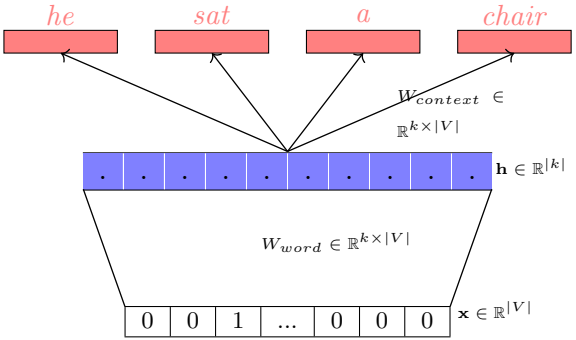
Module 10.6: Contrastive estimation



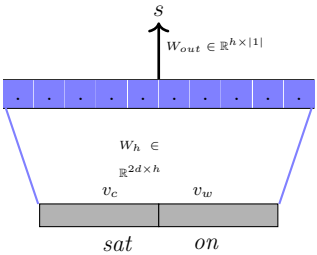
Some problems

- Same as bag of words
- The softmax function at the output is computationally expensive
- Solution 1: Use negative sampling
- Solution 2: Use contrastive estimation
- Solution 3: Use hierarchical softmax

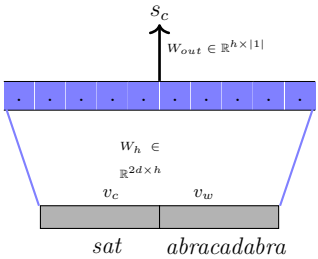
Positive: *He sat on a chair*

Negative: *He sat abracadabra a chair*

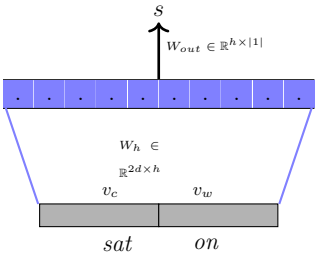
Positive: *He sat on a chair*



Negative: *He sat abracadabra a chair*



Positive: *He sat on a chair*



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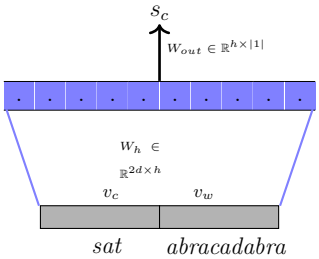
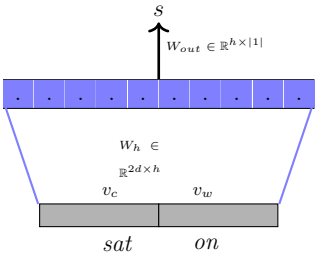


- We would like s_c to be greater than s

Positive: *He sat on a chair*



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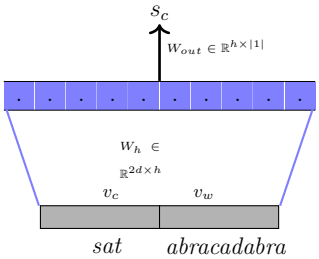
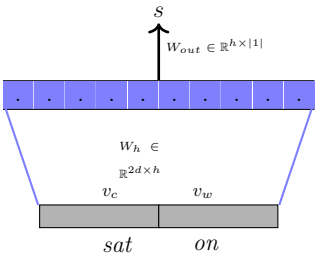
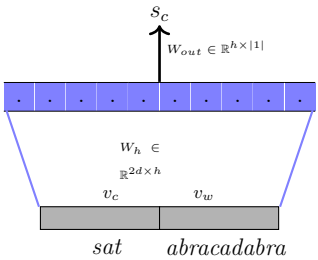


- We would like s_c to be greater than s
- Okay, so let us try to maximize $s - s_c$

Positive: *He sat on a chair*

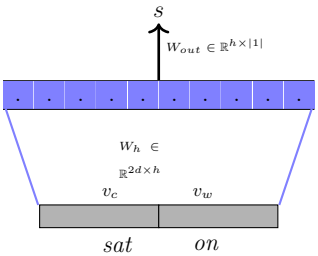


Negative: *He sat abracadabra a chair*



- We would like s_c to be greater than s
- Okay, so let us try to maximize $s - s_c$
- But we would like the difference to be at least m

Positive: *He sat on a chair*



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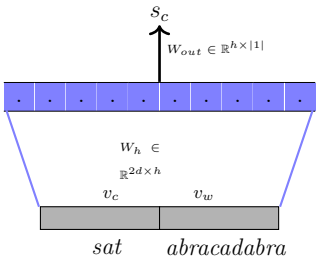
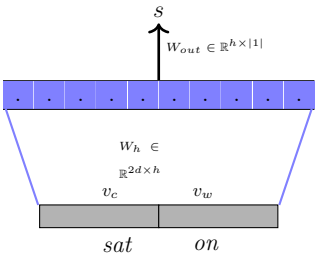


- So we can maximize $s - (s_c + m)$

Positive: *He sat on a chair*



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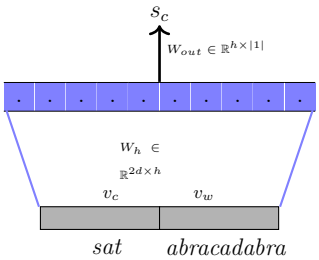
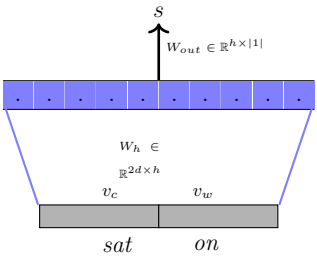


- So we can maximize $s - (s_c + m)$
- What if $s > s_c + m$

Positive: *He sat on a chair*



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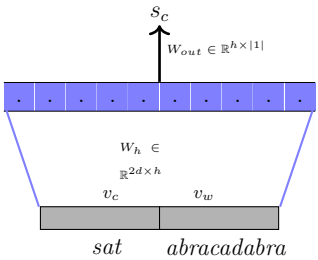
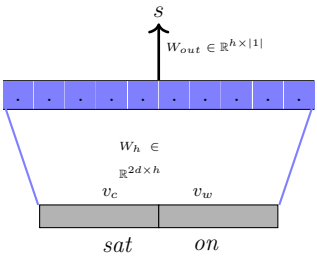
Negative: *He sat abracadabra a chair*



- So we can maximize $s - (s_c + m)$
- What if $s > s_c + m$ *(don't do any thing)*

Positive: *He sat on a chair*



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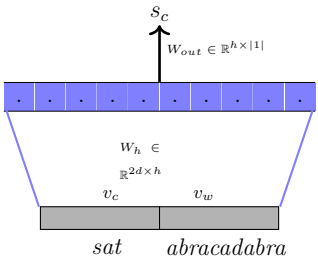

- So we can maximize $s - (s_c + m)$
- What if $s > s_c + m$ *(don't do any thing)*

maximize $max(0, s - (s_c + m))$