

Sequential Question Answering

Lead-in: He signed the Goldwater-Nichols Act after the Packard Commission investigated the Department of Defense.

Question 1: Name this Republican president who firmly advocated supply-side economics. He was an actor and a governor of California before becoming president.

Answer: Ronald Wilson Reagan

Question 2: In March of 1981, this man shot President Reagan in order to impress the actress Jodie Foster. His acquittal due to insanity angered many Americans and led to the Insanity Defense Reform Act of 1984.

Answer: John Warnock Hinckley, Jr.

Question 3: Codenamed Operation Urgent Fury, the invasion of this Caribbean island was launched by Reagan in order to protect American students and topple a Communist government set up after the deposition of Maurice Bishop.

Answer: invasion of Grenada

Lead-in: Only twenty-one million units in this system will ever be created.

Question 1: Name this digital payment system whose transactions are recorded on a "block chain".

Answer: Bitcoin

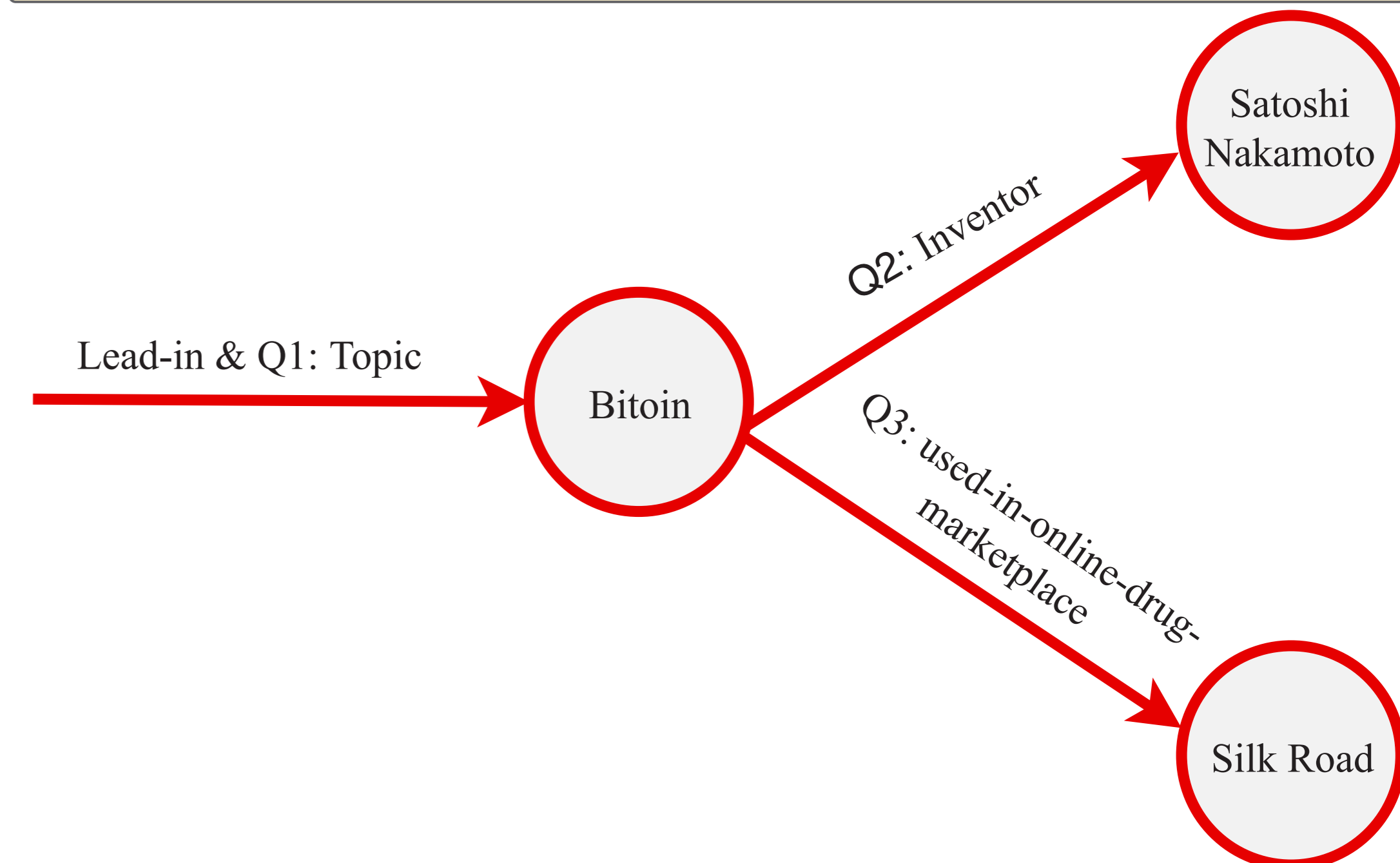
Question 2: Bitcoin was invented by this person, who, according to a dubious Newsweek cover story, is a 64-year-old Japanese-American man who lives in California.

Answer: Satoshi Nakamoto

Question 3: This online drugs marketplace, Chris Borglum's one-time favorite, used bitcoins to conduct all of its transactions. It was started in 2011 by Ross Ulbricht using the pseudonym Dread Pirate Roberts.

Answer: Silk Road

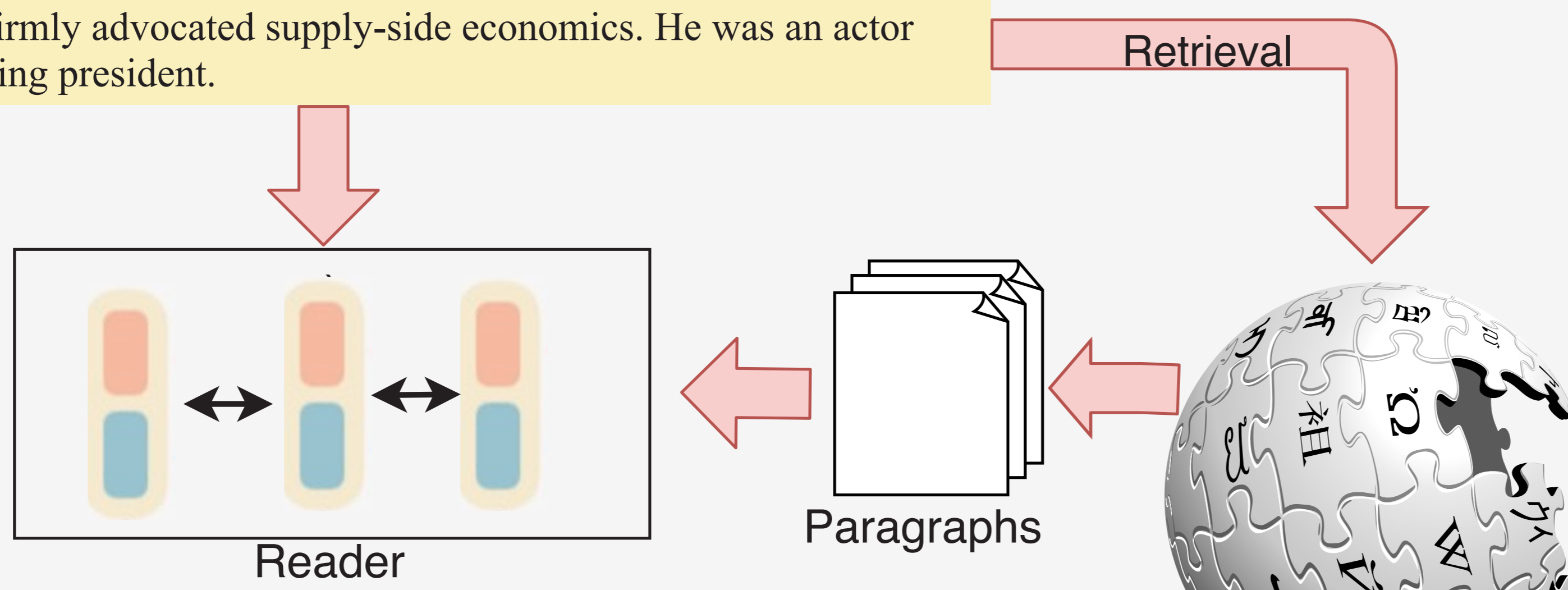
- Available at sequential.qanta.org
- UMD Human-Computer QA competition. Register by Nov 15. at qanta.org



Open-Domain QA with Context

Q1: Name this Republican president who firmly advocated supply-side economics. He was an actor and a governor of California before becoming president.

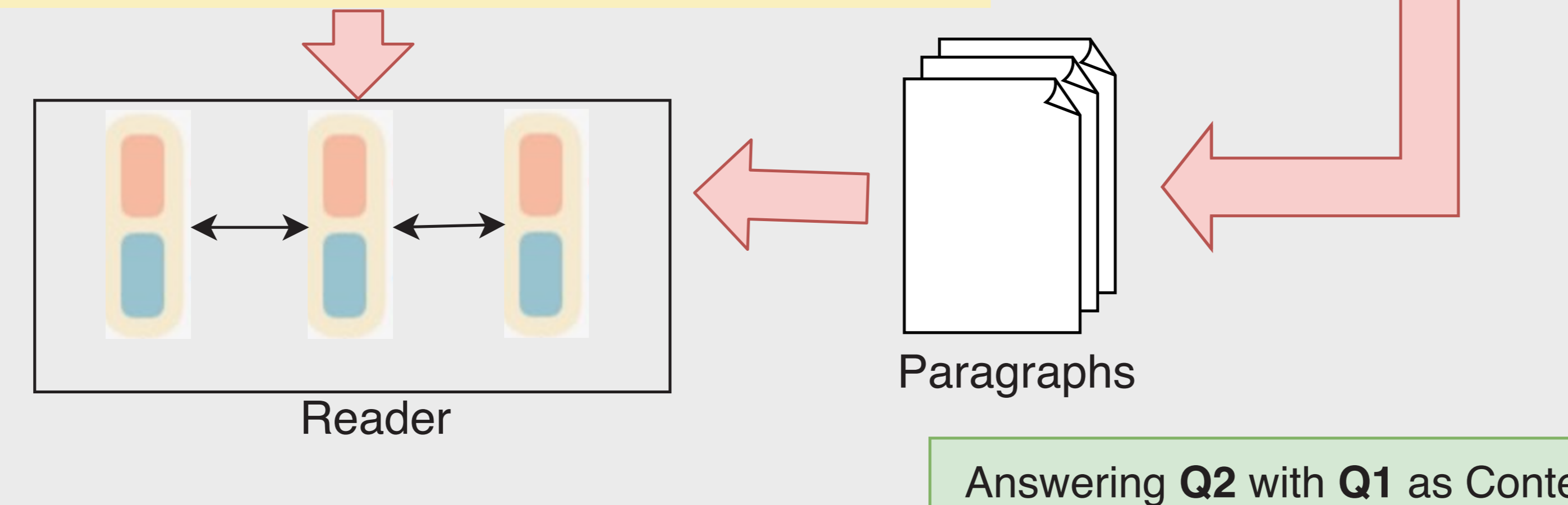
A1: Ronald Reagan



Ronald Reagan In March of 1981, this man shot President Reagan in order ...

Q2: In March of 1981, this man shot President Reagan in order to impress the actress Jodie Foster. His acquittal due to insanity angered many Americans and led to the Insanity Defense Reform Act of 1984.

A2: John W. Hinckley, Jr.



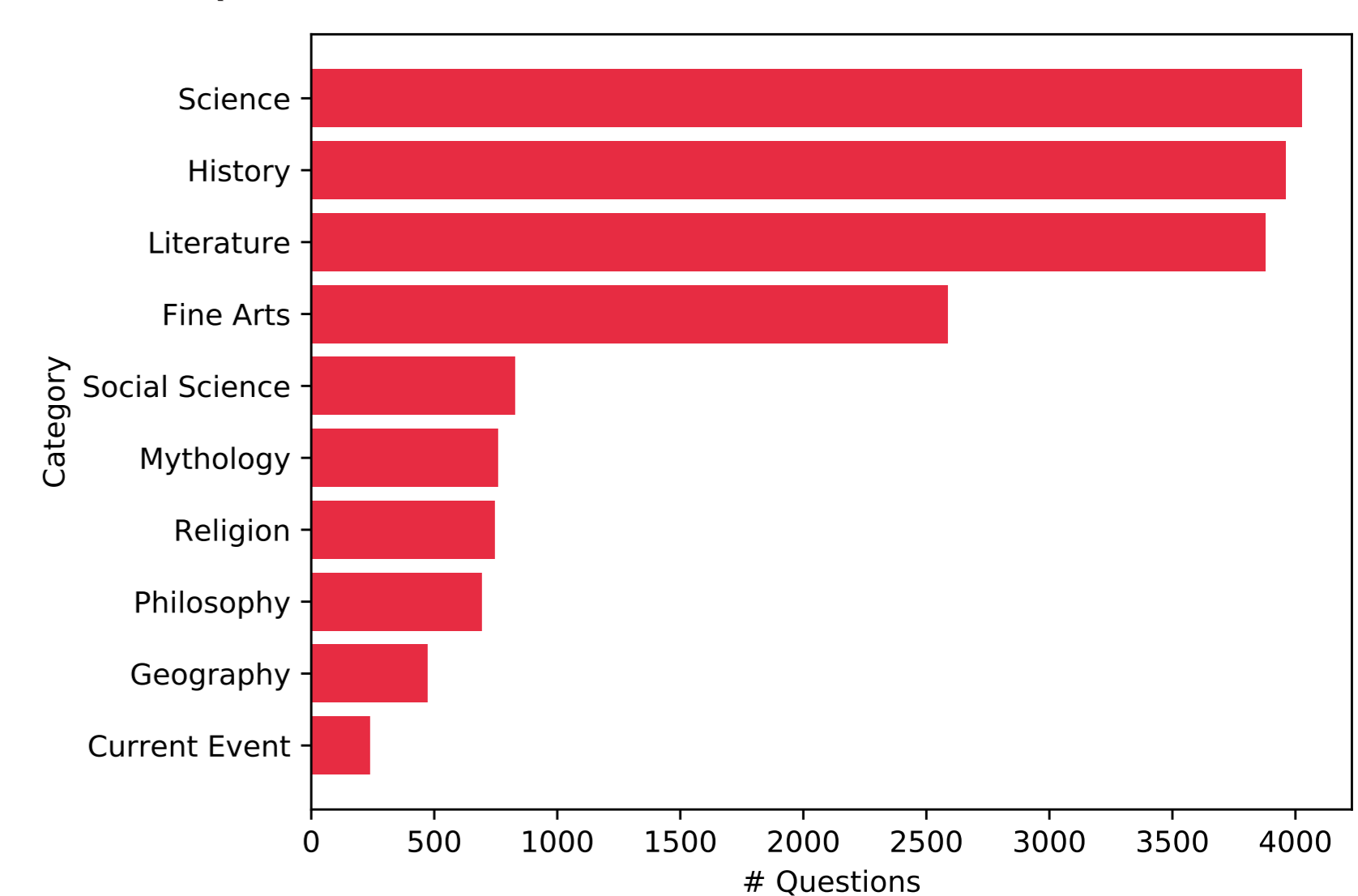
Answering Q2 with Q1 as Context

Dataset Construction

- Crawled Bonus Quiz Bowl questions from quizdb.org
- Dataset Summary

	#Questions (Sequences)	#Question Tokens
Train	45,747 (15,249)	32.6 ± 9.6
Dev	3,630 (1,210)	33.5 ± 9.9
Test	6,555 (2,185)	32.1 ± 10.2

- Diverse Questions



Results

- Baseline: DrQA (Chen et al., 2017) + limiting answers spans to detected entities

Model	Exact-Match Accuracy %
No-Context Baseline	39.7
+Retrieval with previous gold answers	40.1
+Reading with appended relation spans	40.7

Reading Comprehension with Context

Q2
In March of 1981, this man shot President Reagan in order to impress the actress Jodie Foster ...

Context
During her freshman year at Yale in 1980–1981, Foster was stalked by John W. Hinckley, Jr., who had developed an obsession with her after watching Taxi Driver. He moved to New Haven and tried to contact her, both through letters and by phone. On March 30, 1981, he attempted to assassinate U.S. President Ronald Reagan, wounding him and three other people, claiming that his motive was to impress Foster...

A1
Ronald Reagan

Candidate Answers

Relation span
He is best known for defending President Ronald Reagan during the assassination attempt by John Hinckley Jr.

Question embedding q

Relation embedding r

Explicit Relation Embedding

$$\text{Score}_{\text{John Hinckley Jr.}} = \mathbf{w}_{\text{rel}}^T [|\mathbf{q} - \mathbf{r}|; \mathbf{q} \circ \mathbf{r}]$$

- r encodes the relation between Ronald Reagan and John Hinckley Jr.
- r is computed with an LSTM over the concatenated relation spans.
- q is from the reader LSTM.
- $\text{Score}_{\text{John Hinckley Jr.}}$ is added to the span score of the baseline reader.

QuAC and CoQA

QBLink

- Designed by experts to challenge human players
- Open-Domain
- Requires modeling connections between relations and entities in different questions (vs. coreference resolution)

Example from CoQA (Reddy et al., 2018)

Context: Jessica went to sit in her rocking chair. Today was her birthday and she was turning 80. Her granddaughter Annie was coming over in the afternoon and Jessica was very excited to see her. Her daughter Melanie and Melanie's husband Josh were coming as well. Jessica had ...

Q1: Who had a birthday?

Only for reading comprehension

A1: Jessica

Focused on coreference resolution

Q2: How old would she be?

A2: 80

Q3: Did she plan to have any visitors?

A3: Yes

References

- Boyd-Graber et al., Besting the quiz master: Crowd-sourcing incremental classification games. EMNLP 2012.
- Chen et al., Reading wikipedia to answer open-domain questions. ACL 2017.
- Choi et al., QuAC: Question Answering in Context. EMNLP 2018.
- Joshi et al., TriviaQA: A large scale distantly supervised challenge dataset for reading comprehension. ACL 2017.
- Reddy et al., CoQA: A Conversational Question Answering Challenge. EMNLP 2018.
- Rajpurkar et al., SQuAD: 100,000+ questions for machine comprehension of text. EMNLP 2016.