



An Empirical Study of Content Understanding in Conversational Question Answering

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<https://github.com/MiuLab/CQA-Study>





Outline

- Background
- Potential issues of the CQA task.
- Potential issues of the CQA models.



Background

- Conversational question answering task
- Models we will analyze



The Question Answering Task

Passage:

Some forms of civil disobedience, such as illegal boycotts, refusals to pay taxes, ... "although civil disobedients are constrained in their use of coercion by their conscientious aim to engage in moral dialogue, nevertheless they may find it necessary to employ limited coercion in order to get their issue onto the table." The Plowshares organization temporarily closed GCSB Waihopai by padlocking the gates and using sickles to deflate one of the large domes covering two satellite dishes.

Q: What goal do many of these protests have?

A: get their issue onto the table

Independent!

Q: Brownlee argues that sometimes people behave in what way to have their issue heard?

A: limited coercion

Independent!

Q: What action did Brownlee take against GCSB Waihopai that caused them to close temporarily?

A: <no answer>



The Conversational Question Answering Task

Passage:

Secularism is the principle of the separation of government institutions and persons mandated to represent the state from ...

One manifestation of secularism is asserting the right to be free from religious rule and teachings, or, in a state declared to be neutral on matters of belief, from the imposition by government of religion or religious practices upon its people. Another manifestation of secularism is the view that public activities and decisions, especially political ones, should be uninfluenced by religious beliefs or practices.

Q: How many **manifestation of secularism have been mentioned in this passage?**

A: two

Q: Give me one of **them?**

A: to be free from religious rule and teachings

Conversation History

Q: And the second ?

Datasets for Conversational Question Answering



QuAC

Question Answering in Context

CoQA

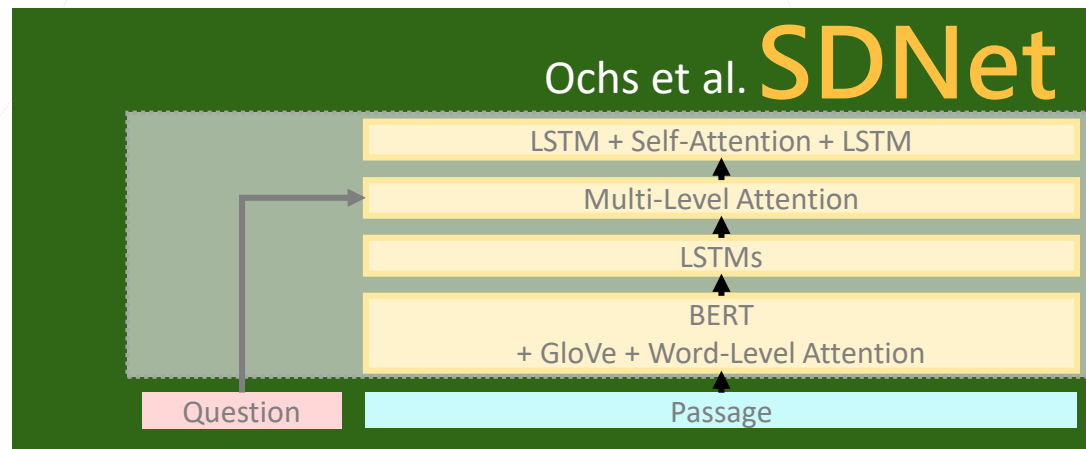
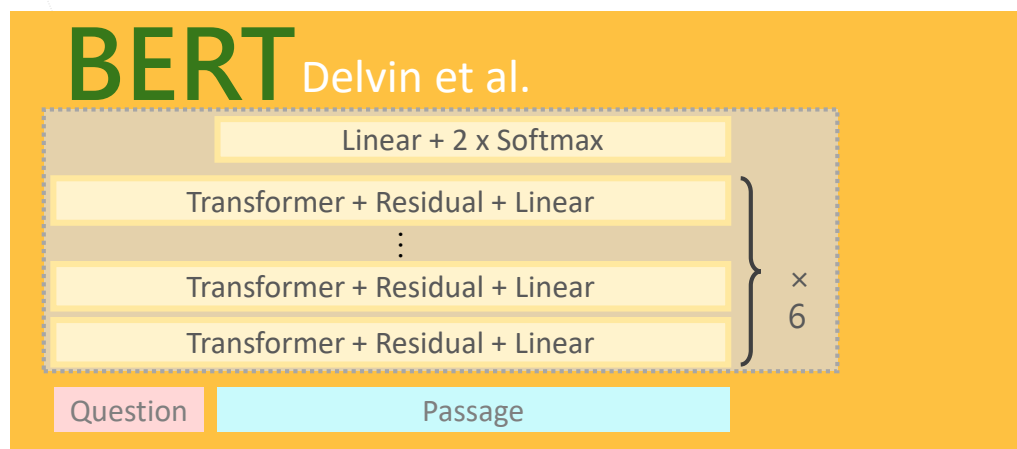
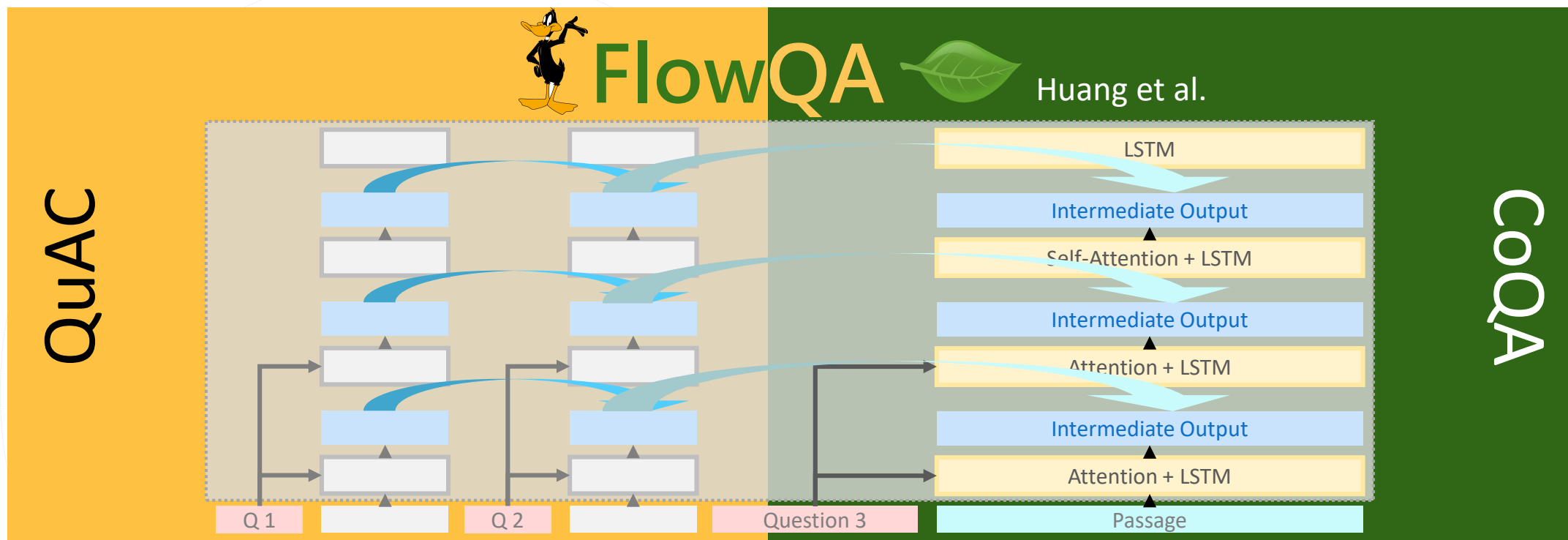


A Conversational Question Answering Challenge





Models Studied





Formulated as a Span-Selection Task

Passage:

Rawls derives two principles of justice from the original position. The first of these is the Liberty Principle, which establishes equal basic liberties for all citizens. 'Basic' liberty entails the freedoms of conscience, association and expression as well as democratic rights; ... Thus participants would be moved to affirm a two-part second principle comprising Fair Equality of Opportunity and the famous (and controversial) difference principle. This second principle ensures that those with comparable talents and ...

Q: What is the Principles of justice?

A: The first of these is the Liberty Principle,

Q: What is the Liberty Principle?

A: establishes equal basic liberties for all citizens.

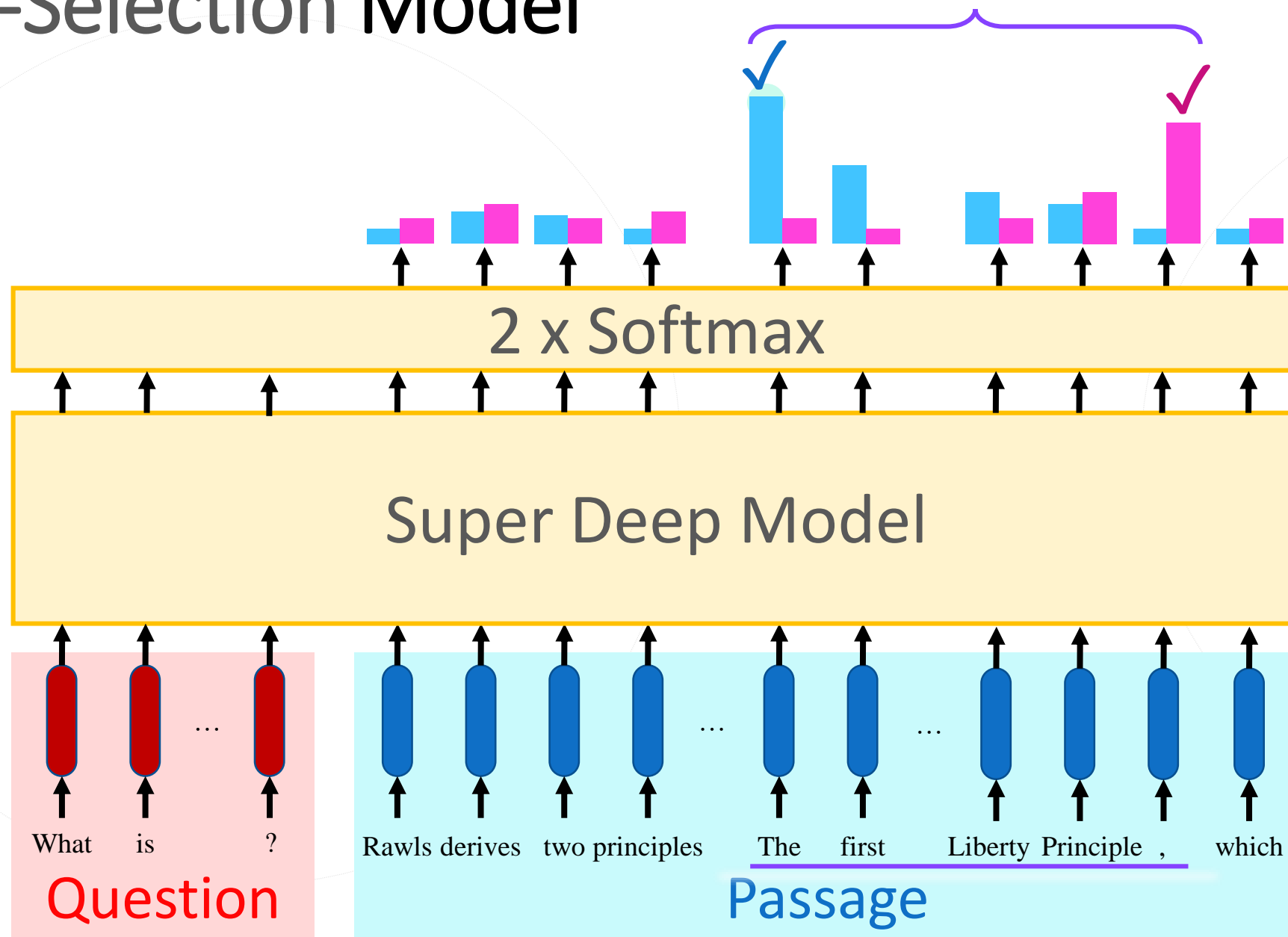
Q: What is another principle?

A: a two-part second principle comprising Fair Equality of Opportunity and the famous (and controversial) difference principle.



Span-Selection Model

The first ... Liberty Principle,





The True Story





We Have Conversation History!

Passage:

Rawls derives two principles of justice from the original position. The first of these is the Liberty Principle, which establishes equal basic liberties for all citizens. \‘Basic\’ liberty entails the freedoms of conscience, association and expression as well as democratic rights; ... Thus participants would be moved to affirm a two-part second principle comprising Fair Equality of Opportunity and the famous (and controversial) difference principle. This second principle ensures that those with comparable talents and ...

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Conversation History

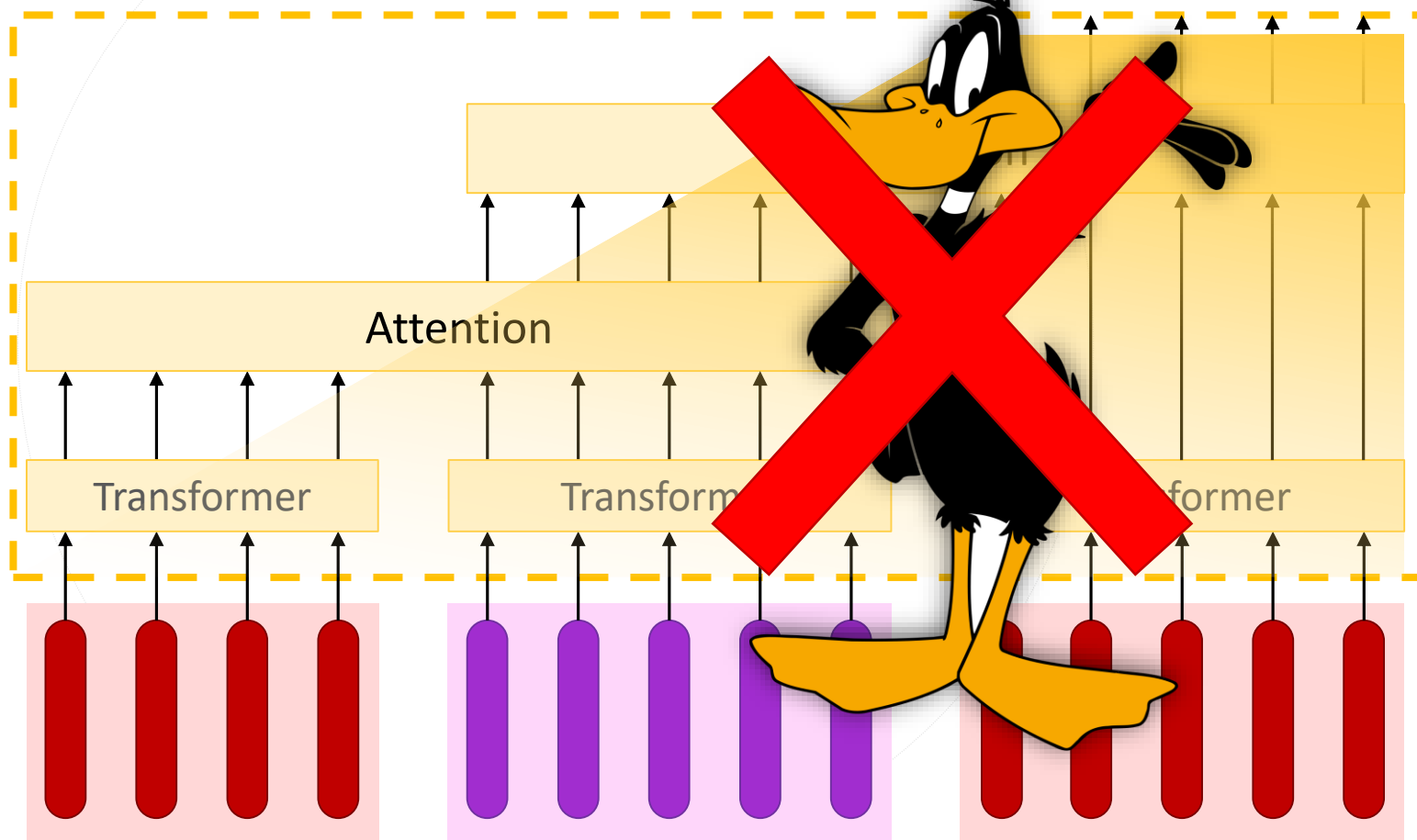
Q: What is another principle?

?

All After DSTC7...



Super Deep Model

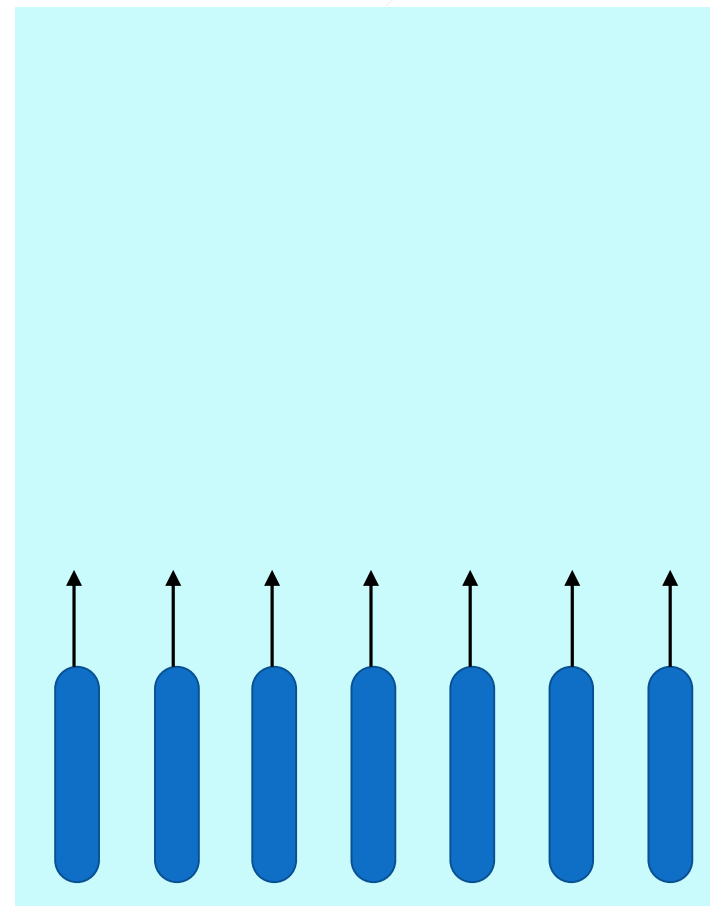


Question 1

Answer 1

Question 2

Passage



Look into the Problem...

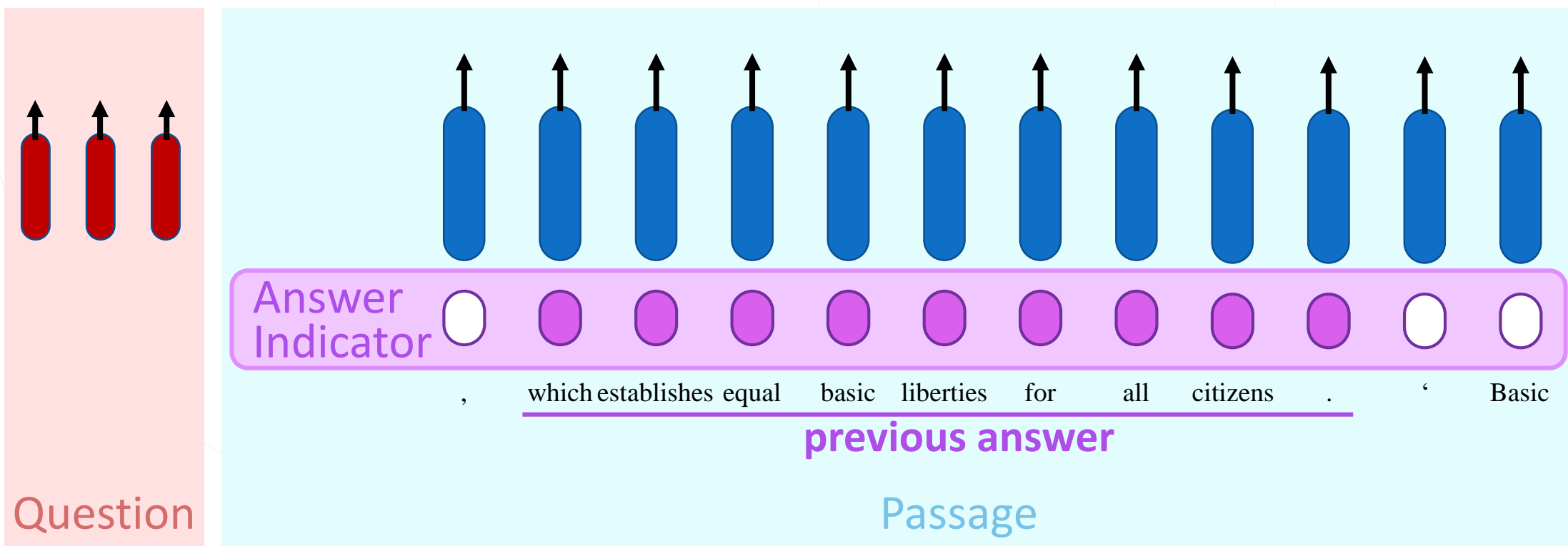




Feeding History with Answer Indicator



Super Deep Model



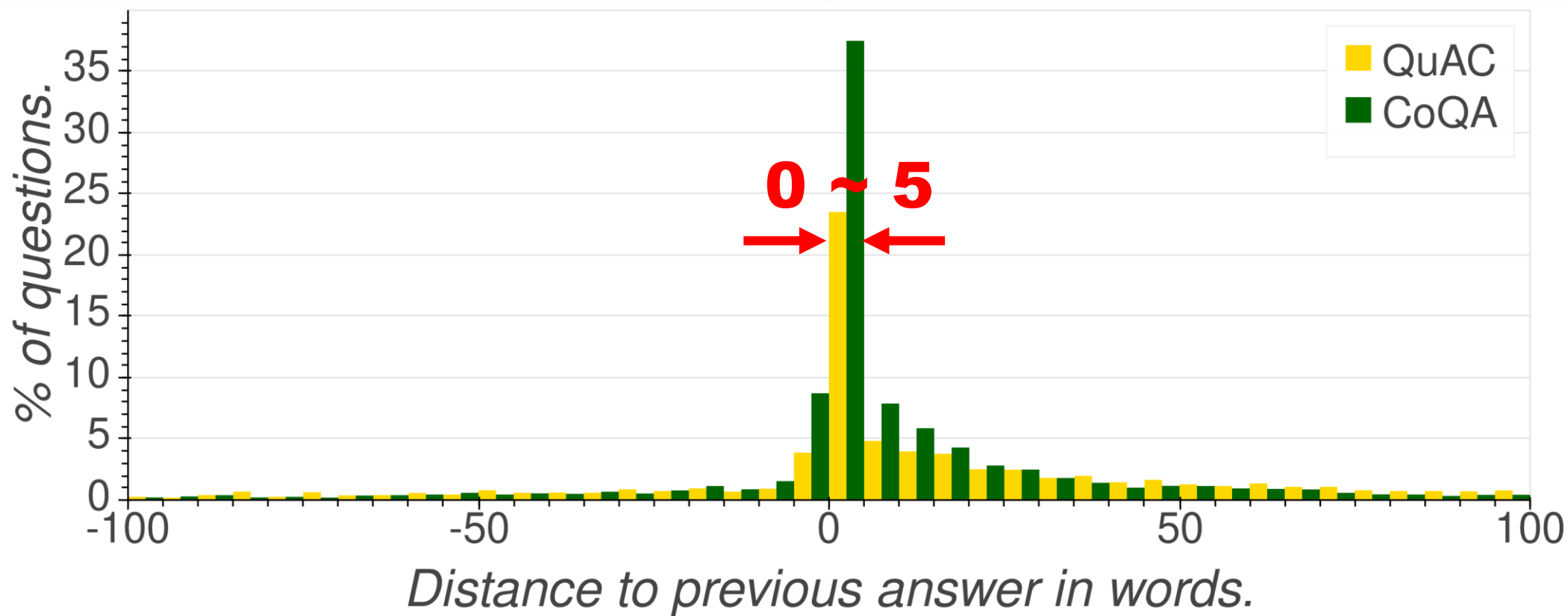


Observation: Answer Distance (in words)

Passage:

answer 1
The first of these is the Liberty Principle, which **answer 2**
establishes equal basic liberties for all
citizens. 'Basic' liberty ...

1 word



We Ask Question 1...

Is the **position** of the previous answer
a huge hint?





Experiments to Verify it

Train & test in 3 different settings:

Q: What is another principle?

Original:

Passage: Rawls derives two principles of justice from the original position. The first of these is the Liberty Principle, which establishes equal basic liberties for all citizens.
'Basic' ...

Minus Text:

Passage: Rawls derives two principles of justice from the original position. mask
mask
which mask
mask
'Basic' ... **position only**

Minus Conversation:

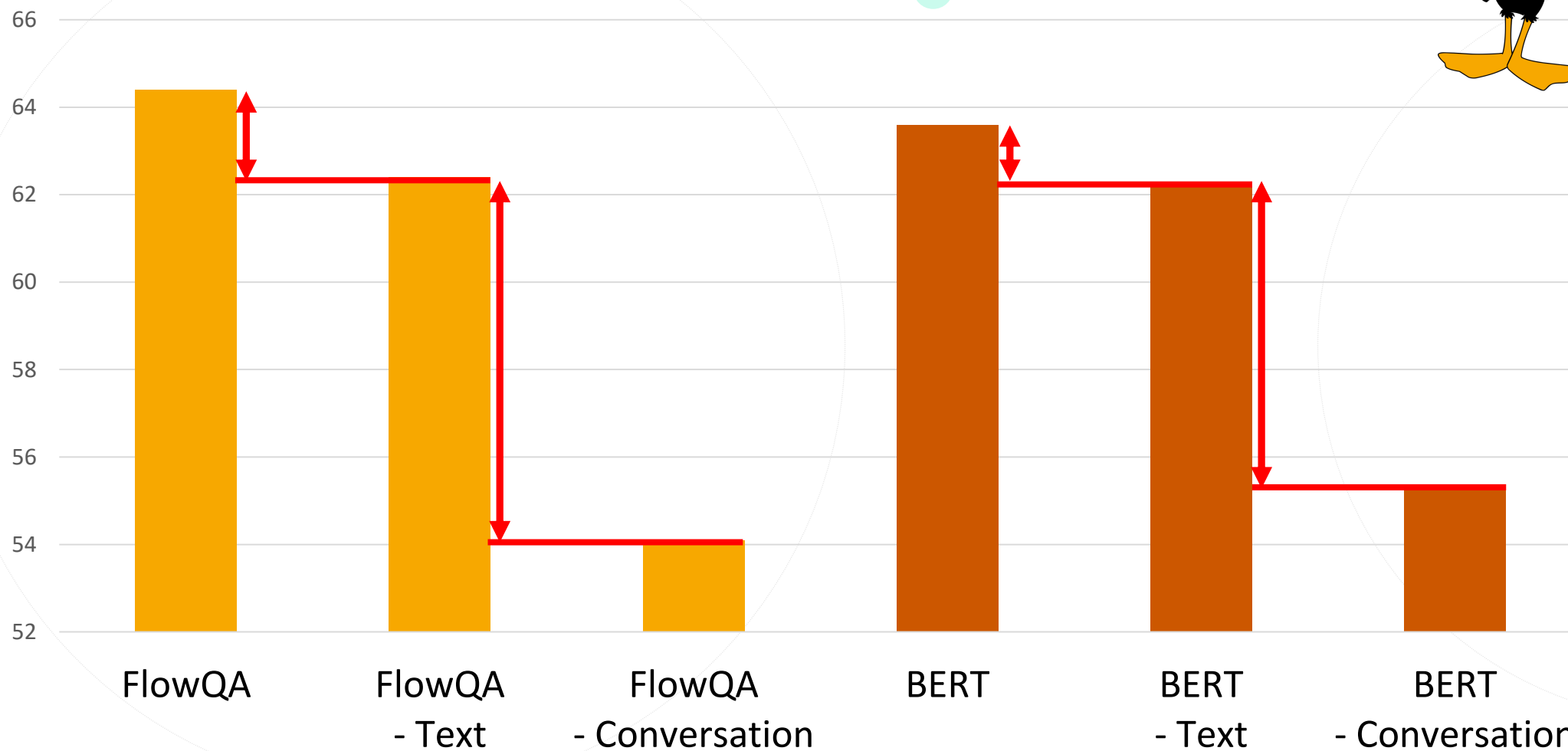
Passage: Rawls derives two principles of justice from the original position. The first of these is the Liberty Principle, which establishes equal basic liberties for all citizens.
'Basic' ...

<Premise>

Content understanding is necessary. → Minus Text ☹️

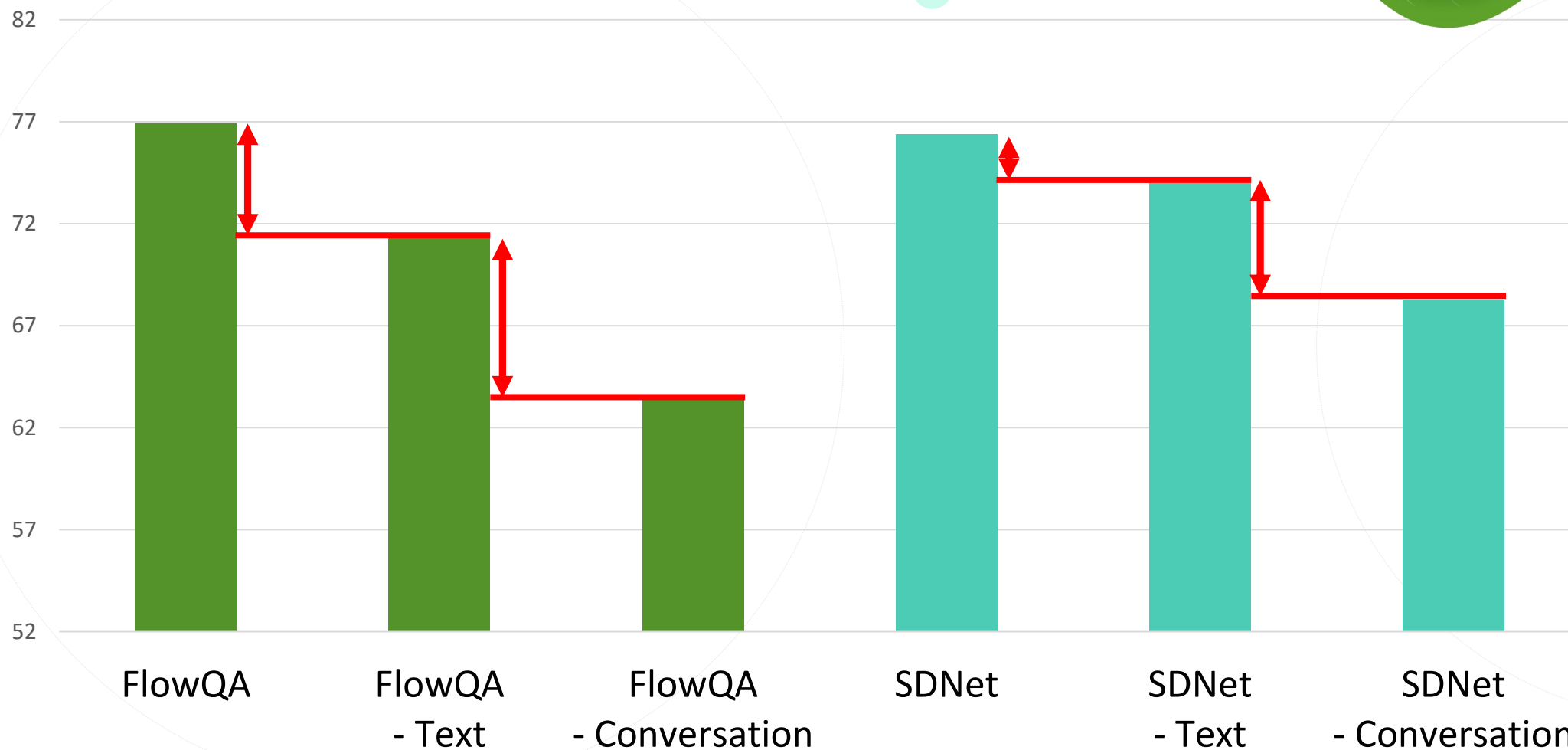


Results on QuAC





Results on CoQA





Implications

- Content understanding:
 - $\text{minus text} \leq \text{minus conversation}$
- Performance:
 - $\text{minus text} \gg \text{minus conversation}$
- Better Score \nRightarrow better content understanding.

We should look beyond a single metric!



Wait!

What do you mean by
understanding?

NO access to content
thus **NO** understanding
of content

We Ask Question 2...

Do previous models understand the content of conversations?





Proposed: Repeat Attack

- Increase the distance between answers?

Passage: Rawls derives two **answer 1** principles of justice from the original position. **answer 2** The first of these is the Liberty Principle, which establishes equal basic liberties for all citizens. 'Basic' liberty entails the freedoms of conscience, ...

Repeat

The first of these is the Liberty Principle,

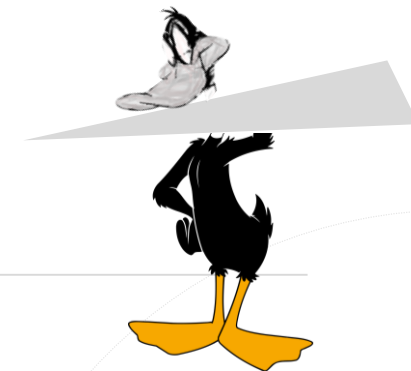
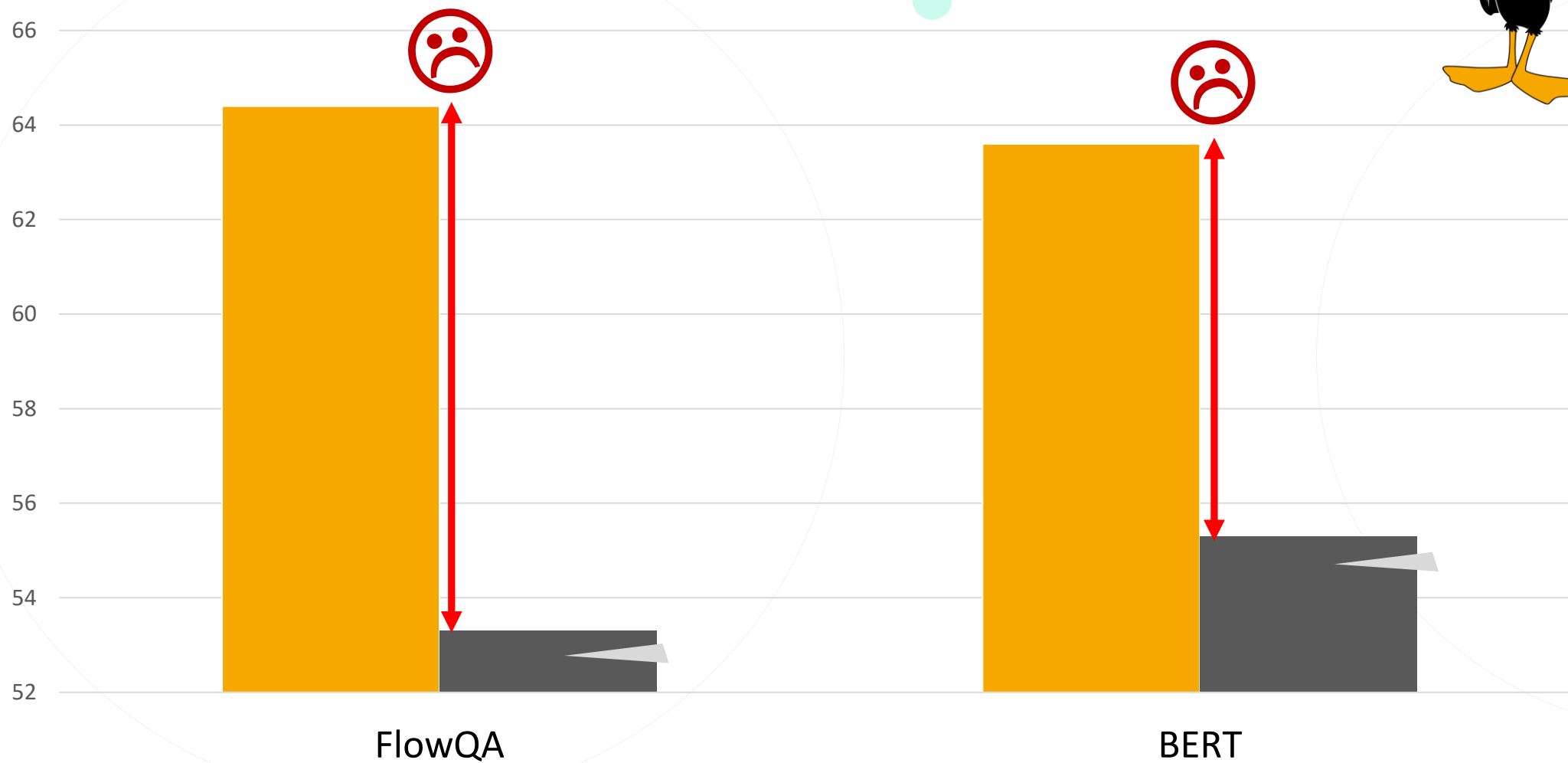
Passage: Rawls derives two **answer 1** principles of justice from the original position. The first of these is the Liberty Principle, which establishes equal basic liberties for all citizens. 'Basic' ...

<Premise>

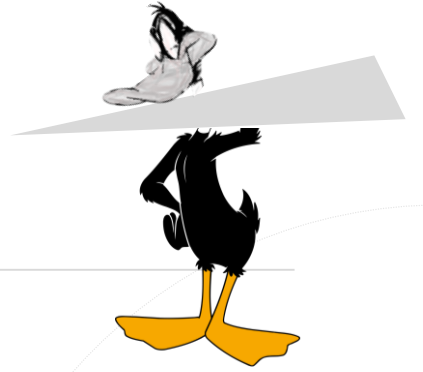
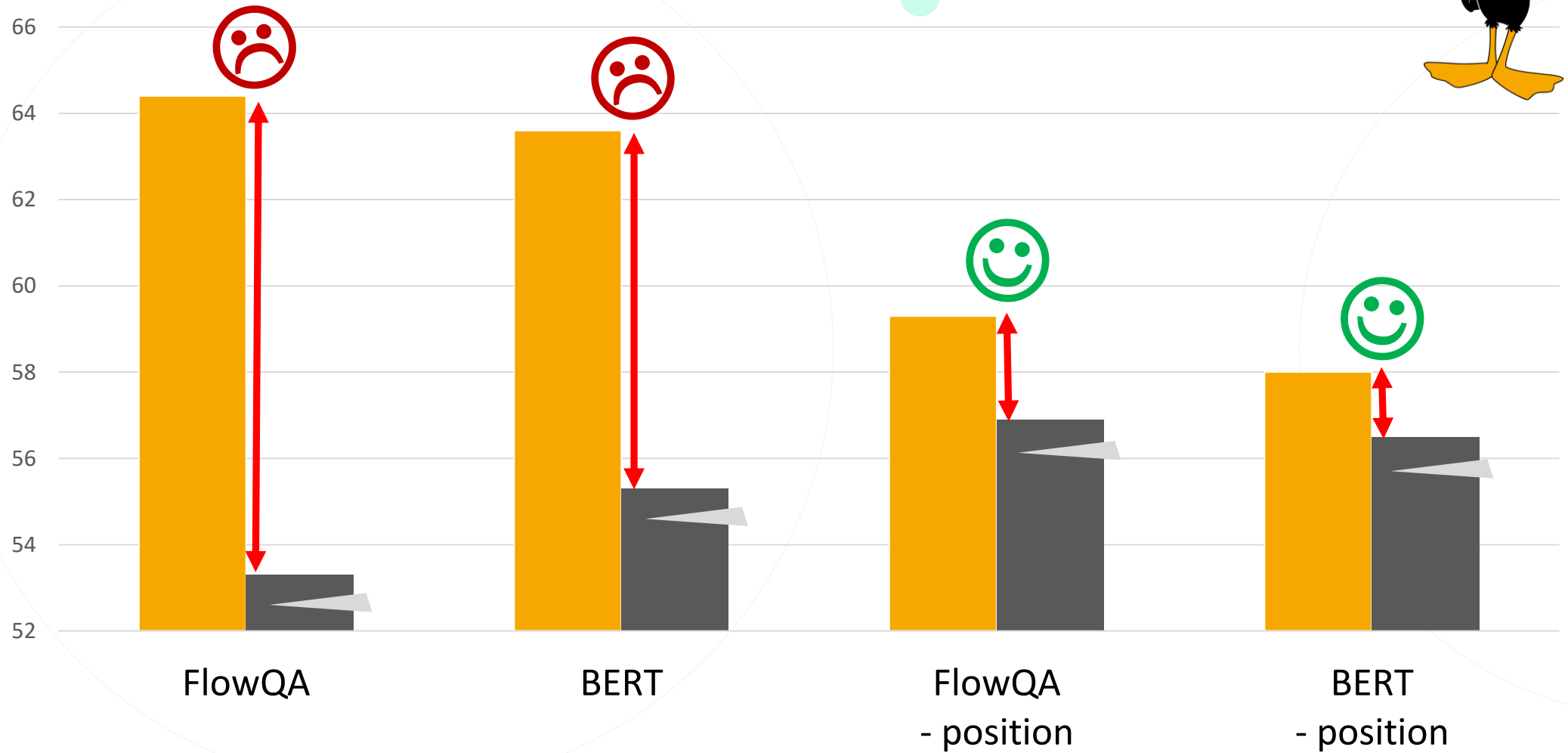
Model understand the content → 😊 even attacked



Results on QuAC



Results on QuAC



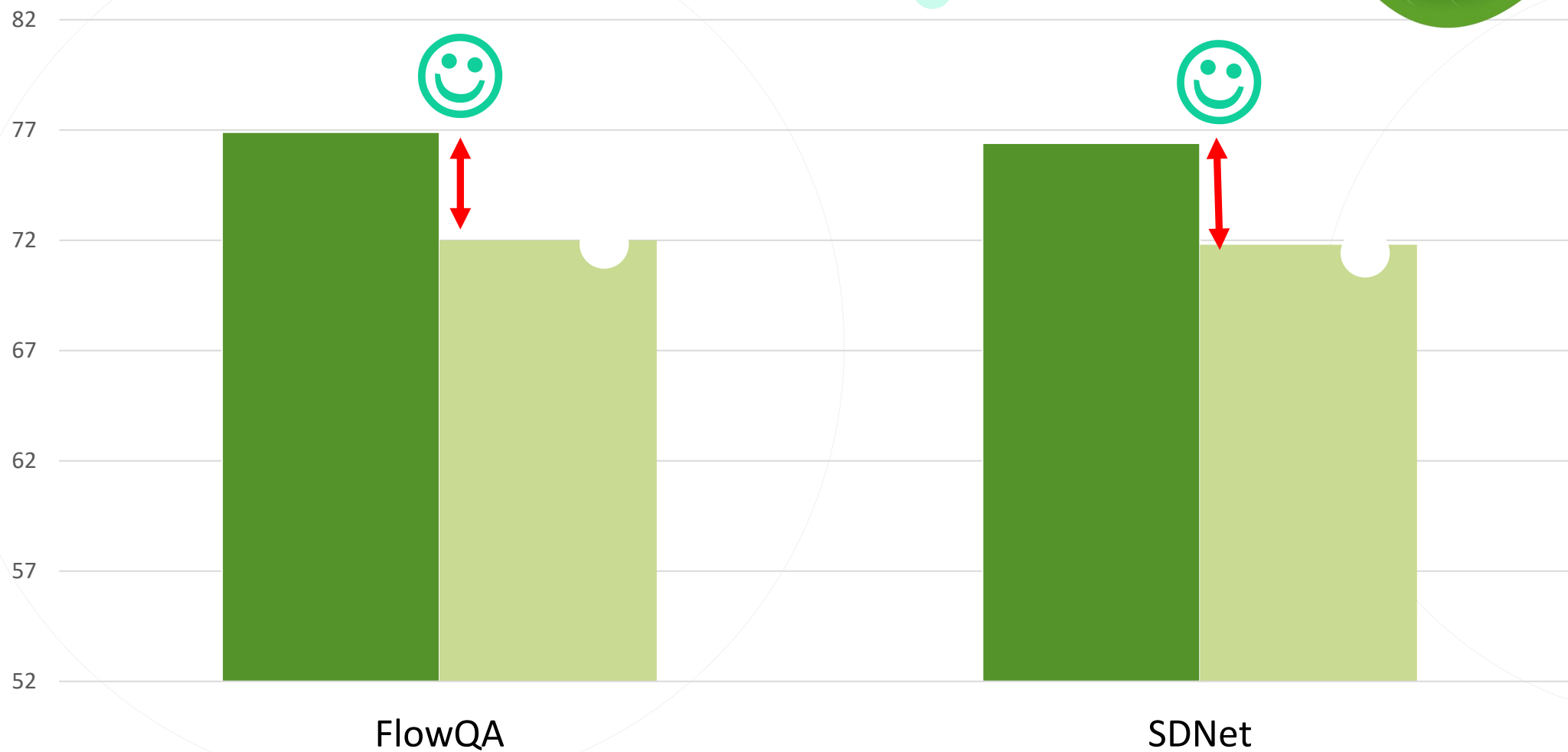
MILAB

NTU

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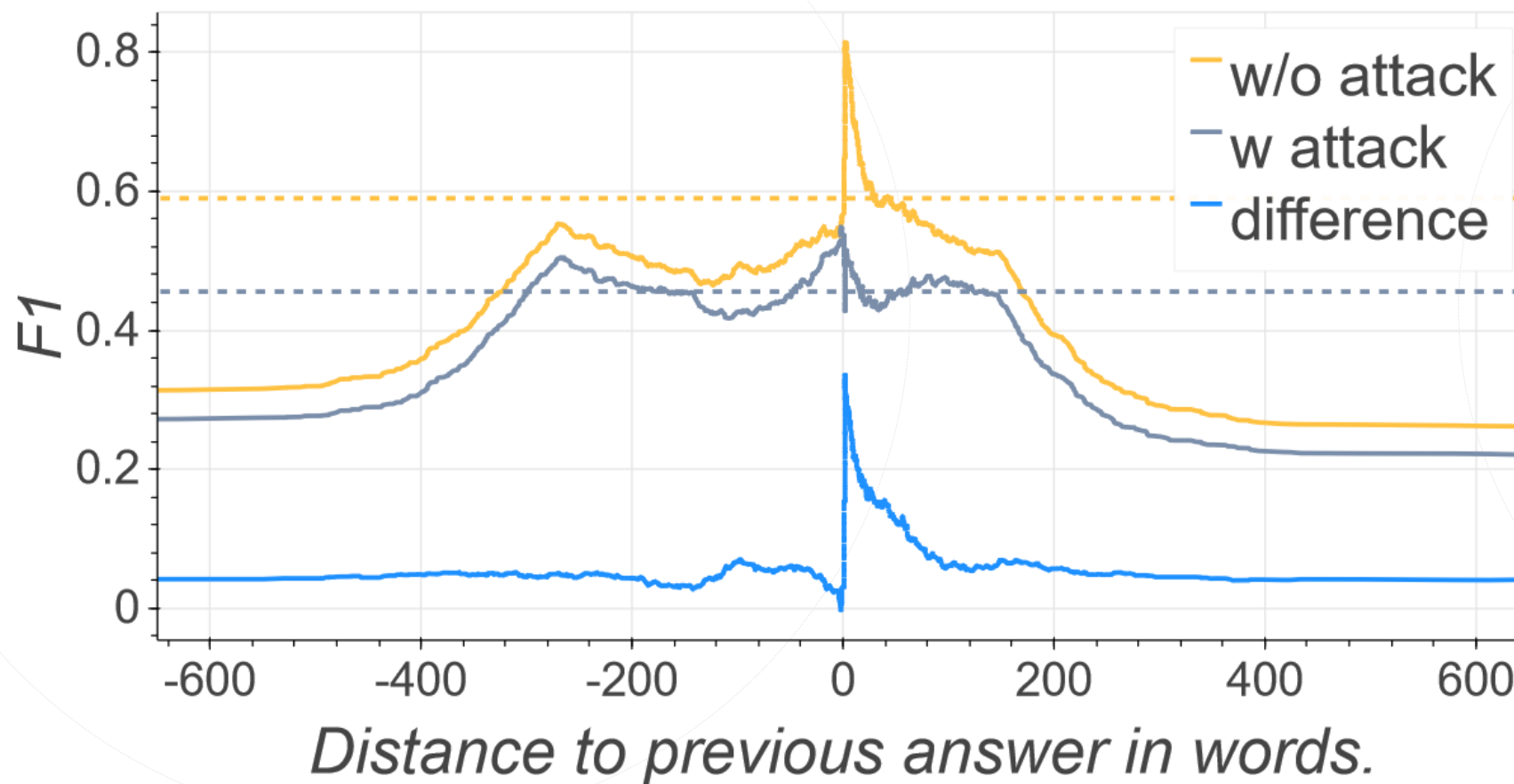


Results on CoQA



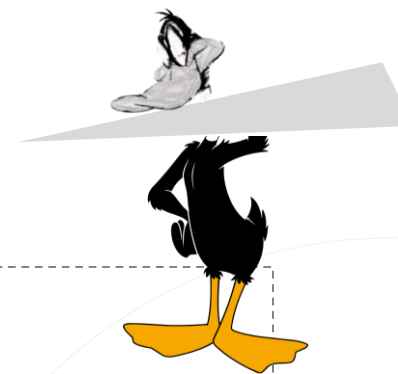


Quantitatively





Victim of the Attack



Passage:

In 2004, Old man returned to prominence when he landed a significant role in the Harry Potter film series, playing Harry Potter's godfather Sirius Black. In 2004,

Old man returned to prominence when he landed a significant role in the Harry Potter film series, playing Harry Potter's godfather Sirius Black. The following

year, he starred as James Gordon in Christopher Nolan's commercially and critically successful Batman Begins. ...

Attack / Answer after Attack

Correct / Original answer

Q: What was his resurgence or comeback role?

The QuAC models seem not understand the content.



Contributions

- A series of experiments are proposed.
- Potential hazards can be avoid in future research.



Find Us

- I am applying PhD!
- Poster session tonight!!

Conversational Question Answering

Passage:

Rawls derives two principles of justice from the original position. The first of these is the Liberty Principle, which establishes equal basic liberties for all citizens. 'Basic' liberty entails the freedoms of conscience, association and expression as well as democratic rights; ... Thus participants would be moved to affirm a two-part second principle comprising Fair Equality of Opportunity and the famous (and controversial) difference principle. This second principle ensures that ...

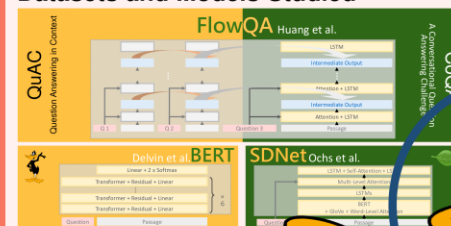
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Q: What is the Liberty Principle?
A: establishes equal basic liberties for all citizens.

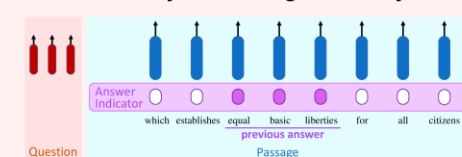
Conversation History

Q: What is another principle?

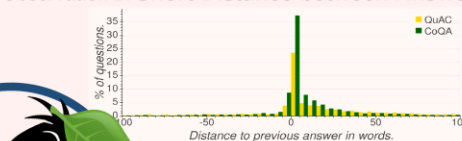
Datasets and Models Studied



Observation 1: Way of Feeding in History



Observation 2: Short Distance between Answers



Example: answer 1: The first of these is the Liberty Principle, which establishes equal basic liberties for all citizens. 'Basic' liberty -1 word

Can QuAC & CoQA well reflect content understanding?

Do previous models understand the content of conversations?

Repeat Attack to Verify It

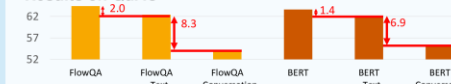
Increase the distance, but keep the semantics!

3 Training & Testing Settings to Verify It

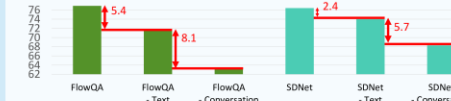
Original:	Minus Text:	Minus Conversation:
Passage: Rawls derives two principles of justice from the original position. The first of these is the Liberty Principle, which establishes equal basic liberties for all citizens.	Passage: Rawls derives two principles of justice from the original position. mask which establishes equal basic liberties for all citizens.	Passage: Rawls derives two principles of justice from the original position. The first of these is the Liberty Principle, which establishes equal basic liberties for all citizens.
Q: What is the Principles ... ? A: The first of these is the Liberty Principle.	Q: What is the Principles ... ? A: mask	Q: What is the Principles ... ? A: The first of these is the Liberty Principle.
Q: What is the Liberty ... ? A: establishes equal basic liberties for all citizens.	Q: What is the Liberty ... ? A: mask	Q: What is the Liberty ... ? A: establishes equal basic liberties for all citizens.

<Premise> Content understanding is necessary.
→ Minus Text ☹️

Results on QuAC



Results on CoQA



Passage: In 2004, Old man returned to prominence when he landed a significant role in the Harry Potter film series. In 2004, he starred as James Gordon in Christopher Nolan's commercially and critically successful Batman Begins. ...

Attack / Answer after Attack: In 2004, Old man returned to prominence when he landed a significant role in the Harry Potter film series. In 2004, he starred as James Gordon in Christopher Nolan's commercially and critically successful Batman Begins. ...

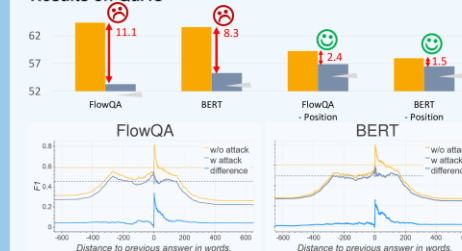
Correct Answer of Q2 / Original answer: Christopher Nolan's commercially and critically successful Batman Begins. ...

Q: What was his resurgence or comeback role?
A: In 2004, Old man returned to prominence when he landed a significant role ...

Q: Are there any other interesting aspects about this article?

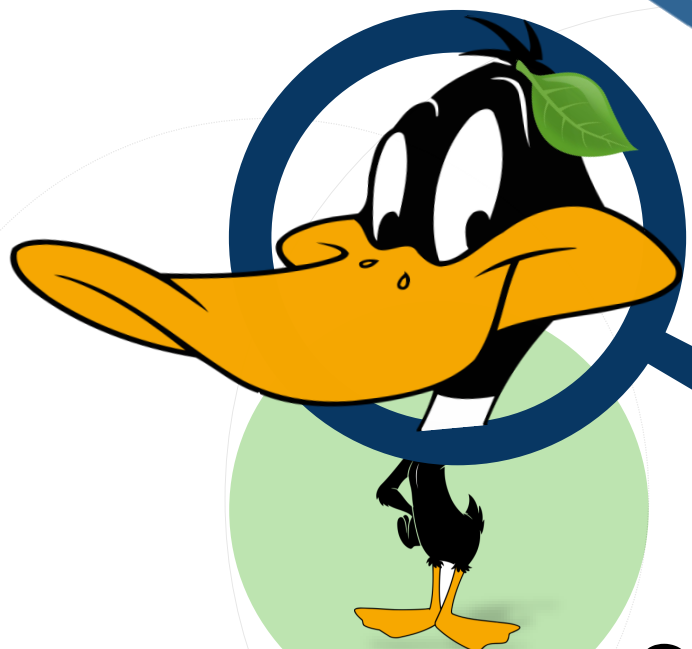
<Premise> Model understand the content well
→ 😊 even attacked

Results on QuAC



Conclusions

- Previous models **may not** understand the content of conversations.
- Content understanding is **not** well reflected by current metrics (e.g. F1).



Code&Poster Available @
<https://github.com/MiuLab/CQA-Study>

