Mainframes

A PROVISIONAL ANALYSIS OF RHETORICAL FRAMES IN AI
CSET Issue Brief
Andrew Imbrie, James Dunham, Rebecca Gelles, and Catherine Aiken
August 2020

APPENDIX B: ANNOTATION GUIDELINES

1. Artificial Intelligence (AI)

An exact mention of the phrase "artificial intelligence" or the abbreviation "AI" is required for an article to be included for annotation. Mentions of sub-fields, such as facial recognition, robotics, 5G, autonomous cars, etc., are not sufficient alone to say that AI is mentioned in the article.

If "artificial intelligence" or "AI" is mentioned, any discussion of sub-fields of AI may be used to invoke the competition frame. Examples include:

- robotics arms race
- battle for talent in facial recognition
- cyberwarfare dominance
- 5G race

2. Competition Frame

This frame is defined as: an expression that describes AI development as a competition between two or more actors, such as governments or companies. Valid concepts include frames describing:

- a military competition ("arms race")
- an analogy to historical competition ("Cold War" or "Sputnik Moment")
- a territorial competition ("supremacy in Europe")
- a competition for resources ("battle for talent")
- any other type of competition ("two-man contest" or "AI rivalry")

Examples:

Text:	Rationale:
…it is a great power <u>rivalry</u> focusing on <u>technological supremacy</u> and which side has the best development model.	The phrase *rivalry focusing on technological supremacy* occurs in a discussion about AI and indicates a competition between two or more actors

Chinese AI company iFlyTek often beats Facebook, Alphabet's DeepMind, and IBM's Watson in competitions to process natural speech[1]	The phrase *beats Facebook, Alphabet's DeepMind, and IBM's Watson in competitions* describes a competition between two or more actors in the context of AI
China is outpacing other countries in the development of 5G today.[2]	Although only one country is *outpacing*, this term entails a race, or competition, between more than one actor, with the relative gains accruing to one side over another.

The following are NOT examples of a competition frame:

Counter-examples:

Text:	Rationale:
US-China trade war is making China stronger[3]	This is NOT an AI competition frame, because it is not used in the context of AI.
His company finds itself under fire, besieged by a U.S. effort to get key allies to ban its networking equipment.[4]	This is NOT an AI competition frame, because *under fire* and *besieged* only describe the actions of one actor; they do not entail competition or relative advantage.

3. Article

The article includes: the title, captions, and body. Links, comments, and citations are not annotated.

4. Paragraph

The article title and photo captions are annotated as individual paragraphs. Each paragraph in the article is annotated.

5. Purpose of frame

The annotator identifies the purpose of the frame for the overall document, and for each occurrence of the frame. The frame may be invoked for the purpose of *motivation*, *explanation*, *critique*, or reporting on *structured competition*. Each of the four purposes is described below.

Structured competition

This frame is invoked to report on organized, structured competition. This frame, describing a literal competition, grand challenge or event, will frequently involve companies, rather than governments, as actors; however, it may occur with an individual as one of the actors.

Text:	Rationale:
Chinese AI company iFlyTek often **beats** Facebook, Alphabet's DeepMind, and IBM's Watson in **competitions** to process natural speech.5	The phrase *beats Facebook, Alphabet's DeepMind, and IBM's Watson in competitions* describes results from organized competition between two or more actors in the context of AI.
Lee explains how a highly-publicized **match** of the ancient game Go between a teenaged Chinese prodigy and the Google-built AlphaGo became China's "Sputnik moment."6	This text uses an AI competition frame, for the purpose of reporting a structured competition. In this text, one of the actors is an individual.

Critique

This frame is invoked in order to condemn the use of the frame itself. When the purpose is critique, there is an explicit rejection of the frame, not just a rejection of the world/reality it describes. This option includes language about the frame and why using it can fuel negative dynamics, instability, and escalation risks, and/or result in unintended consequences.

Examples:

Text	Rationale
Those who take the **arms-race** view are more interested in political posturing than the flourishing of humanity.7	This is a critique of the frame itself, the vision of the relation as an arms race.
However, the framing of this measure in terms of "**foreign adversaries**" also represents a missed opportunity for the U.S. government to present stronger arguments that reflect the systemic concerns involved, which go far beyond Huawei.8	This is a critique of the frame, viewing China and Chinese companies as *adversaries*, which entails competition.
An **AI arms race** would be a grave mistake. The AI boom is more akin to the spread of electricity in the early Industrial Revolution than nuclear weapons during the Cold War.9	This text critiques the use of the competitive frame (*arms race, nuclear weapons*) as opposed to a beneficial non-competitive frame (*spread of electricity*).
But the emerging narrative of an "**AI arms race**" reflects a mistaken view of the risks from AI—and introduces significant new risks as a result.10	The use of *AI arms race* is criticized as a dangerous frame.

Motivation

This frame is invoked to justify new policies, investments, or force postures that will allow one side to maintain a competitive edge or to "win" the race. In some cases, frame is invoked to justify new policies and investments that will have positive-sum effects and benefit all sides.

Examples:

Text	Rationale
… By this metric, a **Sputnik moment** doesn't have to be cause for alarm, and the **race** to build better AI could still benefit us all.[11]	The possibility of universal benefit serves as a motivation, with benefit to all sides.
The head of the country's technology policy stated that China is now quickly tightening the **race** for global artificial intelligence **dominance** and that it may one day **overtake** the United States. Kratsios further elaborated that the US should not be complacent in the fact that it is the current leader when it comes to AI.[12]	Invocation of the competition frame is used to motivate the United States to maintain its competitive edge.
The AI **rivalry** that could give clues about the future strength of the two economies certainly matters a lot, especially taking into account the worsening trade situation. (…) China needs to scale up its effective AI investment to turn the tech buzzword into an economic engine. That means greater spending on AI research, hardware, talent and adoption.[13]	The competition frame is invoked to motivate greater spending on AI.

Explanation

This frame is invoked as a characterization of the world or of reality and as a description of events, including events that may occur in the future, and events that are dangerous or could lead to great instability and conflict.

Examples:

Text	Rationale
This **rivalry** between the world's two largest economies is the subject of the new book *AI Superpowers* by Kai Fu Lee.[14]	The frame is used to describe a relationship between two actors, without motivating action or criticizing its use.
China, the United States, and Russia are each negotiating this fraught landscape differently, in ways responsive to their unique economic and military situations. Governments are	The pursuit of a strategic advantage entails a competition between the actors. This phrase is descriptive of the governments' motivation, but this description is not used for the purpose of motivation.

motivated to pursue leadership in AI by the promise of gaining a **strategic advantage**.[15]	
If AI becomes an **arms race**, then this is extremely bad news for all humans.[16]	The frame is used to describe the competition as potentially dangerous, without critiquing the use of the frame "arms race" or "competition" in AI.

Process of annotating purpose

To avoid confusion when annotating paragraphs or documents that appear to use the competition frame for more than one purpose, the annotators should ask themselves the following questions, in the following order:

1. Is the frame used to describe a structured competition? If so, it is labelled *Structured*, and annotation of this frame is finished. If not,
2. Is the language of the frame itself rejected? If so, it is labelled *Critique*, and annotation of this frame is finished. If not,
3. Is the frame used to motivate some policy? If so, it is labelled *Motivation*, and annotation of this frame is finished. If not,
4. The frame is descriptive or explanatory, and it is labelled *Explanation*.

Annotation Tasks

Annotation is performed at the document level and at the paragraph level.

Document level annotation

For document level annotation, values are assigned to the following fields as shown in the table below:

Field	Values
CONTAINSAI	**Yes, No**
CONTAINSFRAME	**Yes, No**
OVERALLPURPOSE	**Structured, Critique, Motivation, Explanation**
AUTHORFIRSTNAME	**The first name of the author**
AUTHORLASTNAME	**The last name of the author**
AUTHORAFFILIATION	**The affiliation of the author**

Document Task 1. Determine whether the article contains a discussion of AI.

Annotation: If the article contains a discussion of AI, the value Yes is assigned to CONTAINSAI. Otherwise, the annotator assigns the value No to CONTAINSAI and continues to the next article. It is not necessary that AI be the main focus of the document; if there is any mention of AI the value Yes is assigned.

Document Task 2. Determine whether the competition frame occurs in the document.

Annotation: If the article contains at least one occurrence of the competition frame with reference to AI, the value Yes is assigned to CONTAINSFRAME. Otherwise, the annotator assigns No to CONTAINSFRAME and continues to the next article.

Document Task 3. Determine the overall purpose of the frame.

Annotation: The annotator indicates the overall purpose for the frame in the document. One of the values {Motivation, Explanation, Critique or Structured} is assigned to OVERALLPURPOSE.

If the frame is used for more than one purpose in the document, look for the purpose of the author. If the purpose of the author's use of the frame is unclear, look at the title, first and last paragraphs to see if the overall purpose stands out. If the document level purpose is still unclear, consider the purpose that is used most frequently in the document. For example, if the competition frame is invoked once for Explanation and five times for Motivation, the overall purpose is probably Motivation.

Document Task 4. Annotate author(s) and affiliation(s)

Annotation: The author's given name, surname and affiliation are assigned to AUTHORFIRSTNAME, AUTHORLASTNAME **and** AUTHORAFFILIATION, **respectively. Include all authors.** AUTHORAFFILIATION **is the organization listed with the author's name.**

Paragraph level annotation

For paragraph level annotation, values are assigned to the following fields as shown in the table below:

Field	Values
PARCONTAINSFRAME	**Yes, No**
FRAMESPAN	**The frame as expressed in the text, ex.** *rivalry*
FRAMEPURPOSE	**Motivation, Explanation, Critique, Structured**
QUOTEDFIRSTNAME	**The first name of a person quoted in the paragraph**
QUOTEDLASTNAME	**The last name of a person quoted in the paragraph**
QUOTEDAFFILIATION	**The affiliation of a person quoted in the paragraph**
MENTIONEDFIRSTNAME	**The first name of a person mentioned in the paragraph**
MENTIONEDLASTNAME	**The last name of a person mentioned in the paragraph**
MENTIONEDAFFILIATION	**The affiliation of a person mentioned in the paragraph**

Paragraph Task 1: Determine whether the paragraph contains the frame.

Annotation:
Determine whether each paragraph contains an instance of the competition frame. If yes, assign Yes to PARCONTAINSFRAME. If no, assign No to PARCONTAINSFRAME.

Paragraph Task 2: Identify all instances of the frame.

Annotation: The annotator assigns each instance of the frame to FRAMESPAN.

The annotator identifies all occurrences of the competitive frame used in the discussion of AI. Common instantiations of this frame include: arms race, competition, trade war, technology war, battle, rivalry, or Cold War.

Examples:

Text:	Rationale
Each major power will attract others to its orbit or camp, causing conflict of ideologies to turn into an **arms race** based on the development of artificial intelligence (…)[17]	An arms race indicates a competition between two or more actors
This has opened the gate wide open for a **technological race for superiority** in artificial intelligence at the international level.[18]	A race indicates a competition between two or more actors

Language that invokes the action of a single actor is not included in this frame. For example, *besieged, attacked,* and *under fire* describe the actions or condition of only one actor, not a relationship between two rivals or competitors. Therefore, these words do not invoke the competition frame.

If the competition frame is not used to describe AI, it is not annotated, as in the counter-example below.

Counter-example:

Text:	
…we examine Imperial Germany's naval rearmament in the context of its naval rivalry with Great Britain from 1890 to 1916.[19]	This sentence is in close proximity to a mention of "artificial intelligence" in the original article, however, the rivalry is historical and does NOT refer to AI. Therefore, this is NOT a competition frame.

Paragraph Task 3: Determine the purpose of each rhetorical frame.

Annotation: For each occurrence of the rhetorical frame, assign a FRAMEPURPOSE. The four purposes are Motivation, Explanation, Critique or Structured. (See 4. Purpose of frame, page for examples.)

Paragraph Task 4: Annotate names.
Annotation:
1) The annotator identifies names of all people quoted in the paragraph, and assigns the first name, last name, and affiliation to QUOTEDFIRSTNAME, QUOTEDLASTNAME and QUOTEDAFFILIATION, respectively.

2) The annotator identifies names of all people mentioned but not quoted in the paragraph, and assigns the first name, last name, and affiliation to MENTIONEDFIRSTNAME, MENTIONEDLASTNAME and MENTIONEDAFFILIATION, respectively.

NORMALLY, THE TITLE IS NOT INCLUDED WITH THE AFFILIATION. HOWEVER, IF THERE IS NO ORGANIZATION NAME BUT THE TITLE DENOTES THE ORGANIZATION, THEN THE TITLE MAY BE USED.

IF A QUOTE IS ATTRIBUTED TO AN ORGANIZATION, WITH NO PERSON NAME, THE ORGANIZATION IS ENTERED AS QUOTEDAFFILIATION, and QUOTEDFIRSTNAME and QUOTEDLASTNAME are left blank.

LIKEWISE, THERE MAY BE NO FIRST NAME OR AFFILIATION PROVIDED IN THE PARAGRAPH, IN WHICH CASE THE CORRESPONDING FIELDS ARE NOT POPULATED.

EXAMPLES:

TEXT ANNOTATION	ANNOTATION
…THAT'S JUST THE START FOR AI, SAID COL. DREW CUKOR, WHO LEADS THE PENTAGON TEAM CHARGED WITH LAYING OUT A PLAN…20	QUOTEDFIRSTNAME=Drew QUOTEDLASTNAME=Cukor QUOTEDAFFILIATION=Pentagon
ONE COMPANY THAT HAS RECEIVED CRITICISM RECENTLY FOR PARTNERING WITH CHINESE RESEARCHERS IS GOOGLE. ON TUESDAY, KENT WALKER, THE COMPANY'S SENIOR VICE PRESIDENT FOR GLOBAL AFFAIRS TOLD THE CROWD…21	QUOTEDFIRSTNAME=Kent QUOTEDLASTNAME=Walker QUOTEDAFFILIATION=Google
IN THIS PHOTO FROM MAY 9, 2018, SEN. BRIAN SCHATZ, D-HAWAII, PUTS A QUESTION TO THEN-DEFENSE SECRETARY JIM MATTIS …22	MENTIONEDFIRSTNAME=Brian MENTIONEDLASTNAME E=Schatz MENTIONEDAFFILIATION=Sen. MENTIONEDFIRSTNAME=Jim MENTIONEDLASTNAME E=Mattis MENTIONEDAFFILIATION=Defense
"THE GOVERNMENT'S MEANINGFUL ENGAGEMENT … IS NECESSARY, BUT NOT SUFFICIENT, FOR THE NATION TO MAINTAIN ITS LEADERSHIP IN THIS COMPETITIVE REALM," NIST SAID.23	QUOTEDFIRSTNAME= QUOTEDLASTNAME= QUOTEDAFFILIATION=NIST

Co-reference between paragraphs

There may be instances in which a noun or pronoun in a paragraph is understood in the context of a preceding paragraph. In these cases, the noun phrase or pronoun should be annotated.

In the example below, the second paragraph contains the frame (AI arms race). Although the name Allen is not mentioned in the second paragraph, it refers to the Allen previously mentioned. Therefore, for paragraph 2:

QUOTEDFIRSTNAME=Gregory
QUOTEDLASTNAME=Allen

QUOTEDAFFILIATION= CNAS' Technology and National Security Program

Paragraph 1: An adjunct senior fellow in CNAS' Technology and National Security Program, **Gregory Allen** based his report on four trips to Chinese "diplomatic, military, and private-sector" AI conferences, and discussions with industry executives and scientists.

Paragraph 2: **He** reports that the Chinese Communist Party and the People's Liberation Army are keenly interested in — read: pouring money into — research into AI-based surveillance technology and lethal autonomous weapons, even though the latter "runs counter to China's stated goals of avoiding an AI arms race."[24]

It may also be possible for a pronoun or noun phrase to refer to the competition frame. Consider the following example:

Title: Don't Call It an 'Arms Race': US-China AI Competition Is Not Winner-Takes-All

Paragraph 1: The most common framing of the two countries' artificial-intelligence development is dangerous.[25]

In the example above, "the most common framing" refers back to 'Arms Race'". Therefore, "the most common framing" is annotated as a FRAMESPAN (with purpose Critique).

Extended Examples with Explanations

The following examples illustrate some of the decisions made in the annotation process. The entire article in each case may be accessed through the link provided.

1) **Nicholas Thompson, "Will Artificial Intelligence Enhance or Hack Humanity," WIRED, April 28, 2019, https://www.wired.com/story/will-artificial-intelligence-enhance-hack-humanity/**

Document Task 1: Does this article mention AI?
Yes, it is mentioned in the title. The annotator assigns Yes to the CONTAINSAI field.

Document Task 2: Does the rhetorical frame appear in the article?
Yes. The annotator assigns Yes to the CONTAINSFRAME field

Document Task 3. What is the overall purpose of the frame?
The frame is invoked at the document level for Explanation.

The author asks:

These two countries at some point are going to come in **conflict** and I'm going to guess that Country B's technology might be ahead of Country A's. Is that a concern?	Explanation. The author uses the frame to pose a question, using the frame to request clarification in describing a situation.

Yuval Harari replies, invoking it as a description of an emerging dynamic that he sees as dangerous and destabilizing:

Yeah, that's always the concern with **arms races**, which become a **race** to the bottom in the name of efficiency and domination.	Explanation. He does not explicitly critique or reject the competition frame itself. He compares great power competition in AI to an arms race and says that it could lead to *a race to the bottom*

If this document consisted of only these two paragraphs, the annotator would assign a value of *Explanation* to the OVERALLPURPOSE field.

Document Task 4: Who is the author?
Nicholas Thompson, Wired Editor in Chief is the author.
AUTHORFIRSTNAME= Nicholas
AUTHORLASTNAME = Thompson
AUTHORAFFILIATION= Wired

Paragraph Task 1: Does the paragraph contain the competition frame?
For each paragraph below, PARCONTAINSFRAME is Yes.

Paragraph Task 2: Tag each instance of the frame.
In the following two paragraphs, each competition frame is marked in bold. Each of the valid instances of the frame should be marked FRAMESPAN. (False positives are starred and underlined below. The annotator should ignore false positives.)

*YNH: Yeah, that's always the concern with **arms races** (1), which become a **race** (2) to the bottom in the name of efficiency and domination. I mean, what is extremely problematic or dangerous about the situation now with AI, is that more and more countries are waking up to the realization that this could be the technology of domination in the 21st century. So you're not talking about just any economic <u>competition (*3)</u> between the different textile industries or even between different oil industries, like one country decides to we don't care about the environment at all, we'll just go full gas ahead and the other countries are much more environmentally aware. The situation with AI is potentially much worse, because it could be really the technology of domination in the 21st century. And those left behind could be dominated, exploited, conquered by those who forge ahead. So nobody wants to stay behind. And I think the only way to prevent this kind of catastrophic **arms race** (4) to the bottom is greater global cooperation around AI. Now, this sounds utopian because we are now moving in exactly the opposite direction of more and more **rivalry** (5) and **competition** (6). But this is part of, I think, of our job, like with the <u>nuclear arms race (*7)</u>, to make people in different countries realize that this is an **arms race** (8), that whoever wins, humanity loses. And it's the same with AI. If AI becomes an **arms race** (9), then this is extremely bad news for all humans. And it's easy for, say, people in the US to say we are the good guys **in this race** (10), you should be cheering for us. But this is becoming more and more difficult in a situation when the motto of the day is America First. How can we trust the USA to be the leader in AI technology, if ultimately it will serve only American interests and American economic and political domination? So I think, most people when they*

*think **arms race (11) in AI**, they think USA **versus (12)** China, but there are almost 200 other countries in the world. And most of them are far, far behind. And when they look at what is happening, they are increasingly terrified. And for a very good reason.*

*NT: The historical example you've made is a little unsettling. Because, if I heard your answer correctly, it's that we need global cooperation. And if we don't, we're going to need an **arms race (13)**. In the actual <u>nuclear arms race(*14),</u> we tried for global cooperation from, I don't know, roughly 1945 to 1950. And then we gave up and then we said, We're going full throttle in the United States. And then, Why did the <u>Cold War(*15)</u> end the way it did? Who knows but one argument would be that the United States and its relentless buildup of nuclear weapons helped to keep the peace until the Soviet Union collapsed. So if that is the parallel, then what might happen here is we'll try for global cooperation and 2019, 2020, and 2021 and then we'll be off in an **arms race (16)**. A, is that likely and B, if it is, would you say well, then the US needs to really move full throttle on AI because it will be better for the liberal democracies to have artificial intelligence than totalitarian states?*

In the above paragraphs, there are 16 occurrences of the competitive frame, but only 12 of these refer to AI. The starred* mentions refer to a different historical arms race, so these occurrences are not annotated.

The following occurrences of the phrase "arms race" are not competition frames, and would not be annotated.

Counter examples:

Text	Rationale
So you're not talking about just any economic <u>competition</u> between the different textile industries or even between different oil industries (…)	The competition in this text does not refer to AI
But this is part of, I think, of our job, like with the <u>nuclear arms race</u> (…)	This is a historical reference to a different arms race; not referring to AI
In <u>the actual nuclear arms race</u>, we tried for global cooperation from, I don't know, roughly 1945 to 1950.	Historical reference; not referring to AI
Why did <u>the Cold War</u> end the way it did?	Historical reference; not referring to AI

Paragraph Task 3: What is the purpose of the frame?
The twelve mentions of the frame in the paragraphs above are all *Explanation*.

Yeah, that's always the concern with **arms races (1)**, which become a **race (2)** to the bottom in the name of efficiency and domination.	FRAMEPURPOSE=Explanation for both text spans. It is a description of the situation, in this case, with dire consequences.
And I think the only way to prevent this kind of catastrophic **arms race** to the bottom is greater global cooperation around AI.	FRAMEPURPOSE=Explanation. It is a description of the situation, again, with dire consequences.

Now, this sounds utopian because we are now moving in exactly the opposite direction of more and more **rivalry** and **competition**.	FRAMEPURPOSE=Explanation. The use is descriptive.
But this is part of, I think, of our job, like with the nuclear arms race, to make people in different countries realize that this is an **arms race**, that whoever wins, humanity loses. And it's the same with AI.	FRAMEPURPOSE=Explanation.
If AI becomes an **arms race**, then this is extremely bad news for all humans. And it's easy for, say, people in the US to say we are the good guys **in this race**, you should be cheering for us.	FRAMEPURPOSE=Explanation for both text spans.
So I think, most people when they think **arms race in AI**, they think USA **versus** China (…)	FRAMEPURPOSE=Explanation for both text spans.
Because, if I heard your answer correctly, it's that we need global cooperation. And if we don't, we're going to need an **arms race**.	FRAMEPURPOSE=Explanation.
So if that is the parallel, then what might happen here is we'll try for global cooperation and 2019, 2020, and 2021 and then we'll be off in an **arms race**.	FRAMEPURPOSE=Explanation.

Paragraph Task 4: What names are mentioned?
In the first paragraph above, Yuval Harari is quoted. No other names are mentioned. The annotator makes the following assignments:

QUOTEDFIRSTNAME= Yuval
QUOTEDLASTNAME = Harari
QUOTEDAFFILIATION= Null

No affiliation is provided, so the field QUOTEDAFFILIATION is left blank. No other person names are mentioned in the paragraph.

In the second paragraph above, Nicholas Thompson is quoted. No other names are mentioned. The annotator makes the following assignments:

QUOTEDFIRSTNAME = Nicholas
QUOTEDLASTNAME = Thompson
QUOTEDAFFILIATION = Wired

No other person names are mentioned, so the annotator moves on to the next paragraph.

2) **Nathan Gardels, "The Great AI Duopoly,"** *Washington Post***, September 24, 2018, https://www.washingtonpost.com/news/theworldpost/wp/2018/09/24/artificial-intelligence-2/**

Document Task 1: Does the article discuss AI?
Yes, it is mentioned in the title. The annotator assigns Yes to the CONTAINSAI field.

Document Task 2: Does the rhetorical frame appear in the article?
Yes. The annotator assigns Yes to the CONTAINSFRAME field

Document Task 3. What is the overall purpose of the frame?
Based on the paragraphs provided below, the frame is invoked primarily as an explanation. Although the interviewee critiques the frame, the author uses the frame for the purpose of explanation. Therefore, OVERALLPURPOSE=Explanation.

Text	Rationale
(Author): Given the parallel universes you describe aren't you concerned that the AI superpowers will end up in an **arms race**?	The author invokes the frame as an Explanation, for clarifying the thoughts of the interviewee.

Document Task 4: Who is the author?
The author is Nathan Gardels, journalist for WorldPost

AUTHORFIRSTNAME= Nathan
AUTHORLASTNAME = Gardels
AUTHORAFFILIATION= WorldPost

Paragraph Task 2: Does the paragraph contain the competition frame?
For each paragraph below, PARCONTAINSFRAME is Yes.

Paragraph Task 3: Find all competition frames.
The following three paragraphs contain five instances of the competition frame, marked in bold. (False positives are underlined and indicated with an asterisk*. Annotators should ignore false positives.)

WorldPost: Given the parallel universes you describe, aren't you concerned that the AI superpowers will end up in an **arms race (1)**? After all, China and the United States are in the midst of a mounting trade war (*2). The hawks in the Trump administration have targeted the "Made in China 2025" industrial policy in order to prevent China's dominance in AI and robotics.

Lee: An **AI arms race (3)** would be a grave mistake. The AI boom is more akin to the spread of electricity in the early Industrial Revolution than nuclear weapons during the Cold War (*4). Those who take the **arms-race (5)** view are more interested in political posturing than the flourishing of humanity. The value of AI as an omni-use technology rests in its creative, not destructive, potential.

While there is **competition (6)** in commercial applications, those of us engaged in AI tend to be open about sharing basic research since the goal is advancing the field. Unlike many other sciences, AI experiments can be replicated and shared so each builds on the other's knowledge.

In a way, having parallel universes should diminish **conflict (7)**. They can coexist while each can learn from the other. It is not a zero-sum game of winners and losers.

Paragraph Task 3: What is the purpose of the frame?
The first paragraph in the sample above uses the frame for the purpose of Explanation. In the second paragraph, both occurrences are Critique.

Frame examples:

Text	Rationale
Given the parallel universes you describe, aren't you concerned that the AI superpowers will end up in an **arms race?**	*Explanation*. The interviewer seeks clarification.
An **AI arms race** would be a grave mistake. The AI boom is more akin to the spread of electricity in the early Industrial Revolution than nuclear weapons during the Cold War.	*Critique*. The use of the expression arms race is critiqued in contrast to the more benign frame, the spread of electricity.
Those who take the **arms-race** view are more interested in political posturing than the flourishing of humanity.	*Critique*. The frame itself is critiqued as public posturing.
While there is **competition** in commercial applications, those of us engaged in AI tend to be open about sharing basic research since the goal is advancing the field.	*Explanation*. Although the motivation to share research is implied, this is in spite, not because of, the competition.

Paragraph Task 4: Identify person names.
The first paragraph contains one-person name.

MENTIONEDFIRSTNAME= Null
MENTIONEDLASTNAME = Trump
MENTIONEDAFFILIATION= Null

No first name or affiliations are provided, so these fields are left blank.

The second paragraph quotes Lee.

QUOTEDFIRSTNAME= Kai-Fu
QUOTEDLASTNAME = Lee
QUOTEDAFFILIATION= Sinovation Ventures; Artificial Intelligence Institute

Lee's full name and affiliation are mentioned at the beginning of the article, so this information is also associated with his quotes throughout the article.

The third paragraph is a continuation of Lee's quote, so Lee is also annotated for the third paragraph:

QUOTEDFIRSTNAME= Kai-Fu
QUOTEDLASTNAME = Lee
QUOTEDAFFILIATION= Sinovation Ventures; Artificial Intelligence Institute

There are no other person names mentioned in the second and third paragraphs.

Additional examples

Not a Competitive frame

Counter example:

Text:	Rationale:
The AI revolution will have two engines-—China and the United States—pushing its progress swiftly forward.26	There are two actors, but the frame is not used.
Cornyn said the report found that "China is aggressively investing in future technologies that will be foundational to future innovations across technology that will have commercial and **military applications**," including AI in particular.27	The use of AI in military application does not denote competition in AI development.

Explanation purpose

Examples:

Text:	Rationale:
Huawei has been caught in the crosshairs of the US-China **trade war**.28	The *trade war* is discussed in the context of AI, so this is a valid competition frame.
AI development should not proceed in the spirit of **competition**, but rather, in the spirit of cooperation.	Negation of the frame is still an invocation.
It forces start-ups to take extraordinary risks to build extremely complex "moats" to maintain a **competitive advantage** that will protect profits and market share over the long term29	*Maintain a competitive advantage* implies the existence of another actor that the start-up or company in question wants to beat. The use is descriptive, therefore the purpose is Explanation.
AI will be used all the time. It's not something you have on the shelf for some **Doomsday war**.30	Negation of the frame is still an invocation.
Yeah, that's always the concern with **arms races**, which become a **race** to the bottom in the name of efficiency and domination.31	Generic use of the frame is annotated, provided AI is mentioned in the context.

Motivation Purpose

Text:	Rationale:

The idea of a Chinese-U.S. **arms race** for artificial intelligence conjures up images of an army of swarmbots defeating self-driving tanks on a smoldering, depopulated hellscape. It's an idea so captivating that Sen. John Cornyn, R-Texas, wants to make it harder for the Chinese to invest in U.S. technology development, including in companies developing artificial intelligence, out of fear that Beijing will use small investment positions in Silicon Valley firms to erode U.S. national security and technological advantage.[32]	This image is used as motivation arguing against Chinese investment in U.S. technology

Endnotes

[1] Chang Zhang and Nora von Ingersleben-Selp, "US-China trade war is making China stronger," *The Conversation*, July 8, 2019, https://theconversation.com/us-china-trade-war-is-making-china-stronger-118852.

[2] Zhang and Ingersleben-Selp, "US-China trade war is making China stronger."

[3] Zhang and Ingersleben-Selp, "US-China trade war is making China stronger."

[4] "Huawei Warns Trump's Ban May Wipe Out $30 Billion of Sales Growth," *Bloomberg News*, June 17, 2019, https://www.bloomberg.com/news/articles/2019-06-17/huawei-warns-trump-s-ban-to-wipe-out-30-billion-of-sales-growth.

[5] Chang Zhang and Nora von Ingersleben-Selp, "US-China trade war is making China stronger," *The Conversation*, July 8, 2019, https://theconversation.com/us-china-trade-war-is-making-china-stronger-118852.

[6] Matt Schiavenza, "China's 'Sputnik Moment' and the Sino-American Battle for AI Supremacy," *Bloomberg News*, September 25, 2018, https://asiasociety.org/blog/asia/chinas-sputnik-moment-and-sino-american-battle-ai-supremacy.

[7] Nathan Gardels, "The great AI duopoly," *The World Post*, September 24, 2018, https://www.washingtonpost.com/news/theworldpost/wp/2018/09/24/artificial-intelligence-2/.

[8] Elsa B. Kania, "The 5G Fight Is Bigger Than Huawei," *Foreign Policy*, May 22, 2019, https://foreignpolicy.com/2019/05/22/the-5g-fight-is-bigger-than-huawei/.

[9] Gardels, "The Great AI duopoly."

[10] Paul Scharre, "Killer Apps: The Real Dangers of an AI Arms Race," *Foreign Affairs*, May/June 2019, https://www.foreignaffairs.com/articles/2019-04-16/killer-apps.

[11] James Vincent, "China and the US are battling to become the world's first AI superpower," *The Verge*, August 3, 2017, https://www.theverge.com/2017/8/3/16007736/china-us-ai-artificial-intelligence.

[12] Charleston Lim, "China Set to Dominate AI Tech Industry, US Tech Officer Says," *Business Times*, September 12, 2019, https://www.btimesonline.com/articles/118585/20190912/china-set-to-dominate-ai-tech-industry-us-tech-officer-admits.htm.

[13] Li Qiaoyi, "China needs new push to become global AI leader," *Global Times*, August 29, 2019, https://www.globaltimes.cn/content/1163090.shtml.

[14] Matt Schiavenza, "China's 'Sputnik Moment' and the Sino-American Battle for AI Supremacy," *Bloomberg News*, September 25, 2018, https://asiasociety.org/blog/asia/chinas-sputnik-moment-and-sino-american-battle-ai-supremacy.

[15] Adrian Pecotic, "Whoever Predicts the Future Will Win the AI Arms Race," *Foreign Policy*, March 5, 2019, https://foreignpolicy.com/2019/03/05/whoever-predicts-the-future-correctly-will-win-the-ai-arms-race-russia-china-united-states-artificial-intelligence-defense/.

[16] Nicolas Thompson, "Will Artificial Intelligence Enhance or Hack Humanity?" *Wired*, April 28, 2019, https://www.wired.com/story/will-artificial-intelligence-enhance-hack-humanity/.

17 Shehab Al Makahleh, "The new world order and war of ideologies," *The Jordan Times*, January 24, 2019, https://jordantimes.com/opinion/shehab-al-makahleh/new-world-order-and-war-ideologies.

18 Makahleh, "The new world order and war of ideologies."

19 Andrea Gilli and Mauro Gilli, "Why China Has Not Caught Up Yet: Military-Technological Superiority and the Limits of Imitation, Reverse Engineering, and Cyber Espionage," *International Security*, February 15, 2019, https://www.mitpressjournals.org/doi/abs/10.1162/isec_a_00337.

20 Bradley Peniston, "How Will The Pentagon Create Its AIs? The Algorithmic-Warfare Team Is Charting a Path," *Defense One*, July 13, 2017, https://www.defenseone.com/technology/2017/07/artificial-intelligence-pentagon/139402/.

21 Patrick Tucker, "SecDef: China Is Exporting Killer Robots to the Mideast," *Defense One*, November 5, 2019, https://www.defenseone.com/technology/2019/11/secdef-china-exporting-killer-robots-mideast/161100/.

22 Jack Corrigan, "3 Lawmakers Propose $2.2B Over 5 Years to Advance AI," *Defense One*, May 22, 2019, https://www.defenseone.com/technology/2019/05/lawmakers-propose-22-billion-advance-ai-over-next-five-years/157190/.

23 Jack Corrigan, "NIST Has a Roadmap to Develop Artificial Intelligence Standards," *Defense One*, August 13, 2019, https://www.defenseone.com/technology/2019/08/nist-lays-out-roadmap-developing-artificial-intelligence-standards/159135/.

24 Paulina Glass, "China's Rapid AI Development Has Its Limits: Report," *Defense One*, February 8, 2019, https://www.defenseone.com/technology/2019/02/chinas-rapid-ai-development-has-its-limits-report/154760/.

25 Justin Sherman, "Don't Call It an 'Arms Race': US-China AI Competition Is Not Winner-Takes-All," *Defense One*, March 7, 2019, https://www.defenseone.com/ideas/2019/03/dont-call-it-arms-race-us-china-ai-competition-not-winner-takes-all/155378/.

26 Gardels, "The Great AI Duopoly."

27 Patrick Tucker, "What's the 'Risk' in China's Investments in US Artificial Intelligence? New Bill Aims to Find Out," *Defense One*, June 22, 2017, https://www.defenseone.com/technology/2017/06/how-not-win-ai-arms-race-china/138919/.

28 Zhang and Ingersleben-Selp, "US-China trade war is making China stronger."

29 Gardels, "The Great AI Duopoly."

30 Thompson, "Will Artificial Intelligence Enhance or Hack Humanity?"

31 Thompson, "Will Artificial Intelligence Enhance or Hack Humanity?"

32 Patrick Tucker, "What's the 'Risk' in China's Investments in US Artificial Intelligence? New Bill Aims to Find Out," *Defense One*, June 22, 2017, https://www.defenseone.com/technology/2017/06/how-not-win-ai-arms-race-china/138919/.