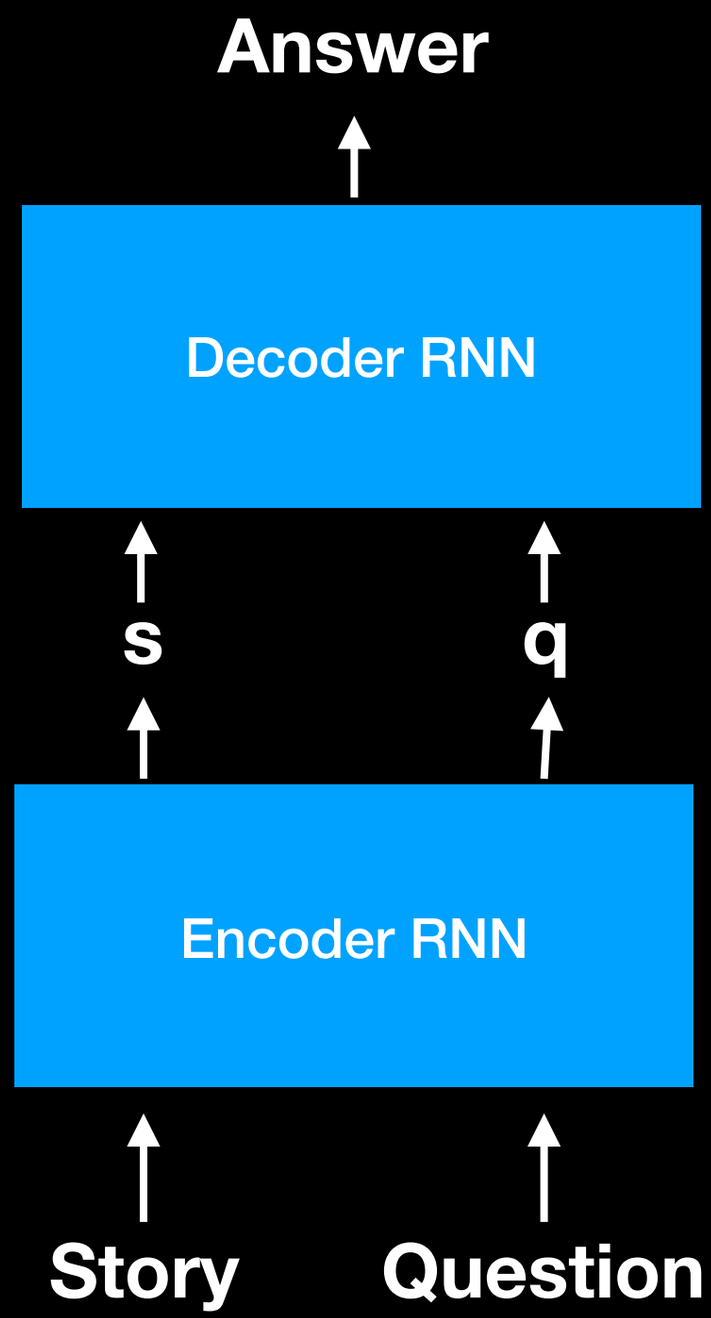
# Ask me (almost) anything

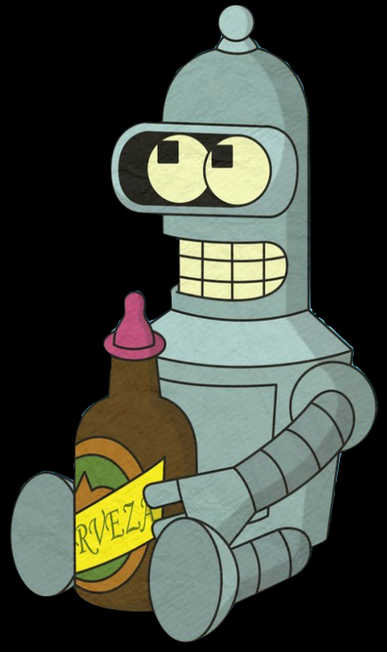
Question answering with recurrent neural networks


Hello,
computer.

# Neural network model



# The bAbI tasks



# The bAbI tasks

1. Single supporting fact
2. Two supporting facts
3. Three supporting facts
4. Two argument relations
5. Three argument relations
6. Yes/no questions
7. Counting
8. Lists/sets
9. Simple negation
10. Indefinite knowledge
11. Basic conference
12. Conjunction
13. Compound coreference
14. Time reasoning
15. Basic deduction
16. Basic induction
17. Positional reasoning
18. Size reasoning
19. Path finding
20. Agent's motivations

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# bAbI

Julius is a swan.
Bernhard is a swan.
Greg is a frog.
Brian is a swan.
Brian is gray.
Lily is a frog.
Julius is gray.
Lily is green.
Bernhard is gray.

**What color is Greg?**

**Green!**

# Baseline results

| Task | Test set accuracy |
|---|---|
| 1. Single supporting fact | 48.4% |
| 2. Two supporting facts | 19.2% |
| 3. Three supporting facts | 17% |
| 4. Two argument relations | 74.6% |
| 5. Three argument relations | 81.6% |
| 6. Yes/no questions | 46.8% |
| 7. Counting | 79% |
| 8. Lists/sets | 74% |
| 9. Simple negation | 59.8% |
| 10. Indefinite knowledge | 46.4% |
| 11. Basic conference | 74% |
| 12. Conjunction | 78% |
| 13. Compound coreference | 94% |
| 14. Time reasoning | 35.8% |
| 15. Basic deduction | 56.6% |
| 16. Basic induction | 48.8% |
| 17. Positional reasoning | 61.2% |
| 18. Size reasoning | 93.4% |
| 19. Path finding | 8% |
| 20. Agent's motivations | 97.6% |

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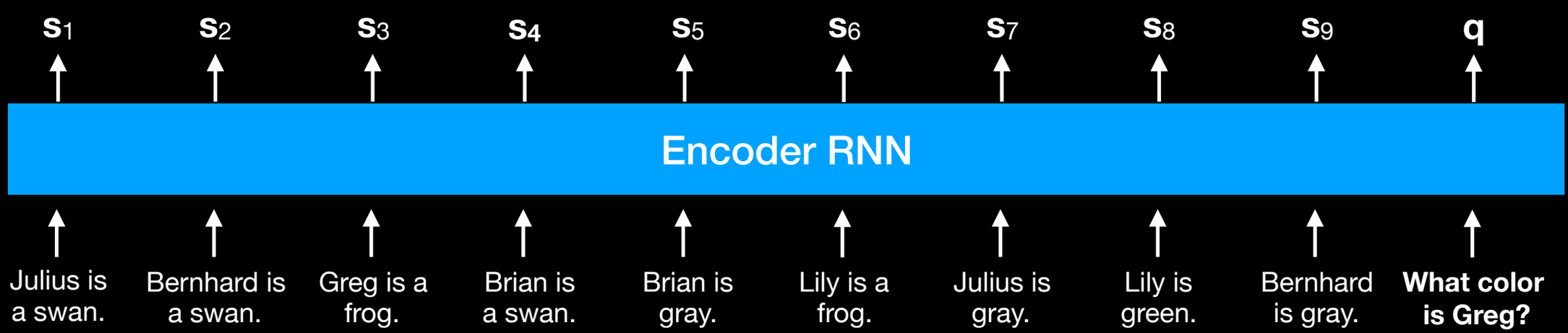
# Dynamic memory network



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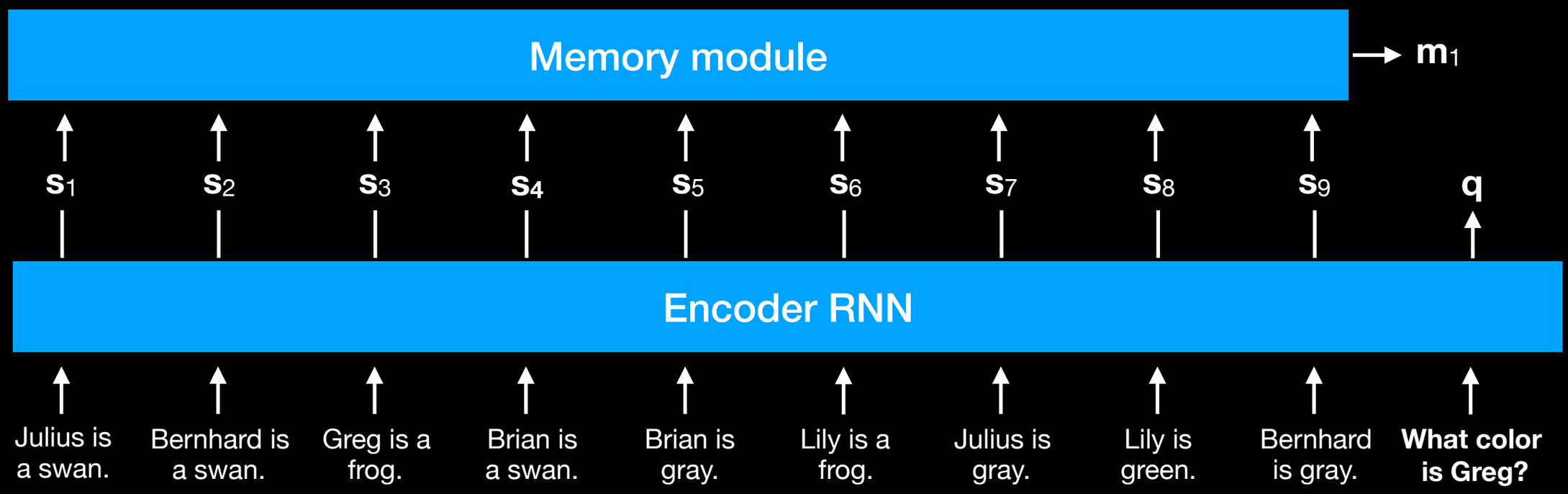

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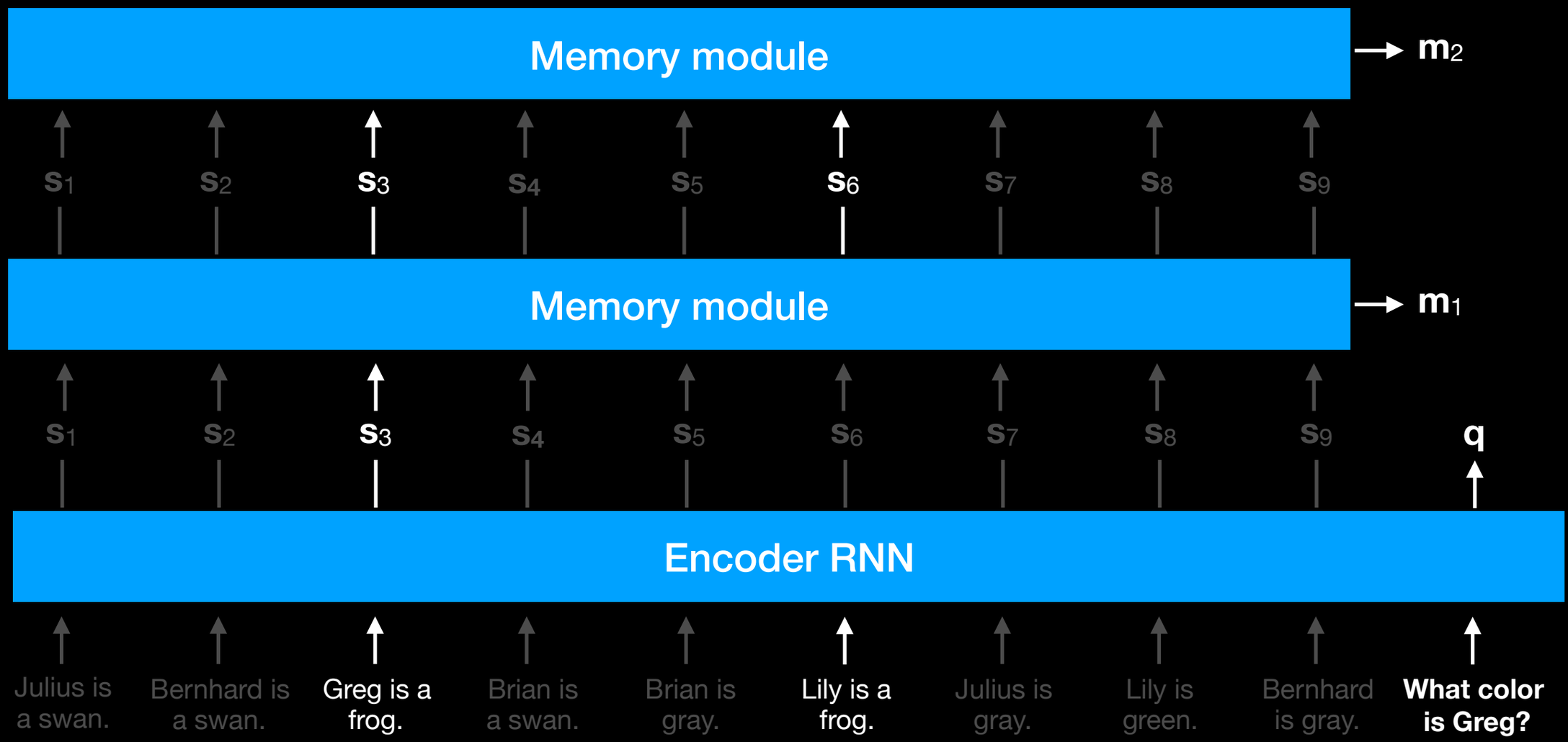
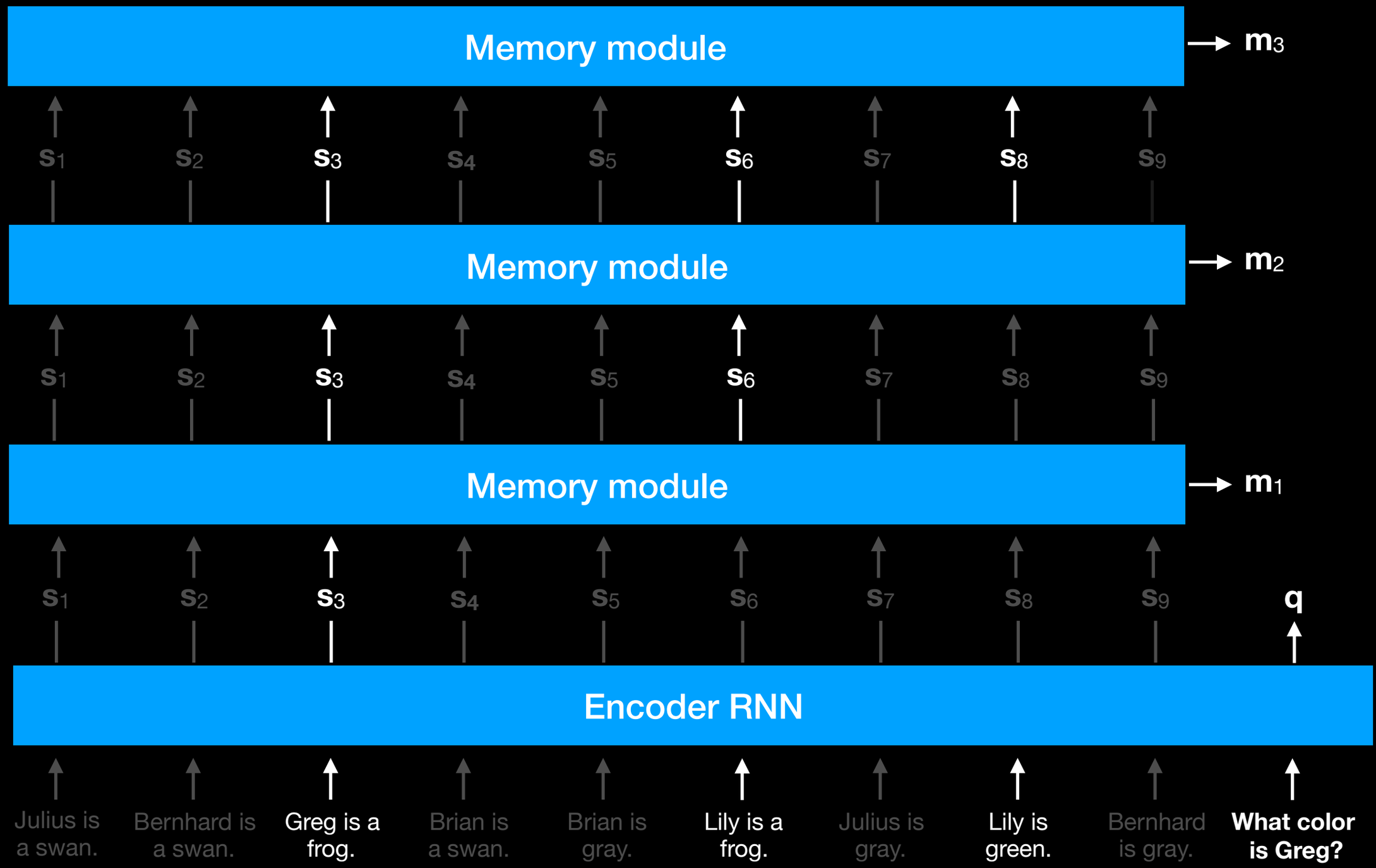


# Dynamic memory network



# DMN results

| Task | Baseline | DMN |
|---|---|---|
| 1. Single supporting fact | 48.4% | 100% |
| 2. Two supporting facts | 19.2% | 30% |
| 3. Three supporting facts | 17% | 30.4% |
| 4. Two argument relations | 74.6% | 100% |
| 5. Three argument relations | 81.6% | 98.2% |
| 6. Yes/no questions | 46.8% | 99.8% |
| 7. Counting | 79% | 98.8% |
| 8. Lists/sets | 74% | 99.6% |
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| 14. Time reasoning | 35.8% | 99.2% |
| 15. Basic deduction | 56.6% | 100% |
| 16. Basic induction | 48.8% | 98.6% |
| 17. Positional reasoning | 61.2% | 60% |
| 18. Size reasoning | 93.4% | 99% |
| 19. Path finding | 8% | 22.4% |
| 20. Agent's motivations | 97.6% | 100% |

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# Memory module gate weights

| Sentence | 1st pass | 2nd pass | 3rd pass | Target |
|---|---|---|---|---|
| Julius is a swan. | 0.0000 | 0.0000 | 0.0000 | 0 |
| Bernhard is a swan. | 0.0000 | 0.0000 | 0.0000 | 0 |
| Greg is a frog. | 0.9988 | 1.0000 | 1.0000 | 1 |
| Brian is a swan. | 0.0000 | 0.0000 | 0.0000 | 0 |
| Brian is gray. | 0.0004 | 0.0062 | 0.0001 | 0 |
| Lily is a frog. | 0.0000 | 0.9995 | 1.0000 | 1 |
| Julius is gray. | 0.0010 | 0.0004 | 0.0000 | 0 |
| Lily is green. | 0.0002 | 0.0022 | 0.9997 | 1 |
| Bernhard is gray. | 0.0005 | 0.0007 | 0.0003 | 0 |

# Next steps

- Improve implementation of DMN.
- Apply to a new dataset.
- Build a web app.

# Thanks!