

# HW9\_3

Tianqi Wu

4/10/2020










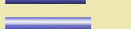
Annotation Cluster 1		Enrichment Score: 19.6				Count	P_Value	Benjamini
<input type="checkbox"/>	UP_KEYWORDS	<a href="#">Secreted</a>	RT			96	8.2E-30	2.4E-27
<input type="checkbox"/>	GOTERM_CC_DIRECT	<a href="#">extracellular region</a>	RT			85	3.1E-25	8.1E-23
<input type="checkbox"/>	UP_SEQ_FEATURE	signal peptide	RT			118	5.0E-24	4.9E-21
<input type="checkbox"/>	UP_KEYWORDS	<a href="#">Glycoprotein</a>	RT			137	4.4E-23	6.5E-21
<input type="checkbox"/>	UP_SEQ_FEATURE	glycosylation site:N-linked (GlcNAc...)	RT			130	1.7E-21	8.5E-19
<input type="checkbox"/>	UP_KEYWORDS	<a href="#">Signal</a>	RT			125	2.1E-20	2.1E-18
<input type="checkbox"/>	GOTERM_CC_DIRECT	<a href="#">extracellular space</a>	RT			61	1.7E-14	1.1E-12
<input type="checkbox"/>	UP_SEQ_FEATURE	disulfide bond	RT			87	2.0E-12	4.8E-10
<input type="checkbox"/>	UP_KEYWORDS	<a href="#">Disulfide bond</a>	RT			94	6.5E-12	3.2E-10

Figure 1: David Cluster

## Problem 3

### 3.1 To Remember, the Brain Must Actively Forget

(<https://www.quantamagazine.org/to-remember-the-brain-must-actively-forget-20180724/>)

#### General Topic

The article focuses on how forgetting help remember better.

#### What...?

What is mushroom body neurons that dopamine releases onto?

#### When...?

When would the brain start to forget things?

#### Where...?

Where are the forgotten memories stored?

**How...?**

- How does protein Rac1 in the hippocampal neurons prolong the retention of memories?
- How did researchers increase the activity of Rac1?
- How does Rac1 involve in several forms of forgetting in fruit flies?

**Why...?**

- Why would neurogenesis complicate the challenge of retrieving prior memories from the hippocampus?
- Why would added neural wiring damage the older engrams?
- Why would the overlaps make it harder to isolate the old memories from newer ones?

**What if...?**

What if we decrease the activity of Rac1, would it let us forget some bad things happened recently?

**I wonder if...?**

I wonder if there are some special SNPs that make Rac1 different from others.

**Connection**

This article reminds me of LSTM model in deep learning where we use forget gates to improve the performance.

## **3.2 Your Brain Chooses What to Let You See**

(<https://www.quantamagazine.org/your-brain-chooses-what-to-let-you-see-20190930/>)

**General Topic**

The article focuses on how attention mechanism work by filtering unimportant things.

**What...?**

What are examples of automatic suppressive types of mechanisms?

**When...?**

When would automatic background subtraction take place?

**Where...?**

Where is the attention mechanism processed?

**How...?**

- How would we focus on important things by lowering the priority of the rest?
- How does brain suppress information about the movement of the background?
- How can we perceive the movements of larger objects instead of smaller ones?

**Why...?**

- Why would older adults show little difference between perception of large and small objects?
- Why would they get much better at recognizing that motion with longer training period?
- Why would our brains adopt strategies that make smaller moving objects against those backgrounds stand out more?

**What if...?**

What if we do some experiments on larger predators that eat larger animals, would the result be the same?

**I wonder if...?**

I wonder if there are some specific neurons that make the attention strategy.

**Connection**

This article reminds me of attention model in deep learning where we only focus on the most relevant information

### **3.3 The Animal Origins of Coronavirus and Flu**

(<https://www.quantamagazine.org/how-do-animal-viruses-like-coronavirus-jump-species-20200225/>)

**General Topic**

The article focuses on zoonoses, diseases that can jump between humans and other animals. In particular, it discusses the animal origins of coronavirus and influenza.

**What...?**

What is the main difference between coronavirus and influenza?

**When...?**

When does coronavirus result highest death rate?

**Where...?**

Where are the receptors bound most by virus's proteins?

### **How...?**

- How does the virus reach the cells of the host?
- How does the virus recognize the cells of its host?
- How can S1 subunit of virus bind to the structure of the cells?

### **Why...?**

- Why is SARS-CoV-2 more deadly than SARS-CoV and MERS-CoV?
- Why bats and intermediate animals don't die from SARS-CoV-2?
- Why do people get infected by intermediate animals?

### **What if...?**

What if we mask the cells that are bound by the virus most, could the virus still recognize them?

### **I wonder if...?**

I wonder if there are some properties in cells that make bats and intermediate animals immune to SARS-CoV-2?

### **Connection**

This article reminds me of GWAS analysis and we may use it to identify the similar virus that may be deadly to people and prepare for it.