soil moisture in the Aral region, which can be used to help farmers decide which crops to plant or when to irrigate them. Kenji Tanaka, a hydrologist, hopes that the SATREPS project can help companies and government agencies develop tools for farmers to use when planning out their irrigation strategies.

SATREPS' partners are also running their experiments. The Karakalpak Institute of Agriculture and Agrotechnology has been testing different irrigation methods, such as drip systems that deliver water to specific plants, to see which technology uses water most efficiently. The International Innovation Center for Aral Sea Basin, a government agency in the region, is growing hardy plants in soil collected from the former lakebed. A devastating sandstorm in 2018, which destroyed crops and killed livestock on a scale not seen before, was a wakeup call for the region, said Bakhytzhan Khabibullaev, the center's director. Uzbekistan's government began a strategy to plant saxaul, a halophyte that is native to the area, in the dry lakebed to hold down the soil and combat dust and salt storms.

But researchers caution against the idea that the Aral Sea can ever be "saved," or returned to its former state. Instead, scientists are focusing on new forms of agriculture and industries that can help local communities adapt to the changes that have taken place, as well as those still to come.

The passage implies a negative feedback loop related to the shrinking Aral Sea. Which of the following best describes this loop?

A. Increased dust storms lead to higher crop yields, necessitating more water.

B. Higher water salinity discourages plant growth, leading to less water usage.

C. Drier air due to a shrinking sea causes hotter temperatures, leading to more evaporation.

D. Government intervention in agriculture disrupts traditional irrigation methods.

Starting in the 1960s, Soviet officials diverted rivers flowing into the Aral Sea to produce cotton in nearby fields. Without rivers regularly replenishing the sea, the large lake began to evaporate, water levels plummeted, and the retreating sea left behind increasingly saline soil where regular crops could not grow. Today, cotton farming continues in an arid region that receives an average of just four inches of rain per year. It's unclear whether the Uzbeki government will adopt the recommendations made by the SATREPS team. But so far, the country seems open to change; President Shavkat Mirziyoyev, who promised to loosen the rigid Soviet-era policies of his predecessor, Islam Karimov, ended the requirement that all Uzbek citizens pick cotton if called upon, and has spoken at the United Nations about the effects of desertification and land degradation on his country.

Climate change makes these adaptations even more urgent. Average temperatures in the Aral basin have increased by around 3.6 degrees Fahrenheit since 1968. The shrinking of the Aral Sea itself has affected the climate; as the water disappeared, the air became drier and lost the cooling effect of the nearby lake, creating a feedback loop that resulted in hotter and drier weather. Sandstorms now spread dust and toxic heavy metals to nearby villages, while retreating water has caused a build-up of salts in the soil. Aside from atriplex, SATREPS researchers are planting crops like sorghum, mung bean, and amaranth in test plots to learn which can best survive in dry, saline soil. So far, they've developed promising varieties of winter wheat and barley. They're also collecting satellite data to measure precipitation, solar radiation, and soil moisture in the Aral region, which can be used to help farmers decide which crops to plant or when to irrigate them. Kenji Tanaka, a hydrologist, hopes that the SATREPS project can help companies and government agencies develop tools for farmers to use when planning out their irrigation strategies.

SATREPS' partners are also running their experiments. The Karakalpak Institute of Agriculture and Agrotechnology has been testing different irrigation methods, such as drip systems that deliver water to specific plants, to see which technology uses water most efficiently. The International Innovation Center for Aral Sea Basin, a government agency in the region, is growing hardy plants in soil collected from the former lakebed. A devastating sandstorm in 2018, which destroyed crops and killed livestock on a scale not seen before, was a wakeup call for the region, said Bakhytzhan Khabibullaev, the center's director. Uzbekistan's government began a strategy to plant saxaul, a halophyte that is native to the area, in the dry lakebed to hold down the soil and combat dust and salt storms.

But researchers caution against the idea that the Aral Sea can ever be "saved," or returned to its former state. Instead, scientists are focusing on new forms of agriculture and industries that can help local communities adapt to the changes that have taken place, as well as those still to come.

The passage mentions the use of satellite data by the SATREPS project. What is the MOST LIKELY reason for collecting this data?

A. To monitor changes in the size and depth of the Aral Sea over time.

B. To identify areas with the highest concentration of toxic heavy metals.

C. To create a detailed map of the irrigation infrastructure in the region.

D. To predict future weather patterns and inform planting decisions.

Starting in the 1960s, Soviet officials diverted rivers flowing into the Aral Sea to produce cotton in nearby fields. Without rivers regularly replenishing the sea, the large lake began to evaporate, water levels plummeted, and the retreating sea left behind increasingly saline soil where regular crops could not grow. Today, cotton farming continues in an arid region that receives an average of just four inches of rain per year. It's unclear whether the Uzbeki government will adopt the recommendations made by the SATREPS team. But so far, the country seems open to change; President Shavkat Mirziyoyev, who promised to loosen the rigid Soviet-era policies of his predecessor, Islam Karimov, ended the requirement that all Uzbek citizens pick cotton if called upon, and has spoken at the United Nations about the effects of desertification and land degradation on his country.

Climate change makes these adaptations even more urgent. Average temperatures in the Aral basin have increased by around 3.6 degrees Fahrenheit since 1968. The shrinking of the Aral Sea itself has affected the climate; as the water disappeared, the air became drier and lost the cooling effect of the nearby lake, creating a feedback loop that resulted in hotter and drier weather. Sandstorms now spread dust and toxic heavy metals to nearby villages, while retreating water has caused a build-up of salts in the soil. Aside from atriplex, SATREPS researchers are planting crops like sorghum, mung bean, and amaranth in test plots to learn which can best survive in dry, saline soil. So far, they've developed promising varieties of winter wheat and barley. They're also collecting satellite data to measure precipitation, solar radiation, and soil moisture in the Aral region, which can be used to help farmers decide which crops to plant or when to irrigate them. Kenji Tanaka, a hydrologist, hopes that the SATREPS project can help companies and government agencies develop tools for farmers to use when planning out their irrigation strategies.

SATREPS' partners are also running their experiments. The Karakalpak Institute of Agriculture and Agrotechnology has been testing different irrigation methods, such as drip systems that deliver water to specific plants, to see which technology uses water most efficiently. The International Innovation Center for Aral Sea Basin, a government agency in the region, is growing hardy plants in soil collected from the former lakebed. A devastating sandstorm in 2018, which destroyed crops and killed livestock on a scale not seen before, was a wakeup call for the region, said Bakhytzhan Khabibullaev, the center's director. Uzbekistan's government began a strategy to plant saxaul, a halophyte that is native to the area, in the dry lakebed to hold down the soil and combat dust and salt storms.

But researchers caution against the idea that the Aral Sea can ever be "saved," or returned to its former state. Instead, scientists are focusing on new forms of agriculture and industries that can help local communities adapt to the changes that have taken place, as well as those still to come.

The passage can be seen as an example of the complex interplay between which of the following?

A. Political ideologies and environmental sustainability.
B. Economic development and social welfare.
C. Technological advancements and resource management.
D. Cultural traditions and agricultural practices.

Get these PDFs on

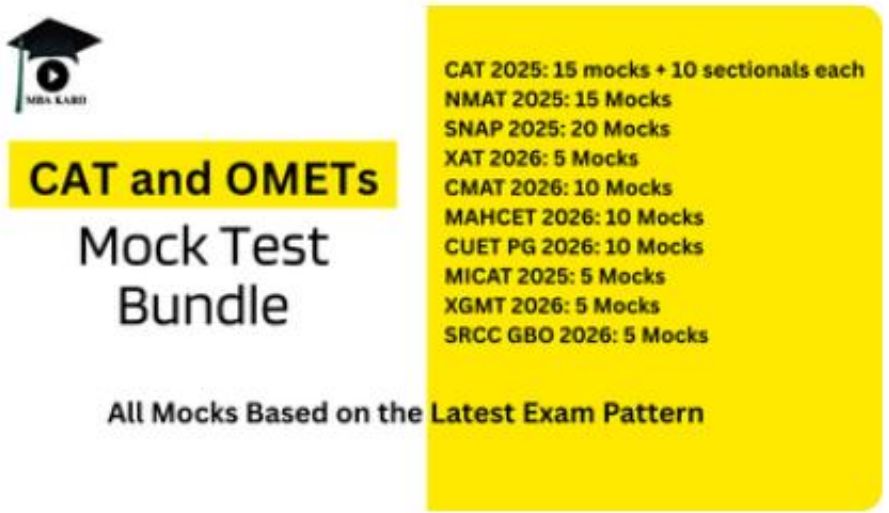
MBA KARO

Our Telegram Group

https://t.me/MBAKaro

Expires On Nov 30, 2025

₹ 1,500



Expires On Apr 30, 2026

₹ 6,000

NMAT – 15
SNAP – 20
XAT – 10
CMAT – 10
MAHCET – 20
CUET PG – 10
MICAT – 5
XGMT – 5
SRCC GBO - 5

CAT and OMETs Mocks by MBA Karo

MBA KARO