

# TINNITUS NARRATIVES: ANOTHER SOCIAL MEDIA PERSPECTIVE

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University of Toulouse, France



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Lancaster University, UK



## THE STORY

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- ❖ Online forums concentrate hundreds of thousands of **spontaneous** patients' reports, not biased by the medical interaction
- ❖ **Machine learning** proves to be a handy tool to extract information from these reports
- ❖ Comprehensive summaries of the **heterogeneity** of perceptions to provide insights

# **SOCIAL MEDIA DATA AND MEDICAL RESEARCH**



- Manchaiah, Londero, Deshpande, Revel, Palacios, Boyd & Ratinaud. **What can we learn about tinnitus from Reddit data.** *Forthcoming*, 2021.
- Ni, Bellon-Harn, Zhang, Li & Manchaiah. **Twitter Usage Using Common Reference to Tinnitus.** *American Journal of Audiology*, 2020.
- Deshpande, Deshpande & O'Brien. **Hyperacusis and social media trends.** *Hearing, Balance and Communication*, 2019.
- Manchaiah, Ratinaud & Andersson. **Representation of tinnitus in the US newspaper media and in facebook pages: Cross-sectional analysis of secondary data.** *Interactive Journal of Medical Research*, 2018.
- Deshpande, Deshpande & O'Brien. **Study of Social Media Utilization by Individuals With Tinnitus.** *American Journal of Audiology*, 2018.
- Basch, Yin, Kollia, Adedokun, Trusty, Yeboah & Fung. **Public online information about tinnitus: A cross-sectional study of YouTube videos.** *Noise & Health*, 2018.

# REDDIT DATA

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# REDDIT DATA

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➤ Posts from February 2011 to September 2019

# REDDIT DATA

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- Posts from **February 2011** to **September 2019**
- 101,000 posts created by 12,000 users were retained after data processing



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*Medical Interactions  
Controlled and Filtered*

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*Online Anonymity  
Heterogeneity of perception*

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*Medical Interactions  
Controlled and Filtered*



*Online Anonymity  
Heterogeneity of perception*



# DATA ANALYSIS



Data

# DATA ANALYSIS



Data —● Processed  
Data

# DATA ANALYSIS

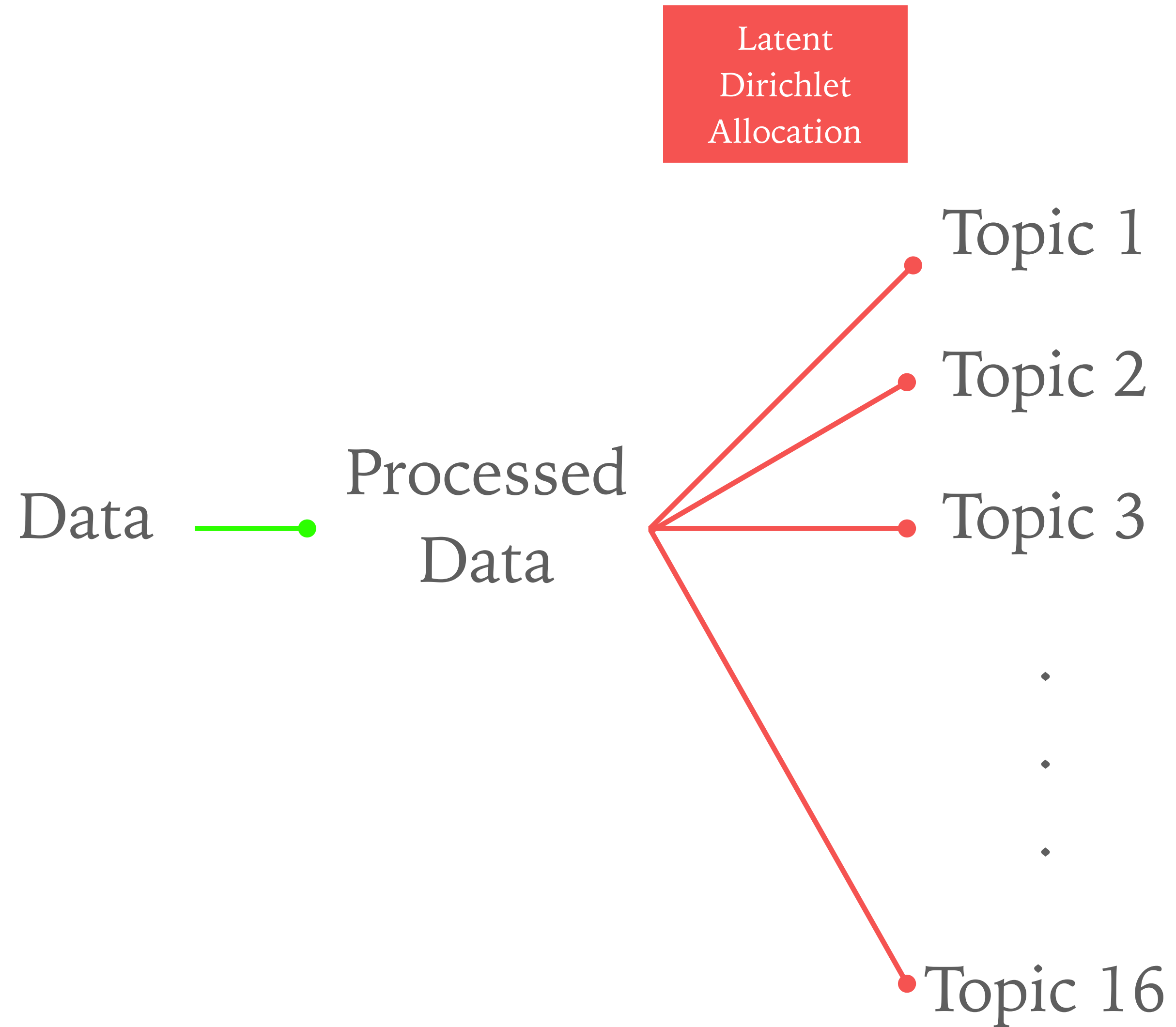
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Latent  
Dirichlet  
Allocation

Data —● Processed  
Data

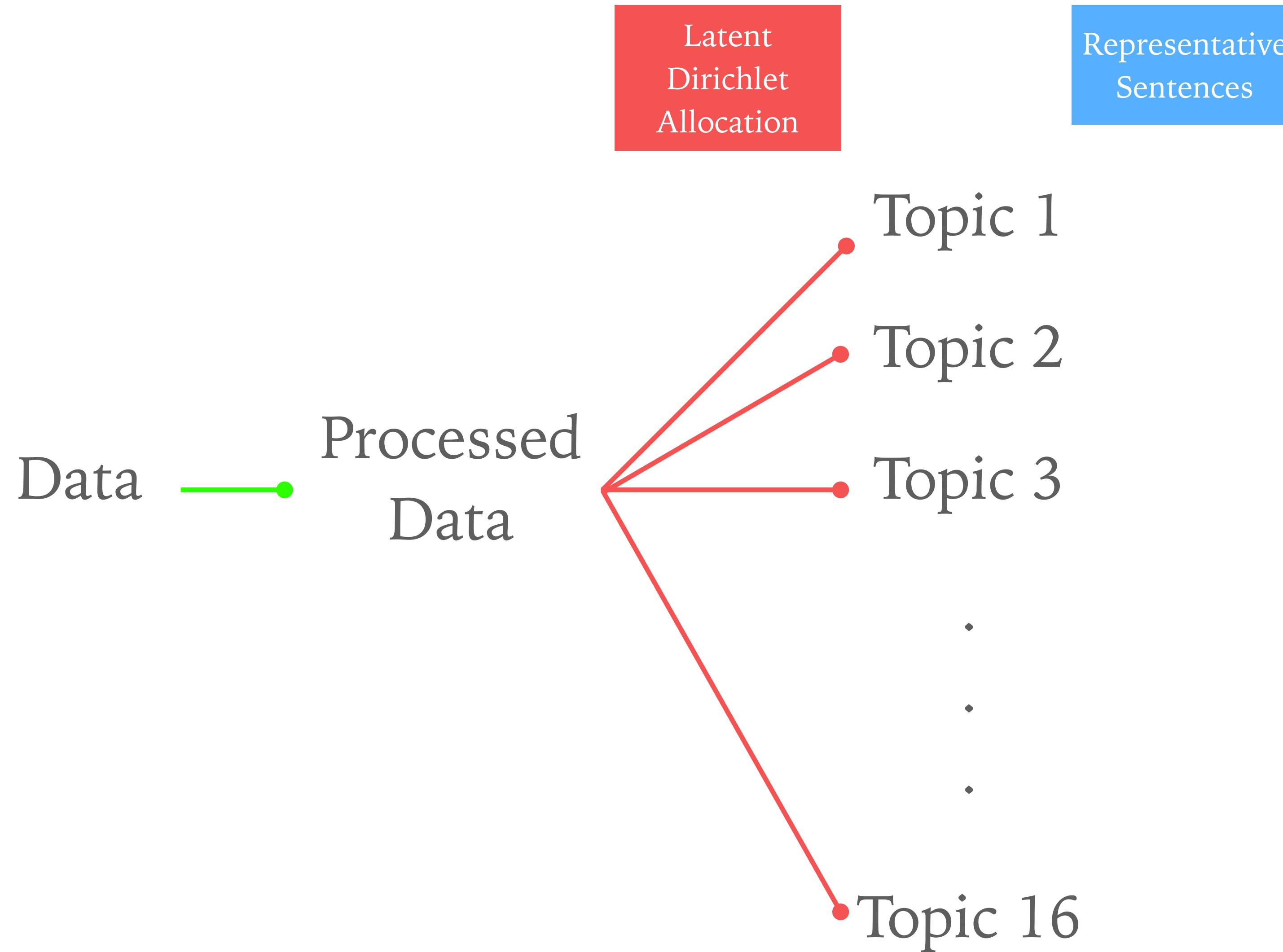
# DATA ANALYSIS

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# DATA ANALYSIS

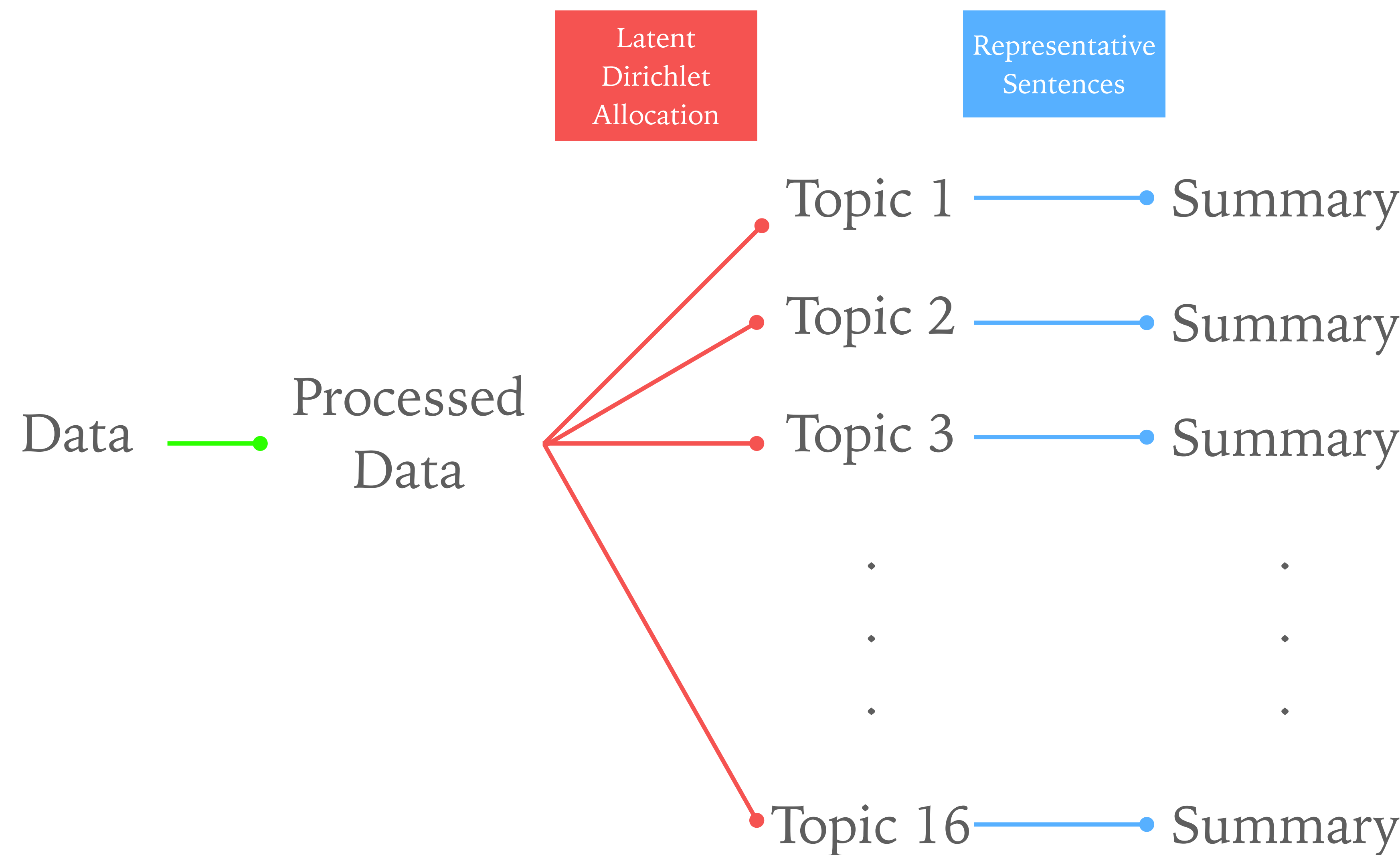
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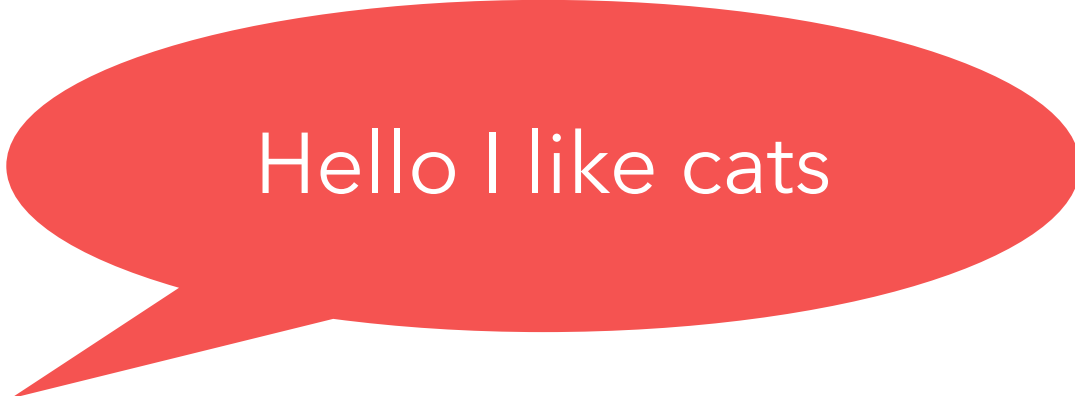
# DATA ANALYSIS

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# LATENT DIRICHLET ALLOCATION





Hello I like cats



Hello I like cats

hello, I ate an orange





Hello I like cats

hello, I ate an orange

Hello! I like cats  
and dogs

Hello I like cats

hello, I ate an orange

Hello! I like cats  
and dogs

Hfihjoqrwr gerijo kovebik vero foggia oi hiofv ojfv iv hriobhv ipjv rpioj  
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# Hello I like cats

hello, I ate an orange

Hello! I like cats  
and dogs

[illegible]

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grea

# Corpus

Hello I like cats

hello, I ate an orange

Hello! I like cats  
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# Corpus

# T1

## T2

Hello I like cats

hello, I ate an orange

Hello! I like cats  
and dogs

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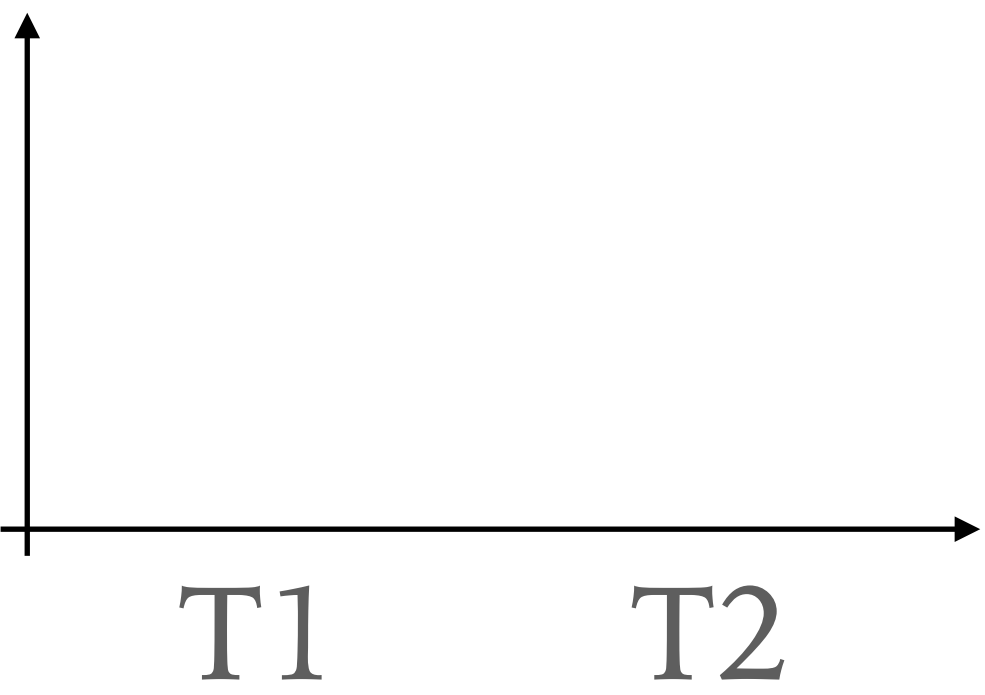
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# Corpus







Hello I like cats

hello, I ate an orange



Hello! I like cats  
and dogs

[illegible]

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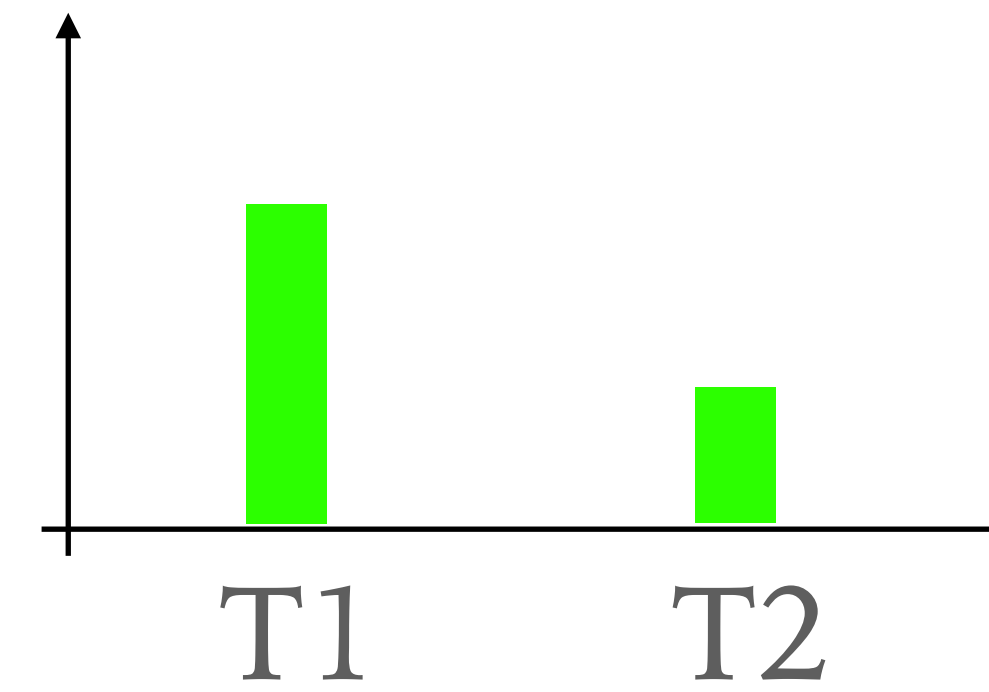
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# Corpus



Hello I like cats

hello, I ate an orange

Hello! I like cats  
and dogs

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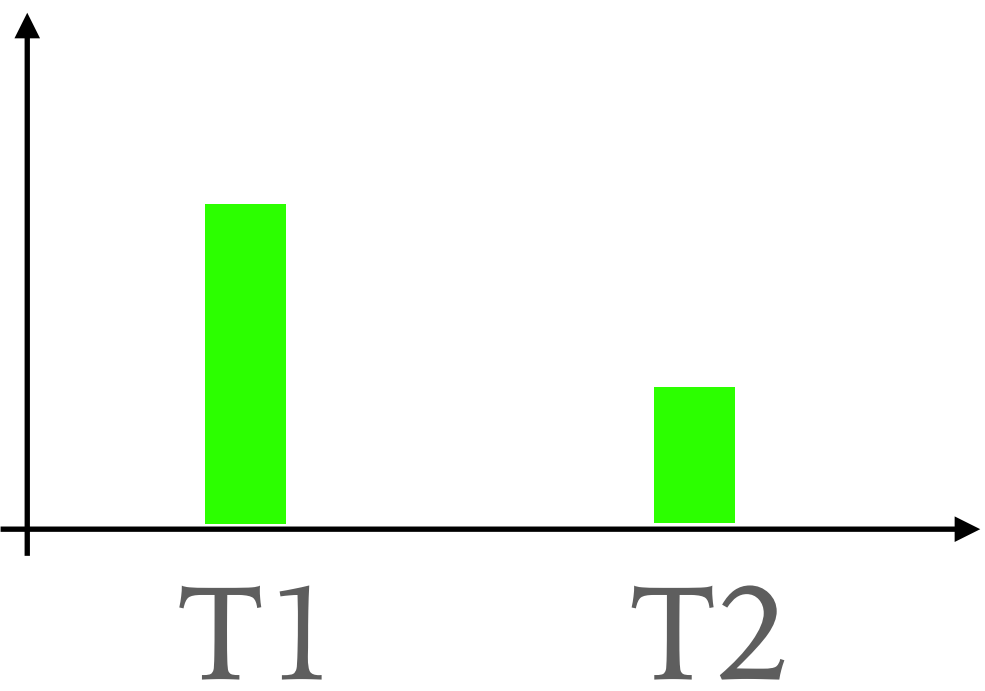
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jreaop gireap greap greap greap greap greap greap greap greap greap greap  
grea

Corpus



$V = \{\text{cat, dogs, hello, orange}\}$



Hello I like cats

hello, I ate an orange



Hello! I like cats  
and dogs

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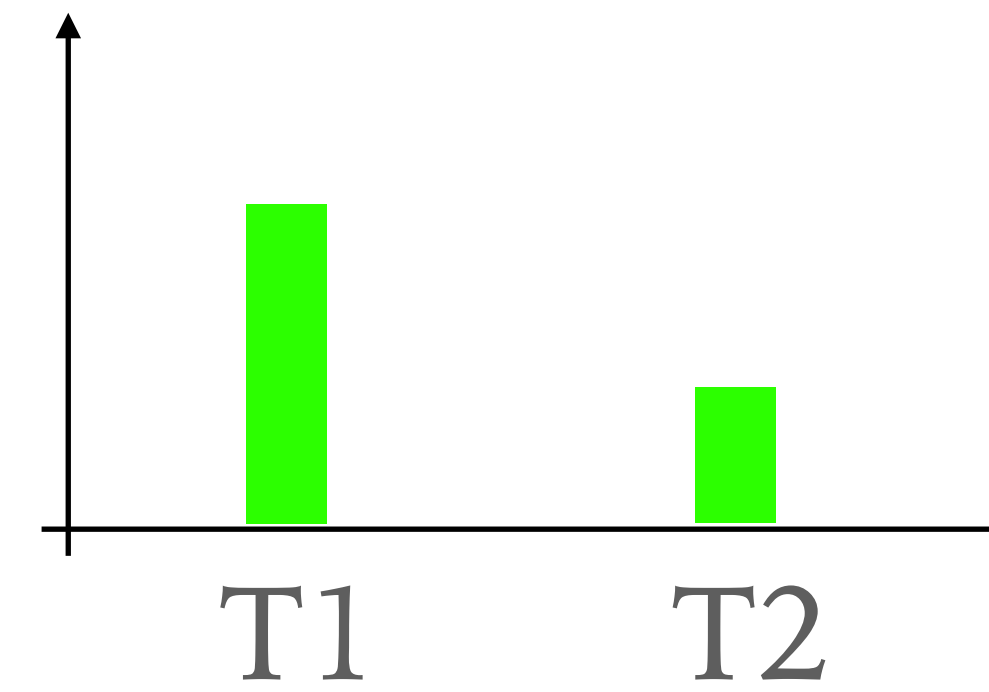
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# Corpus



# T1

$$V = \{\text{cat, dogs, hello, orange}\}$$

Hello I like cats

hello, I ate an orange

Hello! I like cats  
and dogs

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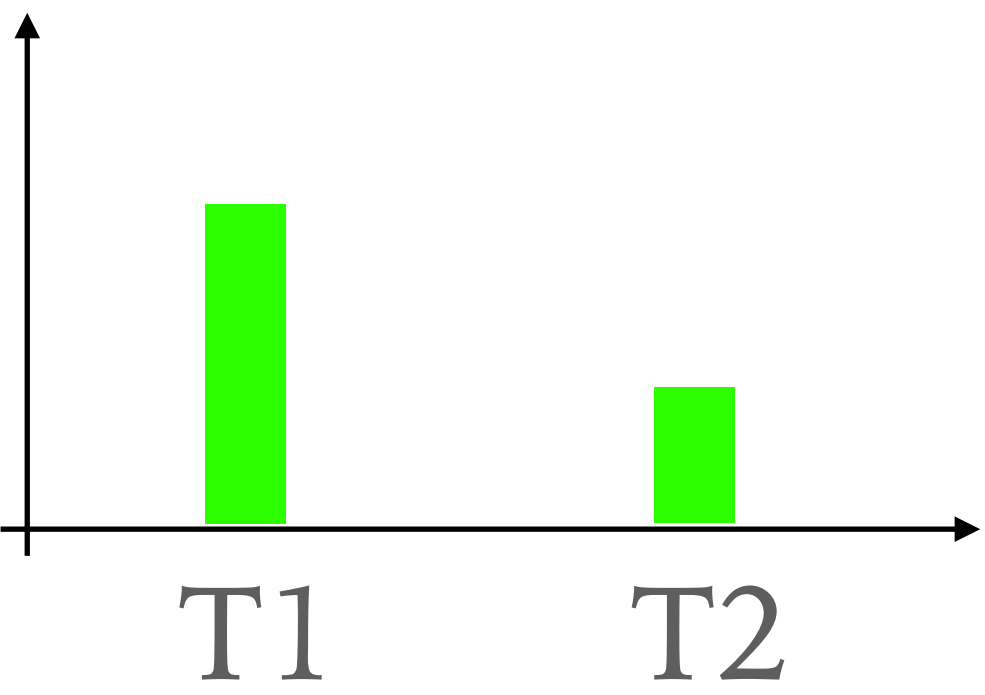
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Corpus



T1 T2

$V = \{\text{cat, dogs, hello, orange}\}$



Hello I like cats

hello, I ate an orange

Hello! I like cats  
and dogs

Hfihjoqrwr gerijo kovebik vero foggia oi hiofv ojfv iv hriobhv ipjv rpioj  
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grfoehb t[og re[gore gr0nfi lora d[e ga rwp jek tog eiwophre joptera jgrepoa  
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Hfihojqwr gerijo kovebik vero foggia oi hiofv ojfv iv hriobhv ipjv rpioj  
voptj opejb tpovj repj voptj goprej bløergb jtrlojbv olbtjhpgjreohb plbr  
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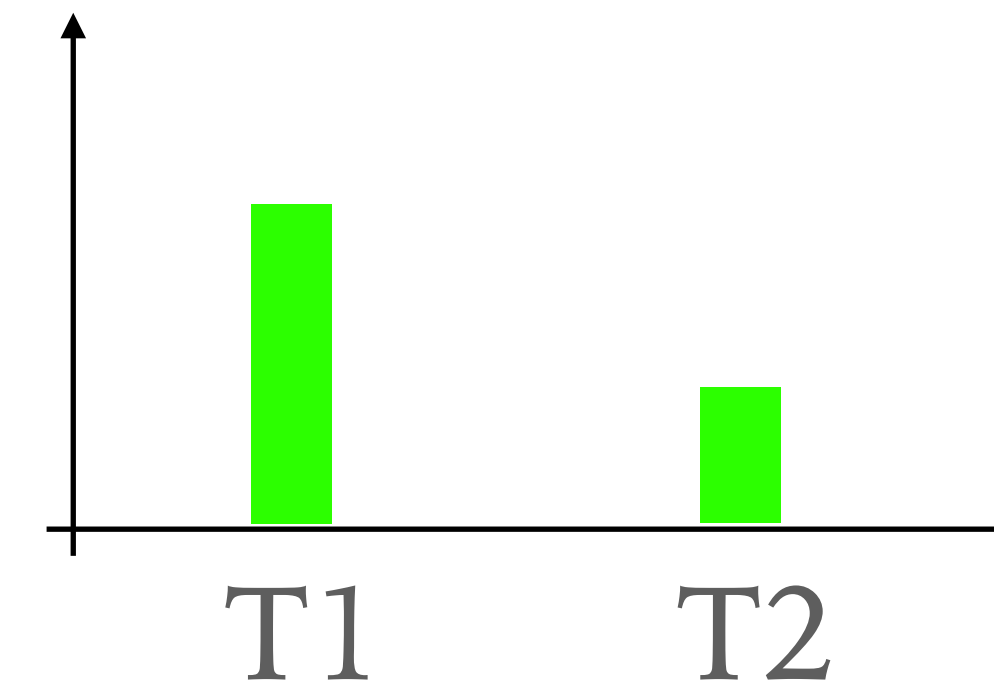
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# Corpus



# T1

## T2

$$V = \{\text{cat, dogs, hello, orange}\}$$



Hello I like cats

hello, I ate an orange



Hello! I like cats  
and dogs

Hfihjoqrwr gerijo kovebik vero foggia oi hiofv ojfv iv hriobhv ipjv rpjov  
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Page 79 of 86

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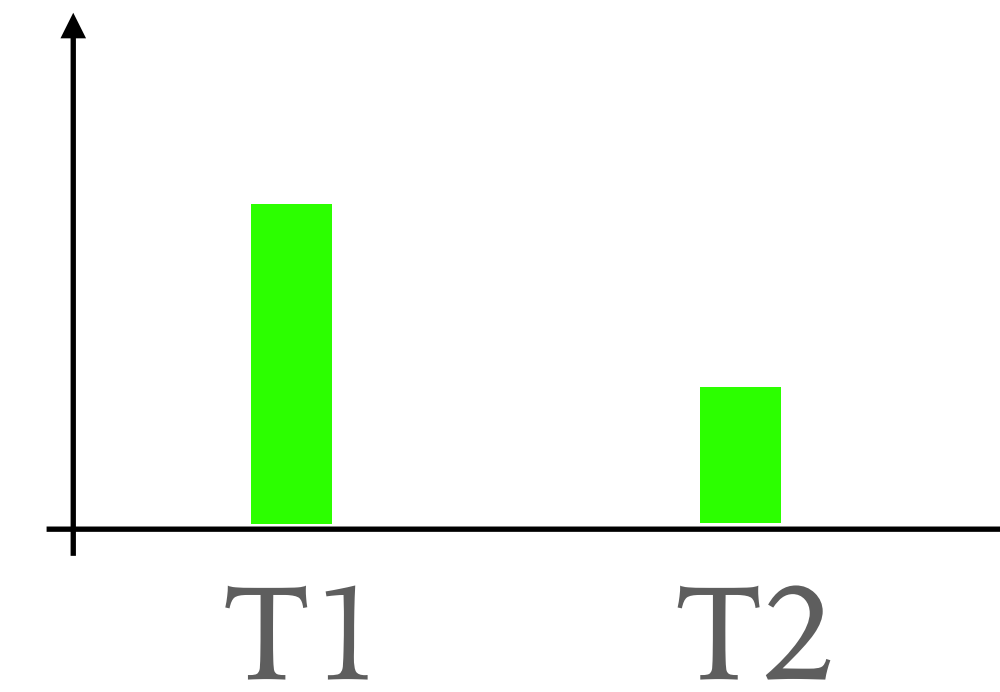
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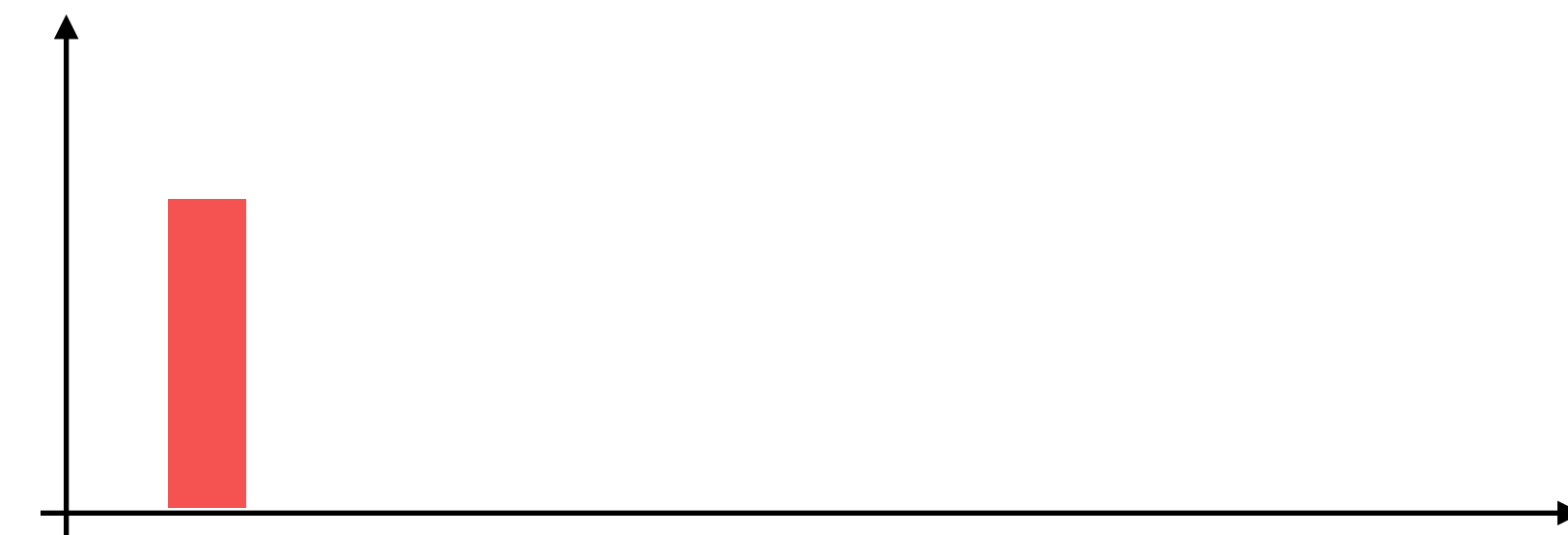
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# Corpus



# T1

## T2


$$V = \{\text{cat, dogs, hello, orange}\}$$



Hello I like cats

hello, I ate an orange



Hello! I like cats  
and dogs

[illegible][illegible][illegible]

Hfihjqoqrwr gerijo kovebik vero foggia oi hiofv ojfv iv hirbhvh ipvj rpioj  
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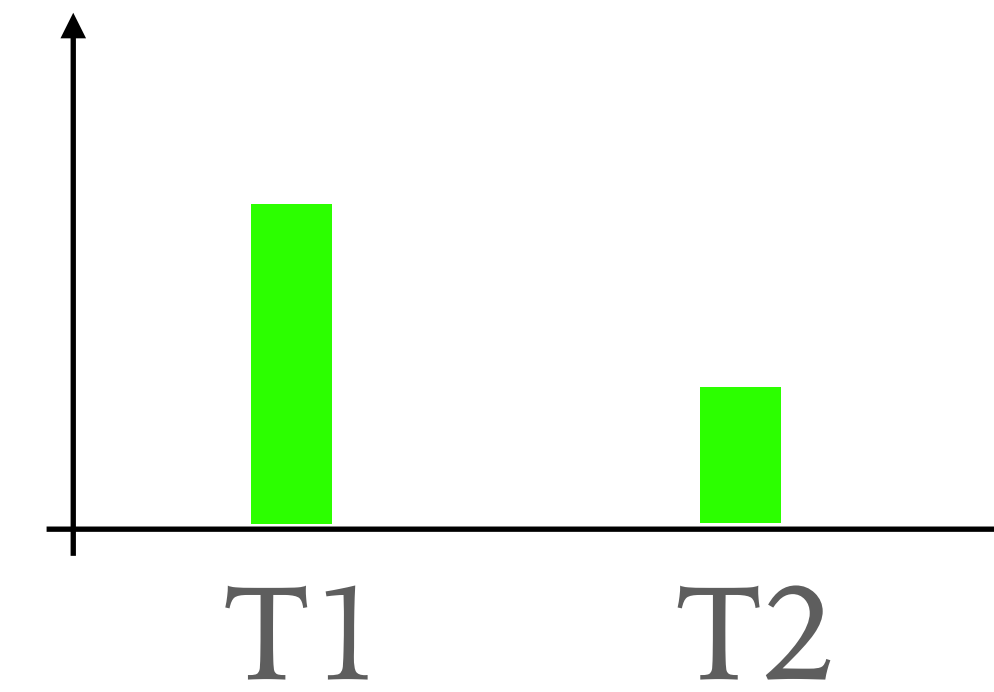
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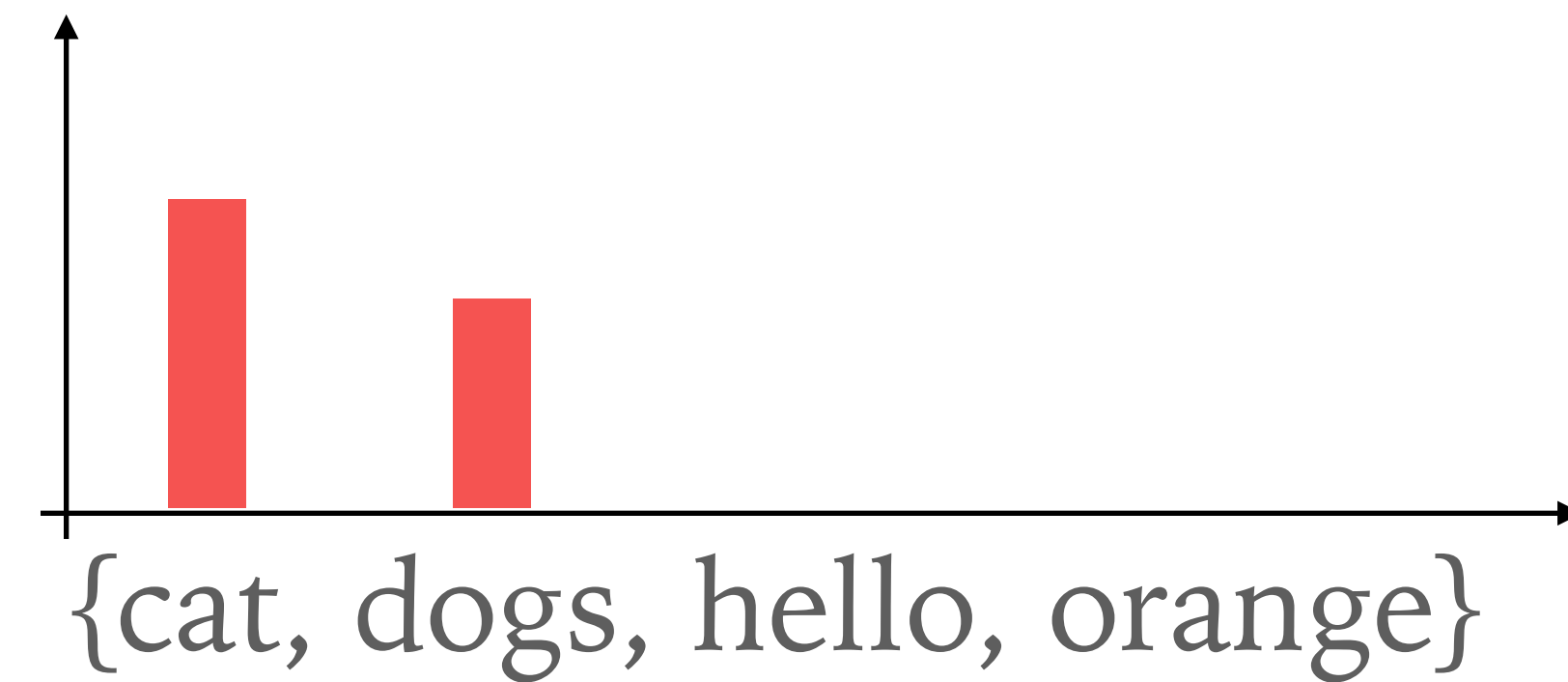
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# Corpus



# T1

## T2


$$V = \{\text{cat, dogs, hello, orange}\}$$



Hello I like cats

hello, I ate an orange

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Hfihjoqrwr gerijo kovebik vero foggia oi hiofv ojfv iv hriobhv ipjv rpioj  
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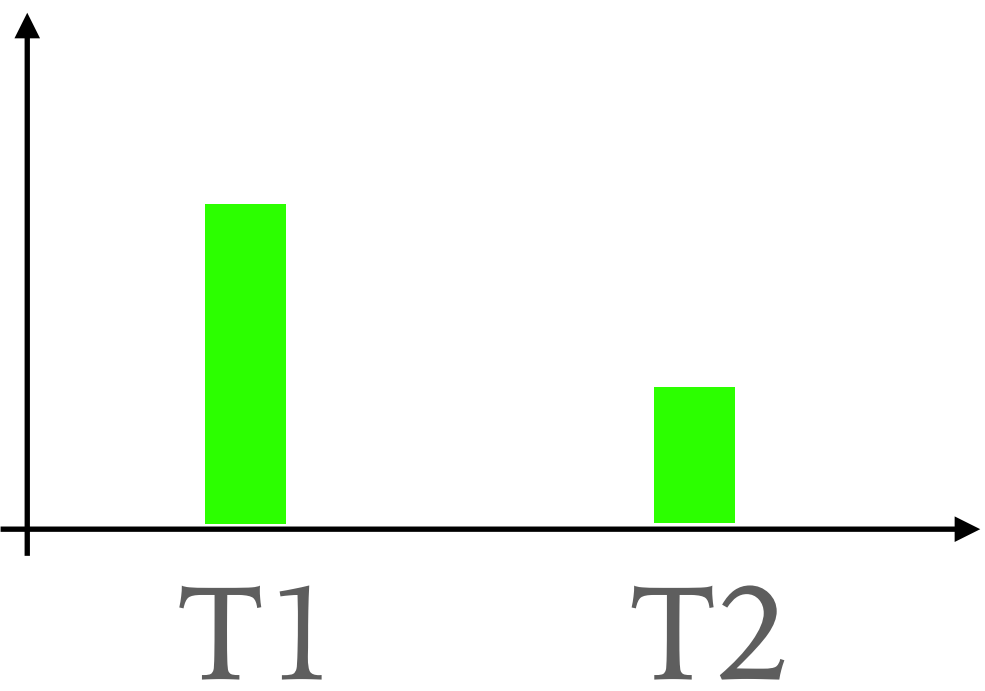
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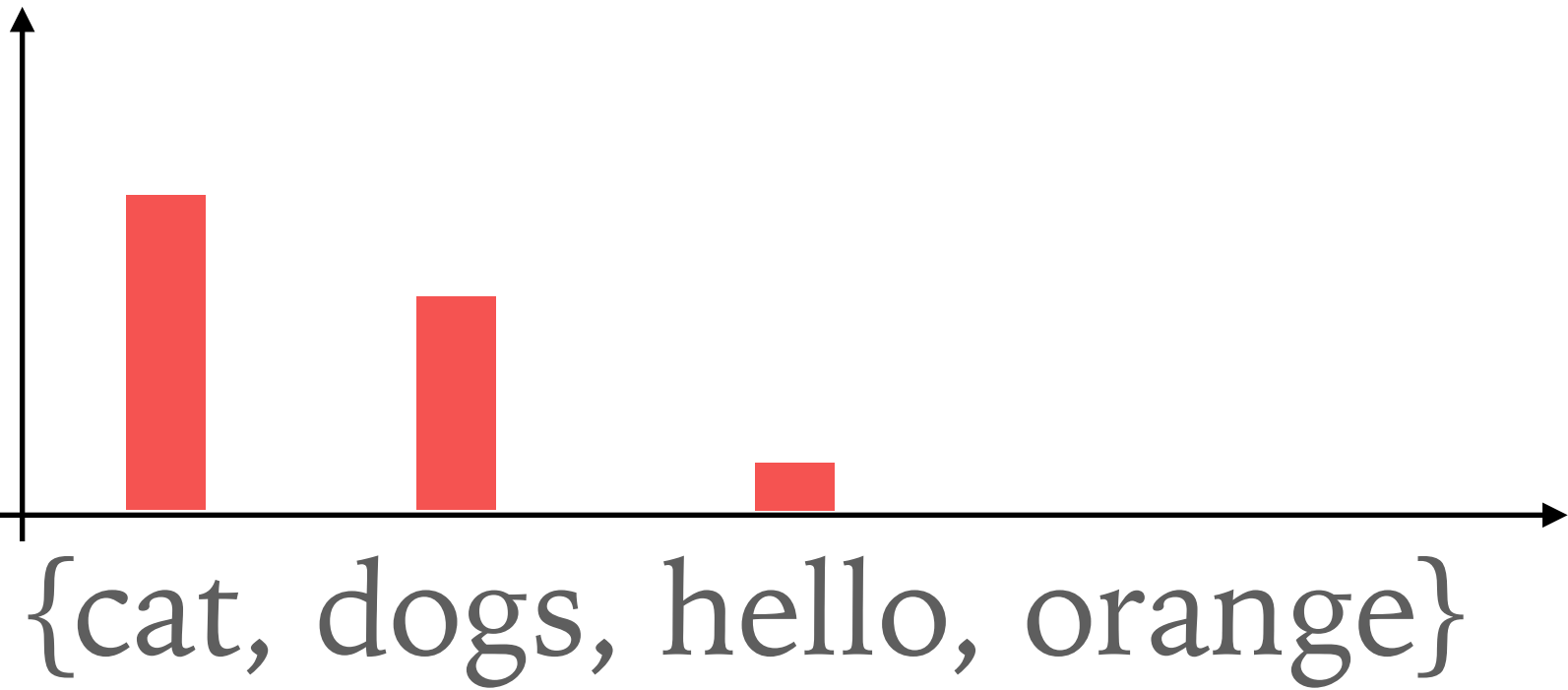
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Corpus



T1 T2



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Hfihjoqrwr gerijo kovebik vero foggia oi hiofv ojfv iv hriobhv ipjv rpioj  
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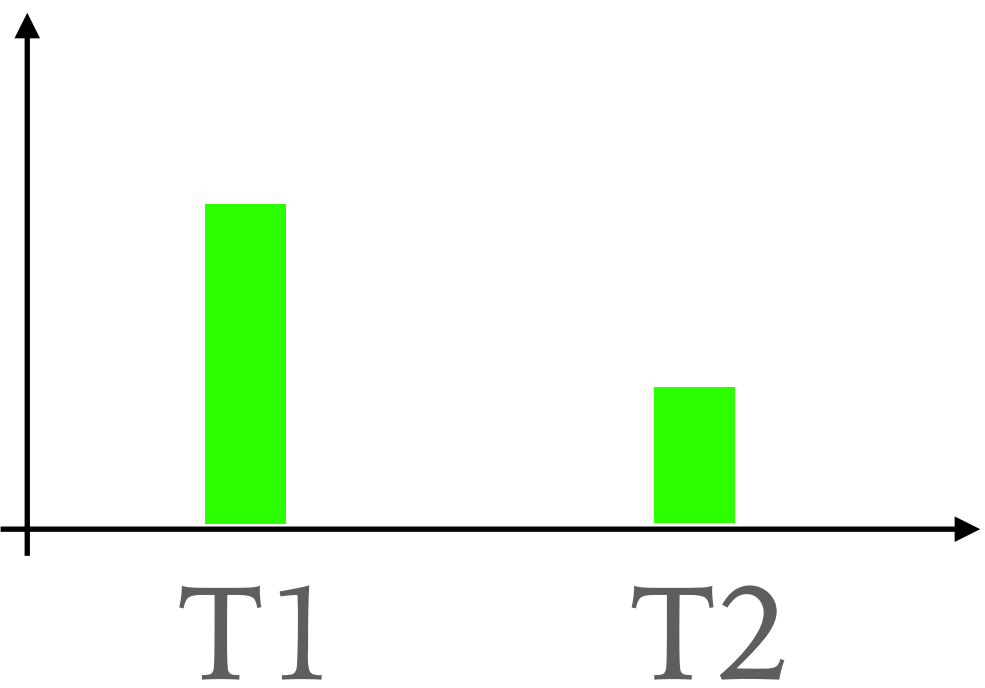
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Hfihjoqrwr gerijo kovebik vero foggia oi hiofv ojfv iv hriobhv ipjv rpioj  
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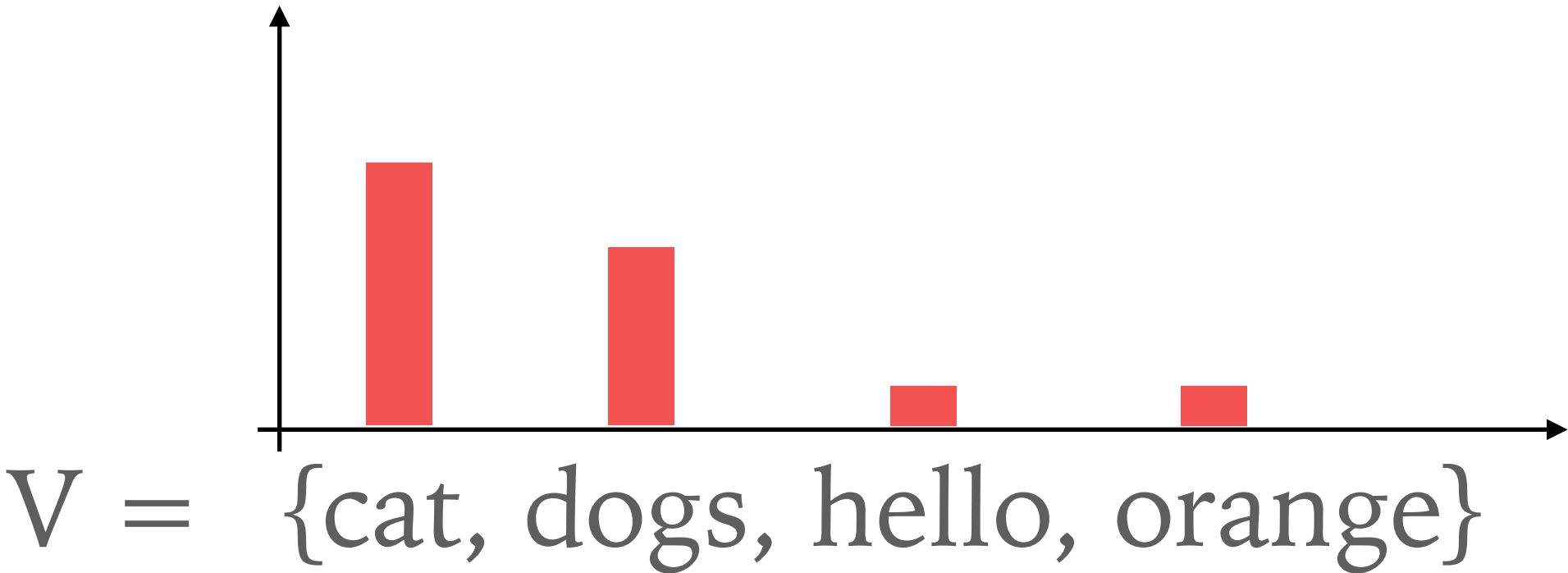
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Hfihjoqrwr gerijo kovebik vero foggia oi hiofv ojfv iv hriobhv ipjv rpioj  
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jreaop gireap greoprwopgre gipre gorpi orepia repoa reopa reopa reaoipi  
grea

Corpus



T1 T2



Hello I like cats

hello, I ate an orange

Hello! I like cats  
and dogs

Hfihjoqrwr gerijo kovebik vero foggia oi hiofv ojfv iv hriobhv ipjv rpioj  
voprtj opejb tporvj repij voprtj goprej b[oergb jtro[gbjr o[btjh[pgjre[ohb p[br  
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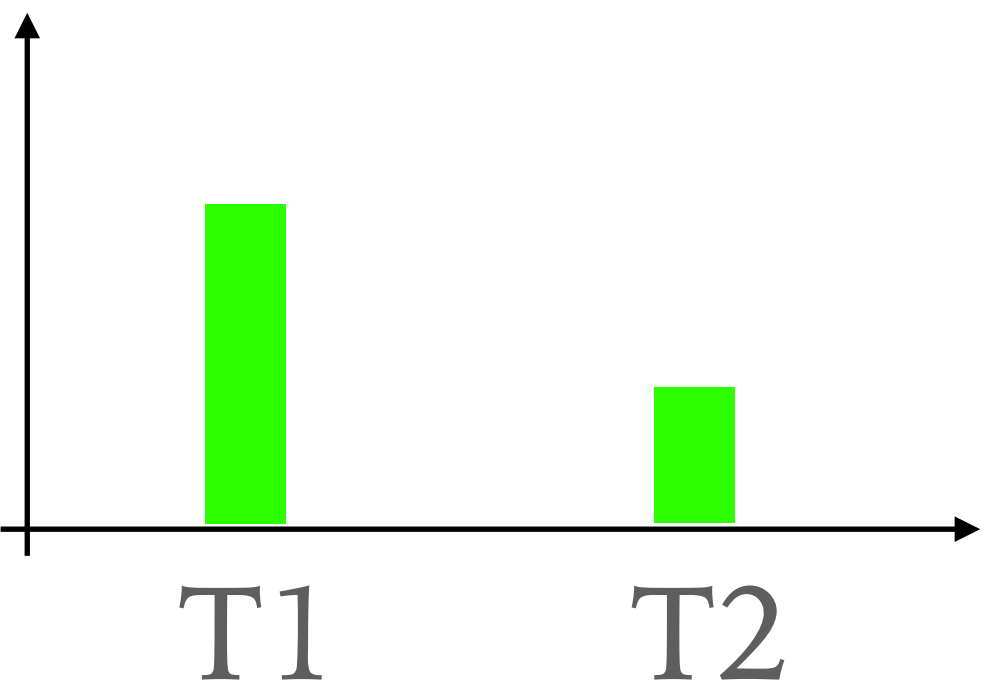
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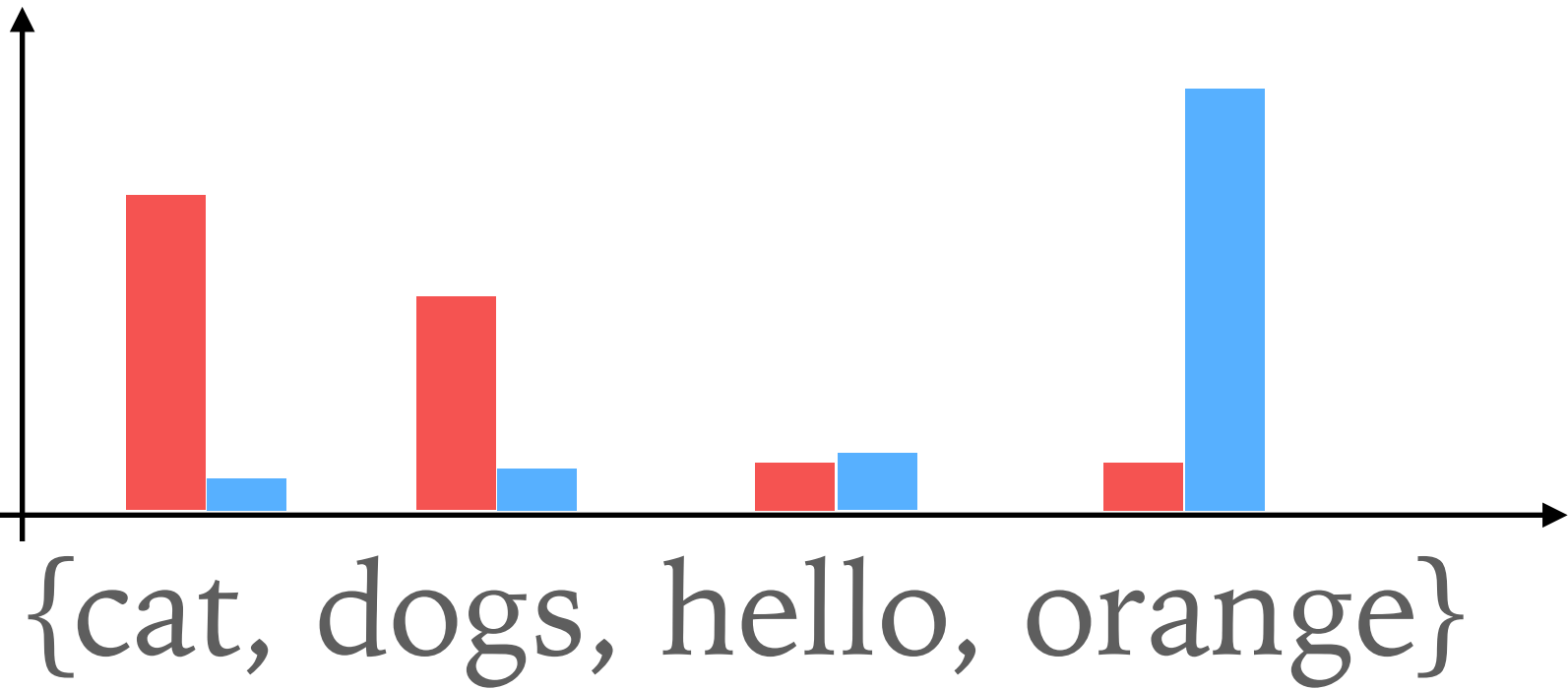
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Corpus



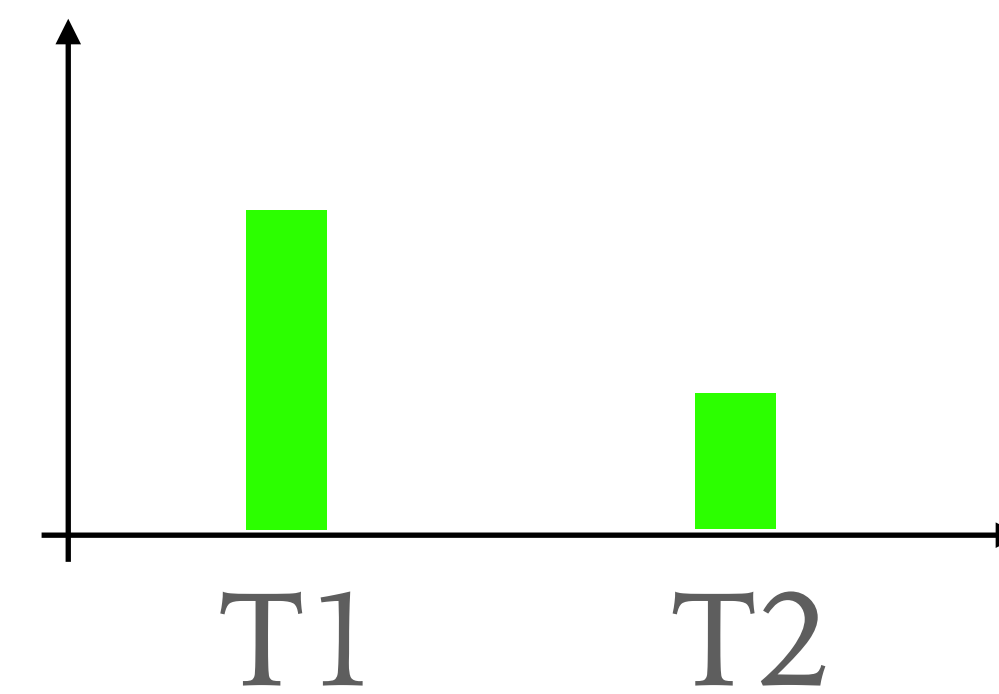
T1 T2



V = {cat, dogs, hello, orange}

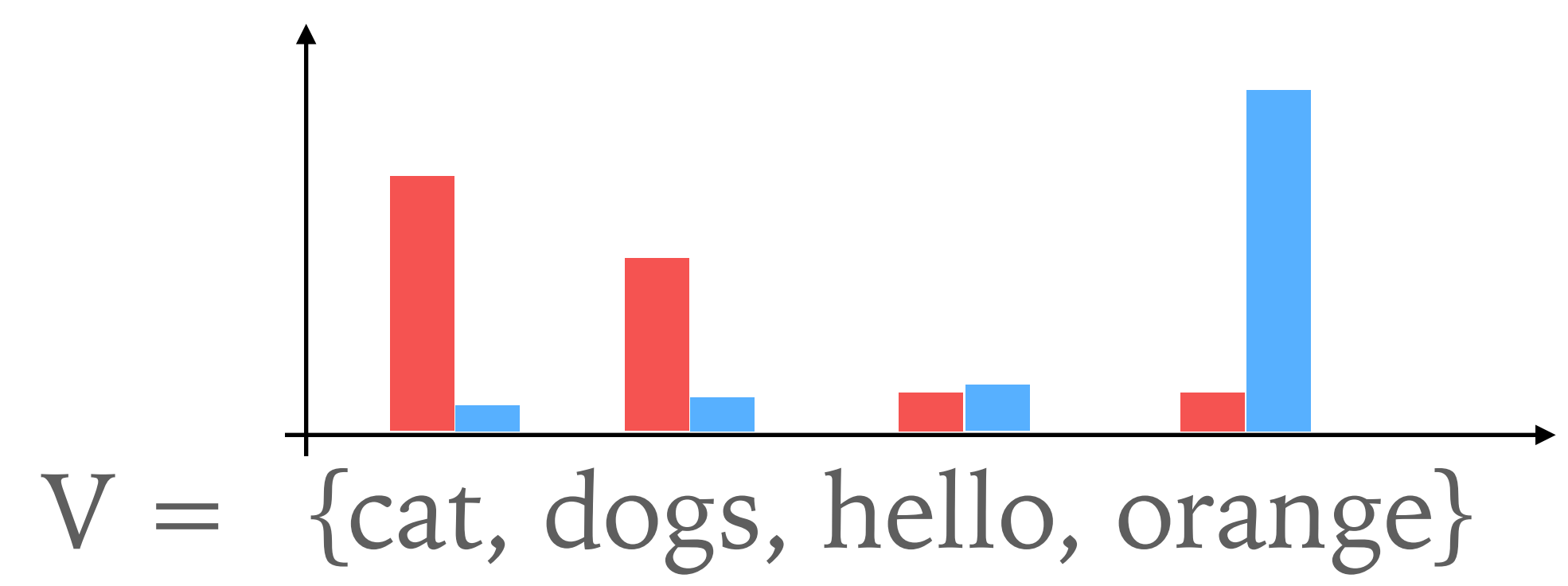
$w_1, w_2, w_3 \cdot w_4$

Corpus



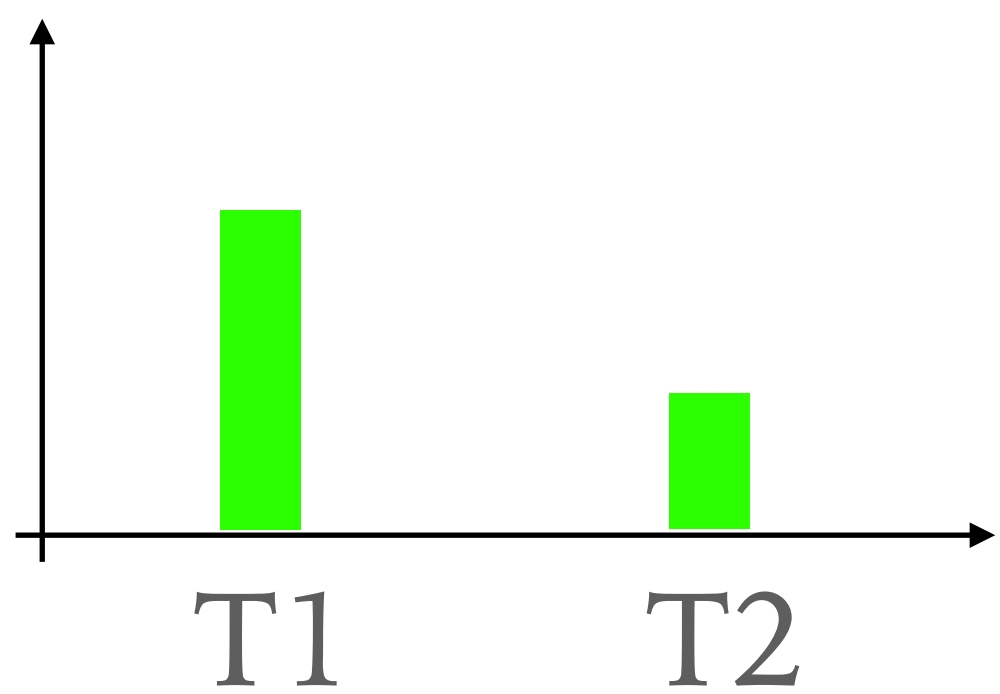
T1

T2



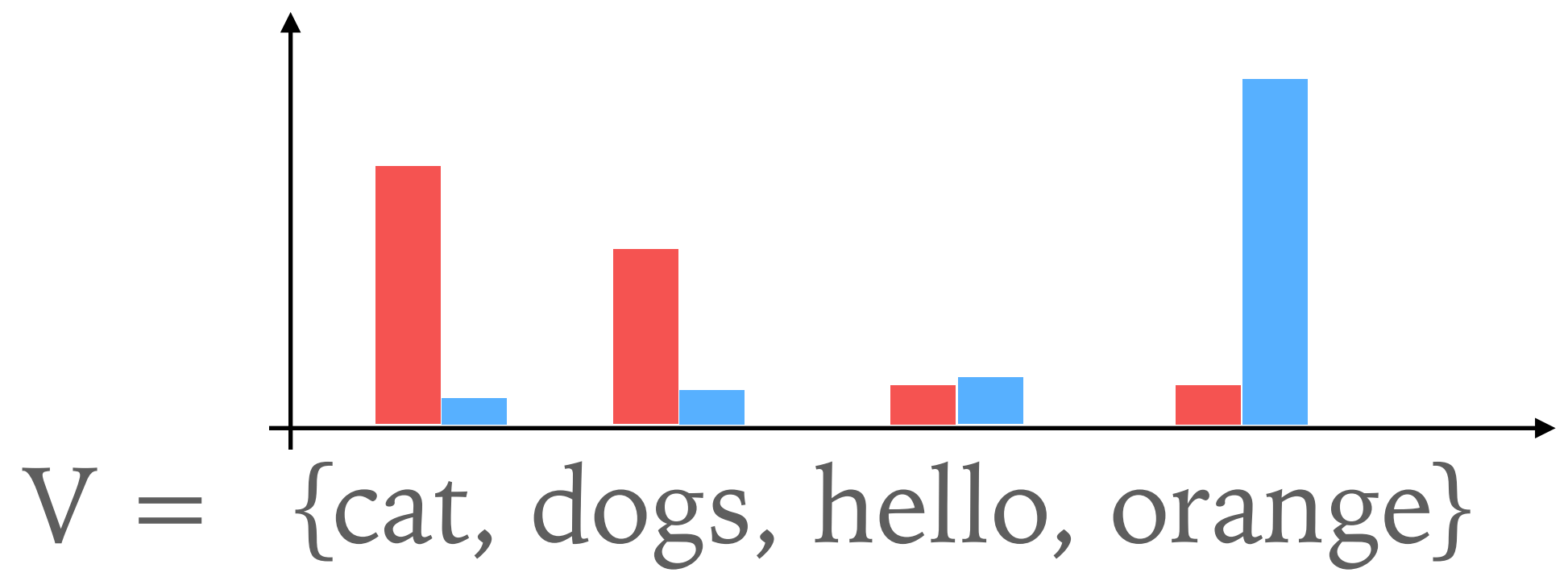
$w_1, w_2, w_3 \cdot w_4$

Corpus



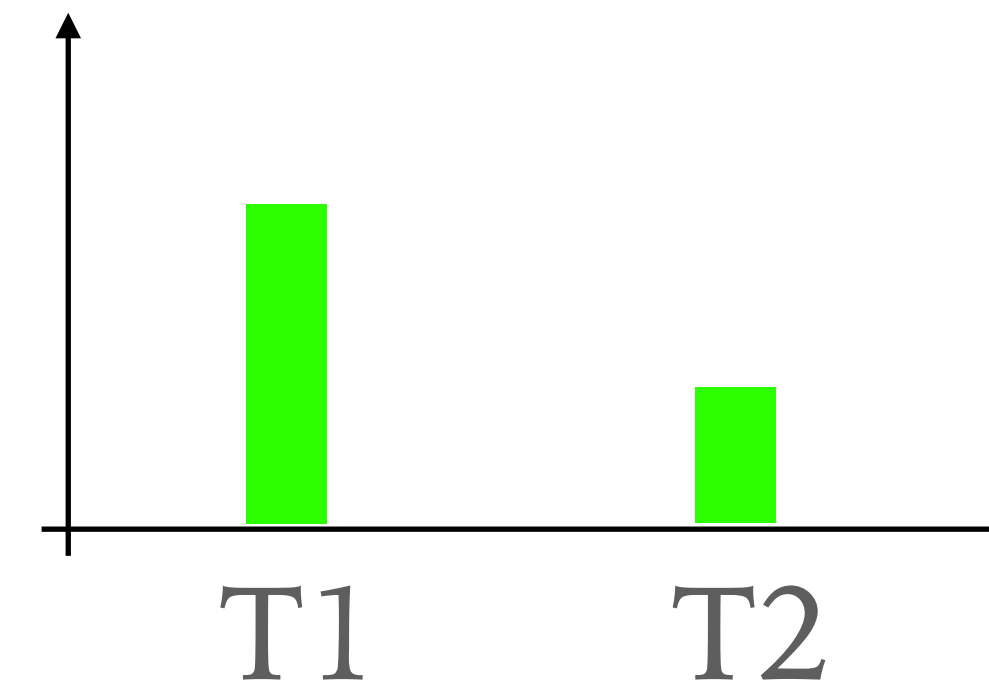
❖ Choose the topic T of the first word

T1 T2



$w_1, w_2, w_3 \cdot w_4$

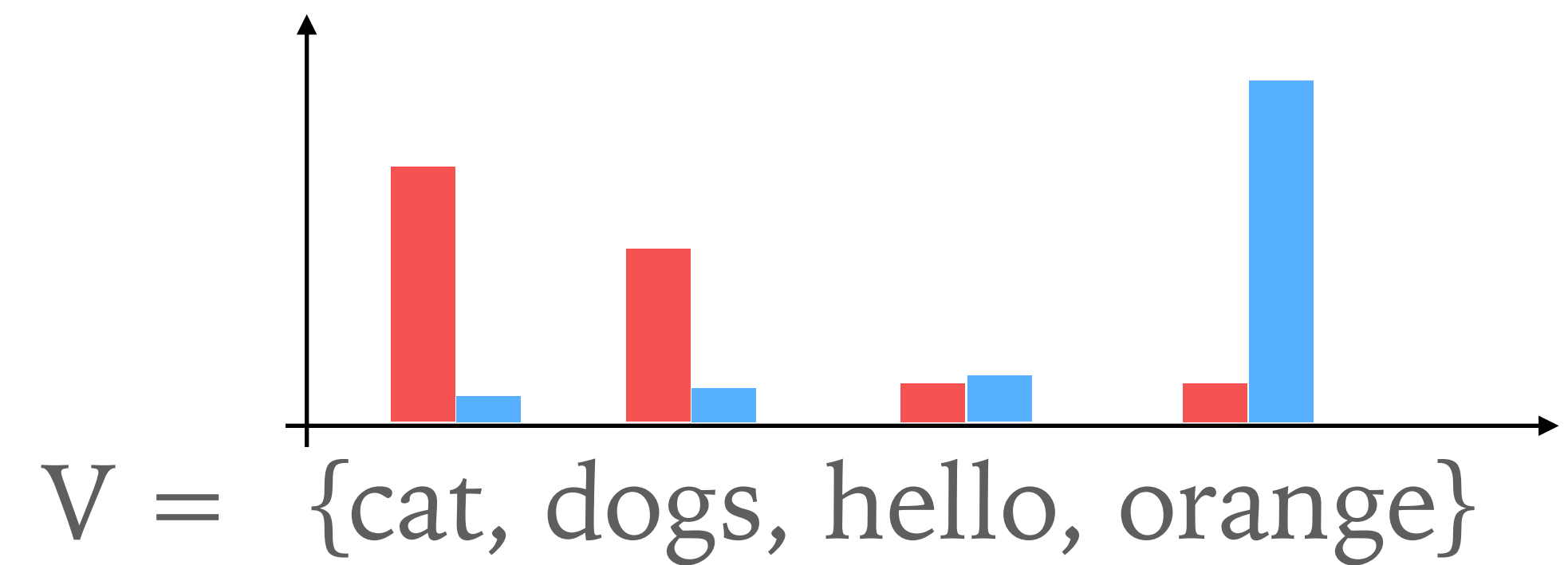
Corpus



- ❖ Choose the topic  $T$  of the first word
- ❖ Given the topic  $T$ , choose a word  $w_1$

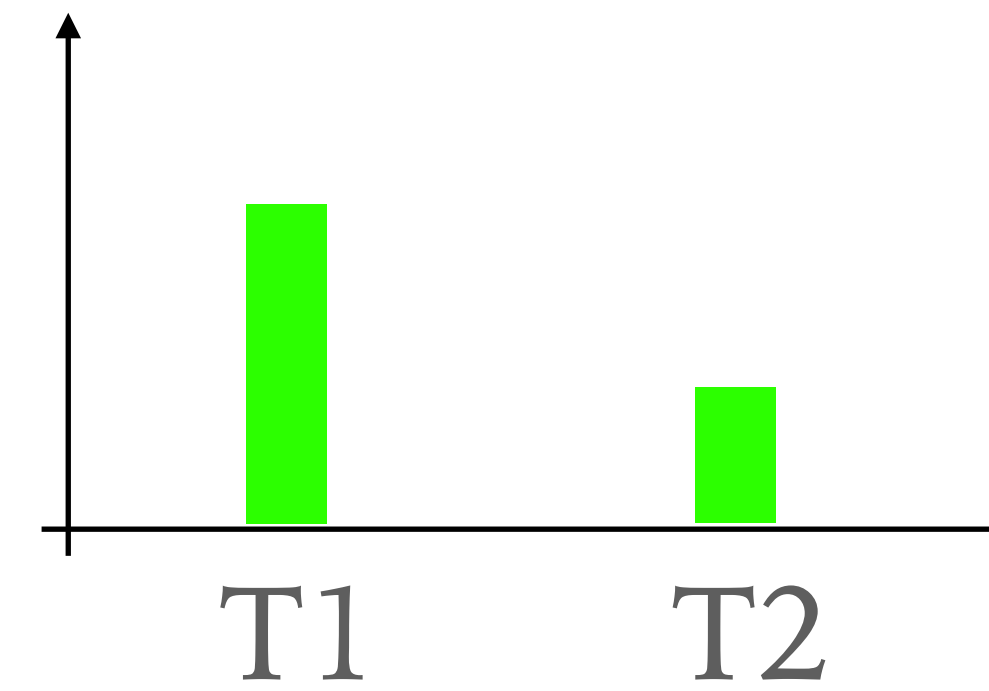
T1

T2



$w_1, w_2, w_3 \cdot w_4$

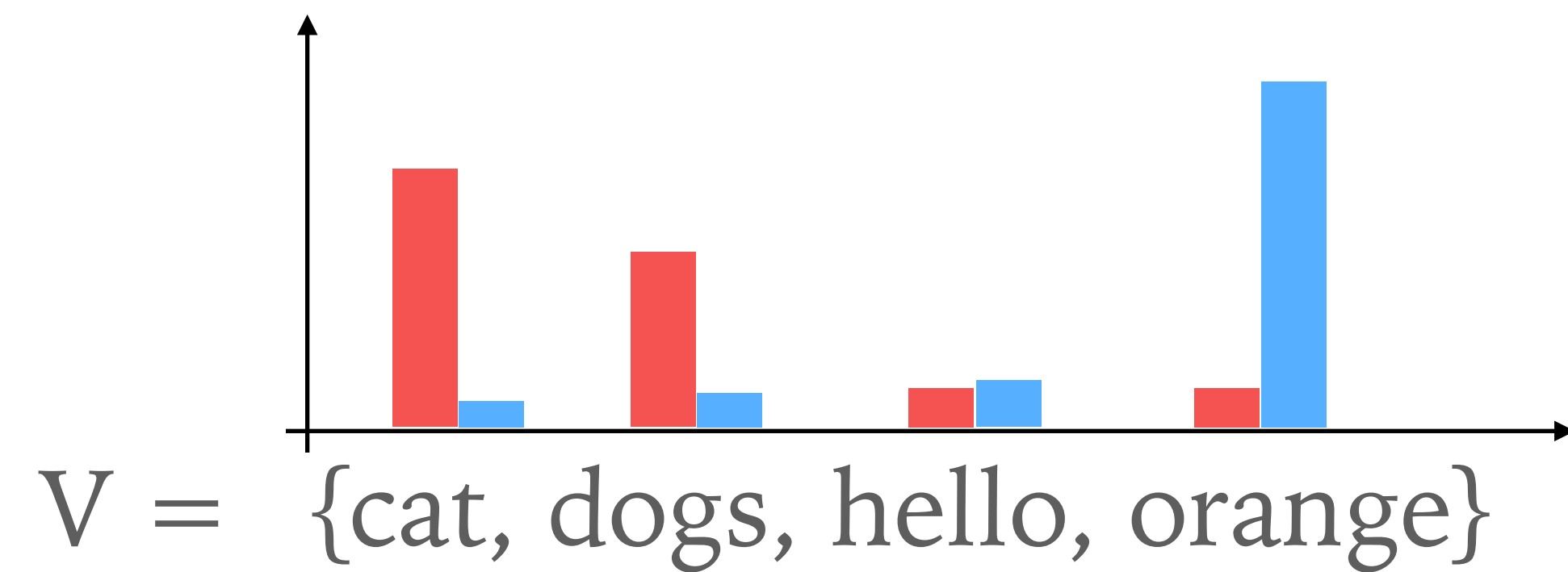
Corpus



- ❖ Choose the topic  $T$  of the first word
- ❖ Given the topic  $T$ , choose a word  $w_1$
- ❖ Repeat for all the words

T1

T2



# **TINNITUS NARRATIVES ON SOCIAL MEDIA**



C1 - 6.3%	C2 - 4.6%	C3 - 5.3%	C4 - 9%	C5 - 9%	C6 - 3.9%	C7 - 6.8%	C8 - 4.4%
life live feel thing deal learn time depress habitu accept part mind point ignor cope abl hard posit	wa year didnt thought start becaus time sinc befor back made wasnt felt rememb couldnt told ago point realli end	day month week time start back ago everi year notic hour stop coupl spike onli happen befor onc	ear left jaw infect pressur pain feel caus tmj wax neck ring full pop tube remov teeth muscl side sinus	loud music ear headphon earplug volum listen wear plug protect concert db level nois play club damag	ive ring ha notic sinc anyon alway ani louder veri realli long els time recent feel onli loud happen heard	nois sleep night tri work mask white play quiet sound room fan listen focus silenc background bed put video app	caus brain damag case perman problem nerv relat possibl sever hyperacusis issu hair condit trauma due
C9 - 5.2%	C10 -8%	C11 - 4.4%	C12 - 5.5%	C13 - 6.7%	C14 - 4.8%	C15 - 8.5%	C16 - 7.6%
sound high pitch sometim head veri tone mine frequenc low chang differ turn someth doe constant louder lower volum usual	cure work treatment research studi therapi effect ha trial devic result drug clinic interest money patient current inform base	peopl dont becaus lot mani thing someth whi talk person everyon problem reason differ isnt	make tri thing wors stress lot anxieti work le doe drink bodi chang good reduc eat medit mind exercis alcohol	doctor ent ani medic check effect caus side anyth possibl symptom told recommend noth issu wait suggest	hear loss test onli normal ani audiologist veri aid frequenc abl year fine deaf khz rang probabl	dont realli wors bad make becaus yeah doesnt fuck mine pretti care worri feel shit bother probabl wont anymor honest	hope good read give post tri ill find advic sorri luck pleas great ani question mayb comment guy answer edit



## Causes

- ◆ TMJ
- ◆ Brain Damage
- ◆ Hear Loss
- ◆ Loud Music

Life's Impact

- ◆ Sleep Issues
- ◆ Depression

Causes

- ◆ TMJ
- ◆ Brain Damage
- ◆ Hear Loss
- ◆ Loud Music

Cure and Coping

Life's Impact

Causes

- ✦ State of Research
- ✦ Stress Management
- ✦ Interactions with Doctors

- ✦ Sleep Issues
- ✦ Depression

- ✦ TMJ
- ✦ Brain Damage
- ✦ Hear Loss
- ✦ Loud Music

Peer Support

- ◆ Experience Sharing
- ◆ Support System
- ◆ Hope
- ◆ Complaints

Cure and Coping

- ◆ State of Research
- ◆ Stress Management
- ◆ Interactions with Doctors

Life's Impact

- ◆ Sleep Issues
- ◆ Depression

Causes

- ◆ TMJ
- ◆ Brain Damage
- ◆ Hear Loss
- ◆ Loud Music

Time Perception

- ✦ Tinnitus Chronology
- ✦ Ever lasting Tinnitus

Peer Support

- ✦ Experience Sharing
- ✦ Support System
- ✦ Hope
- ✦ Complaints

Cure and Coping

- ✦ State of Research
- ✦ Stress Management
- ✦ Interactions with Doctors

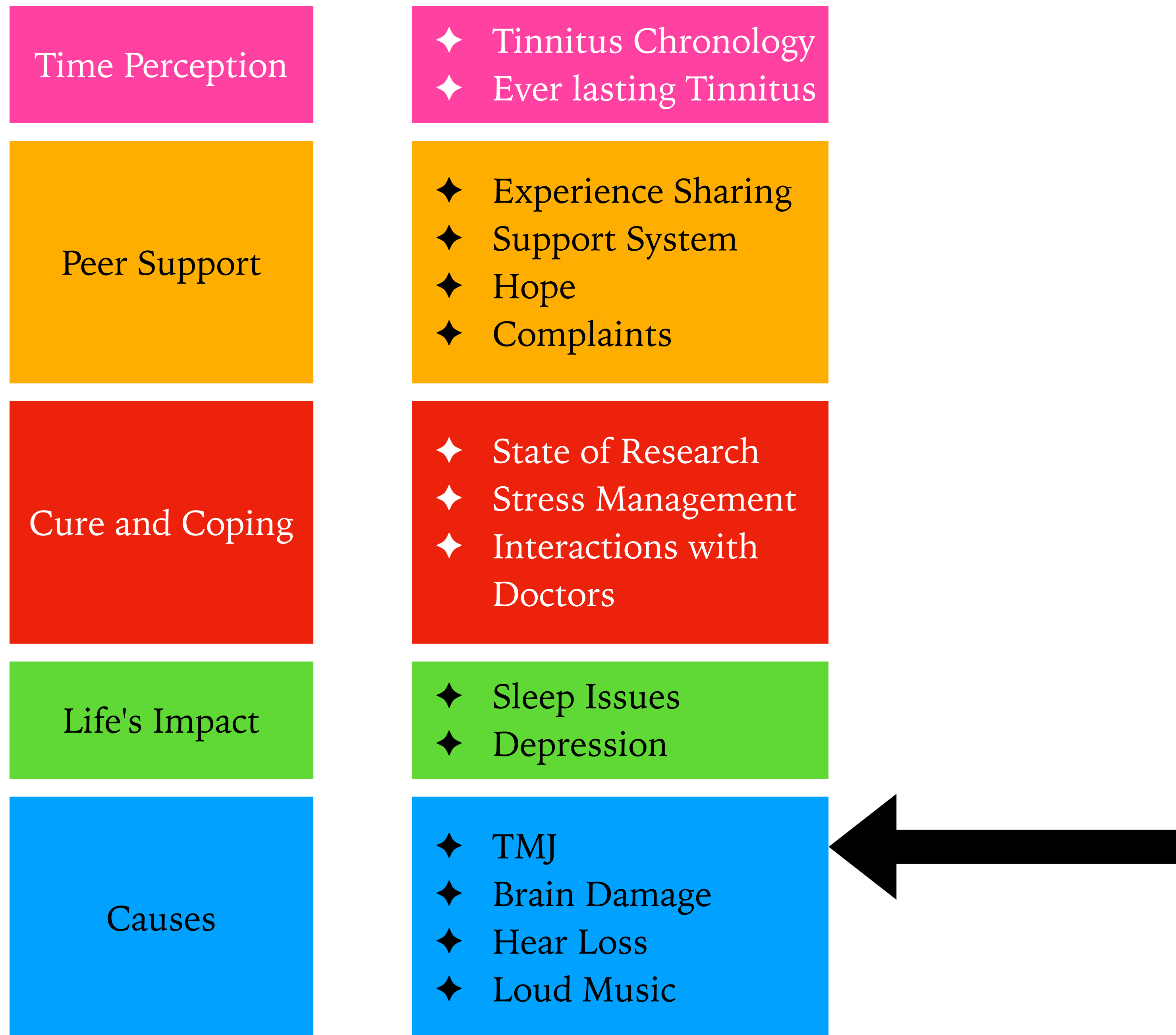
Life's Impact

- ✦ Sleep Issues
- ✦ Depression

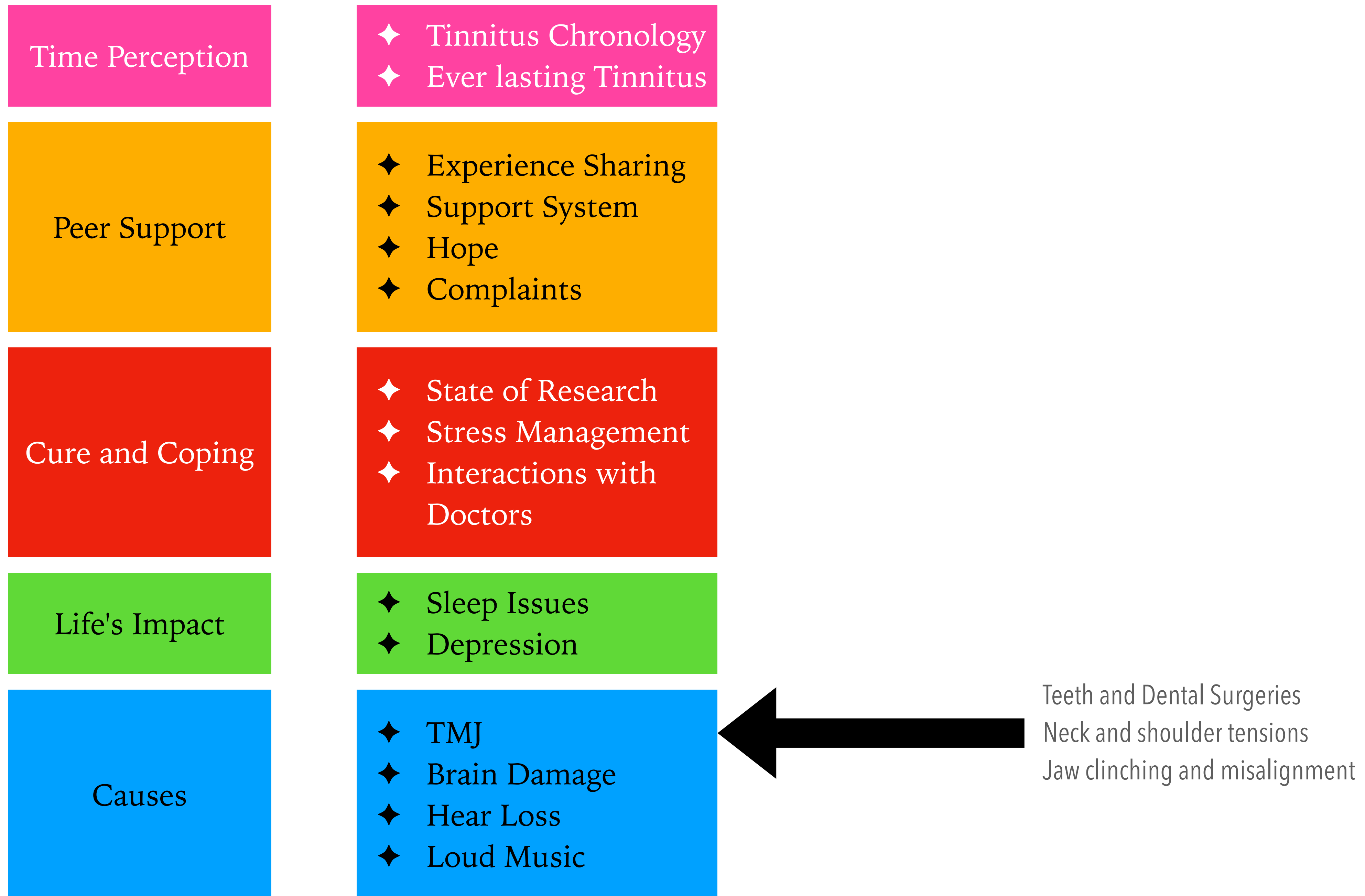
Causes

- ✦ TMJ
- ✦ Brain Damage
- ✦ Hear Loss
- ✦ Loud Music









Time Perception

- ✦ Tinnitus Chronology
- ✦ Ever lasting Tinnitus

Peer Support

- ✦ Experience Sharing
- ✦ Support System
- ✦ Hope
- ✦ Complaints

Cure and Coping

- ✦ State of Research
- ✦ Stress Management
- ✦ Interactions with Doctors



Life's Impact

- ✦ Sleep Issues
- ✦ Depression

Causes

- ✦ TMJ
- ✦ Brain Damage
- ✦ Hear Loss
- ✦ Loud Music

Teeth and Dental Surgeries  
Neck and shoulder tensions  
Jaw clenching and misalignment

Time Perception

- ✦ Tinnitus Chronology
- ✦ Ever lasting Tinnitus

Peer Support

- ◆ Experience Sharing
- ◆ Support System
- ◆ Hope
- ◆ Complaints

Cure and Coping

- ✦ State of Research
- ✦ Stress Management
- ✦ Interactions with Doctors

Life's Impact

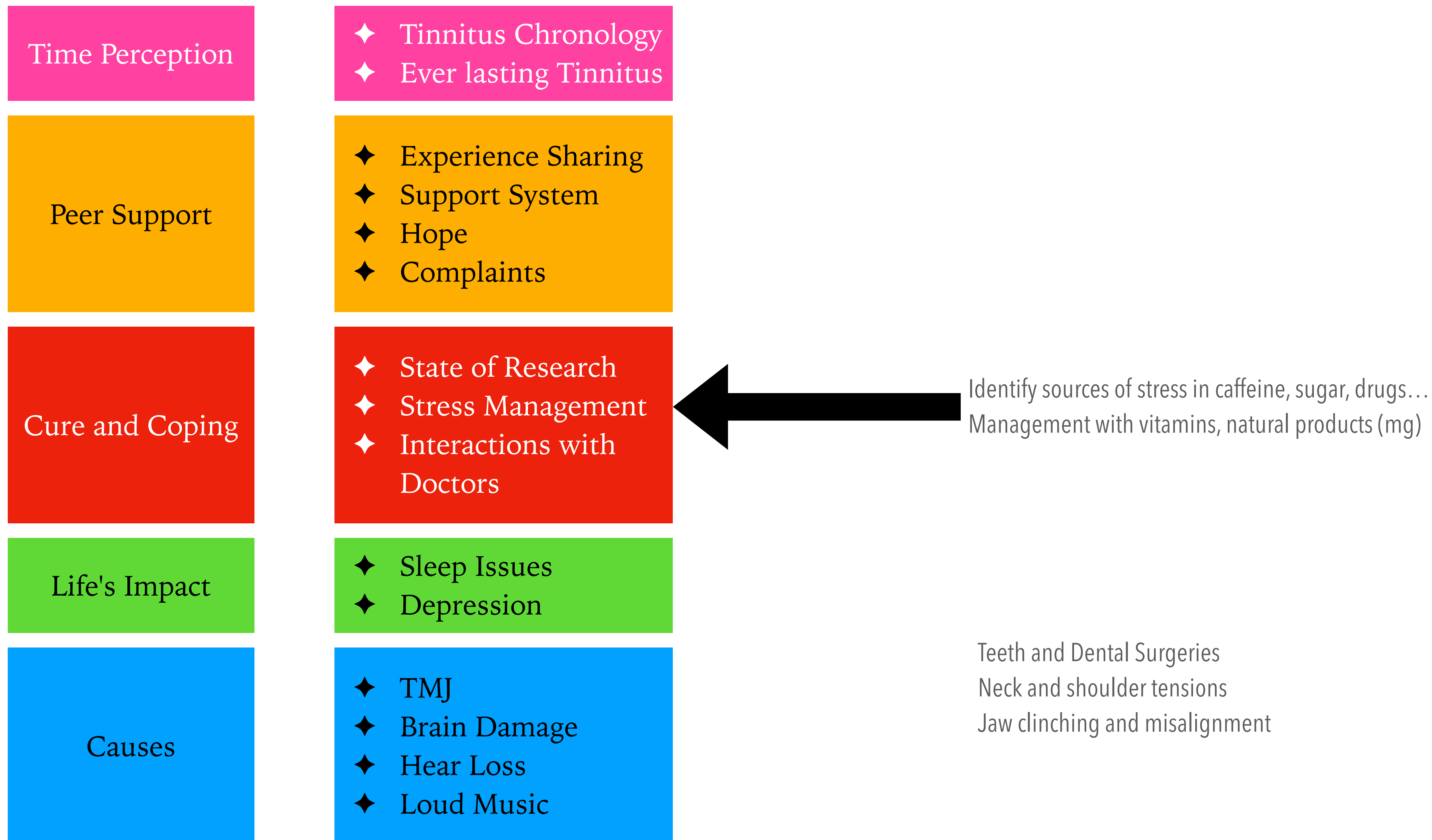
- ◆ Sleep Issues
- ◆ Depression

Causes

- ◆ TMJ
- ◆ Brain Damage
- ◆ Hear Loss
- ◆ Loud Music



Teeth and Dental Surgeries  
Neck and shoulder tensions  
Jaw clenching and misalignment



Time Perception

- ✦ Tinnitus Chronology
- ✦ Ever lasting Tinnitus

Peer Support

- ✦ Experience Sharing
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Cure and Coping

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- ✦ Stress Management
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Life's Impact

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- ✦ Depression

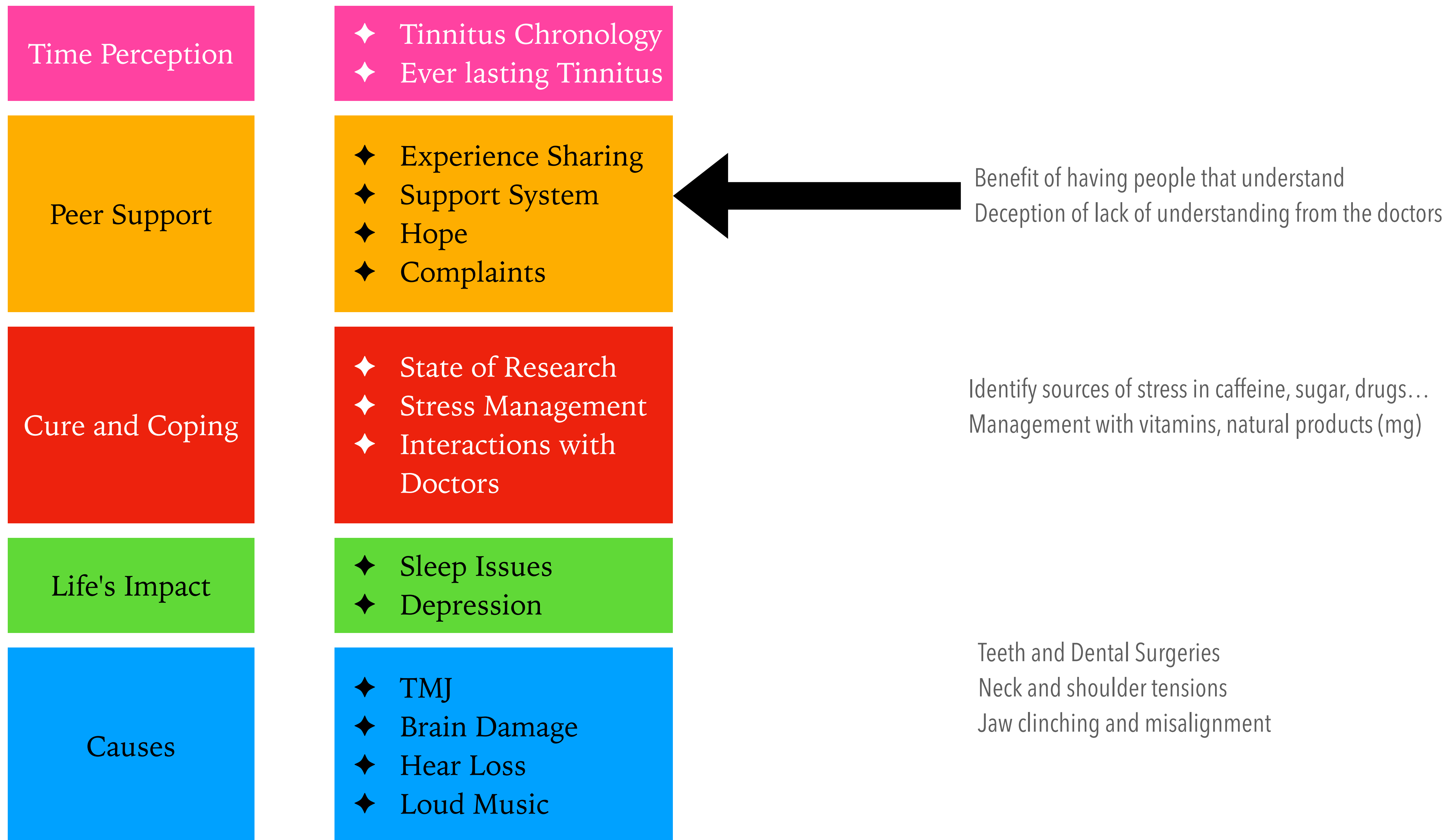
Causes

- ✦ TMJ
- ✦ Brain Damage
- ✦ Hear Loss
- ✦ Loud Music



Identify sources of stress in caffeine, sugar, drugs...  
Management with vitamins, natural products (mg)

Teeth and Dental Surgeries  
Neck and shoulder tensions  
Jaw clenching and misalignment



**FURTHER RESEARCH**

# TOPIC DYNAMICS

.....



# TOPIC DYNAMICS

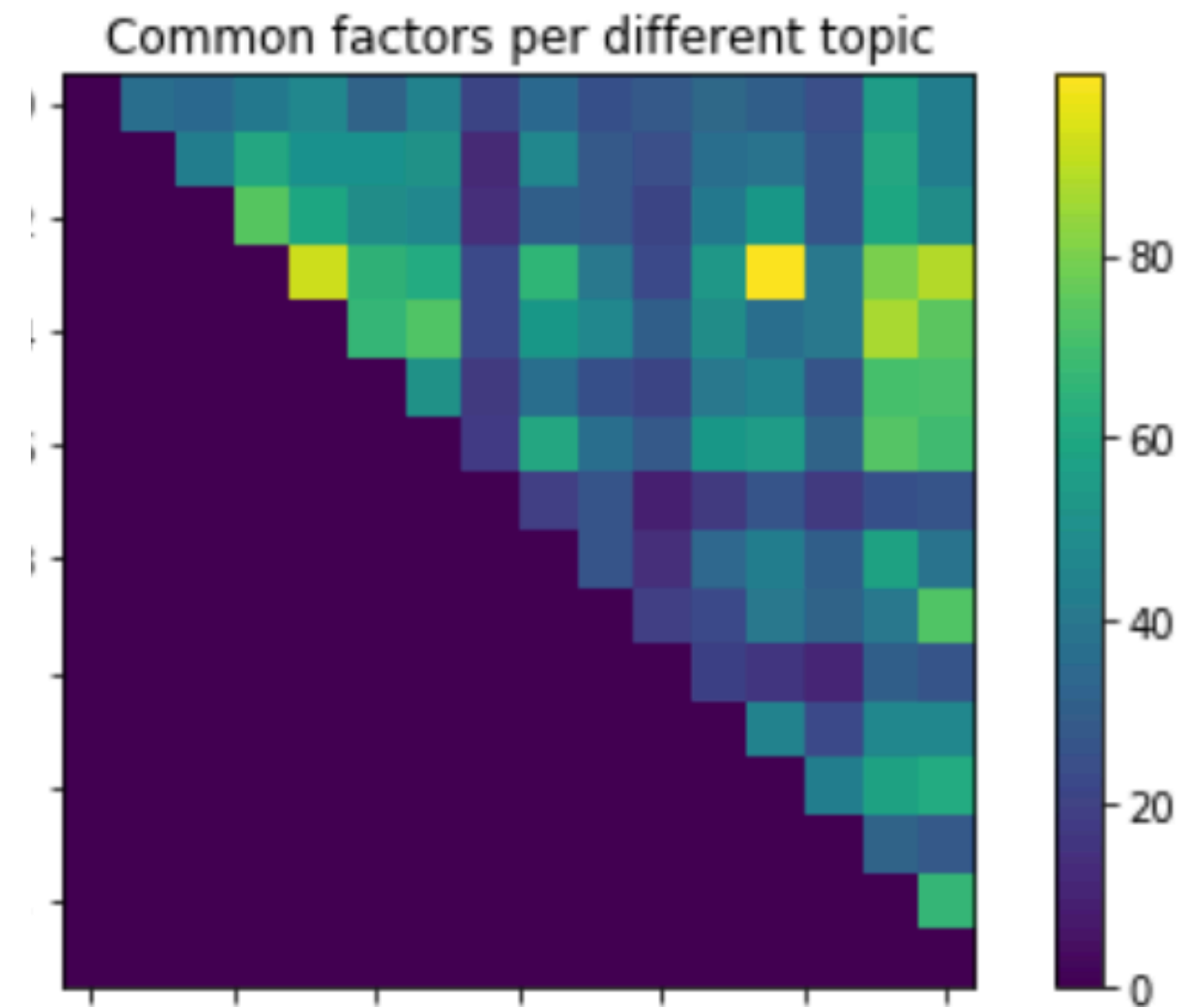
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- Leverage the users dynamics to quantify cooccurrence of topics

# TOPIC DYNAMICS

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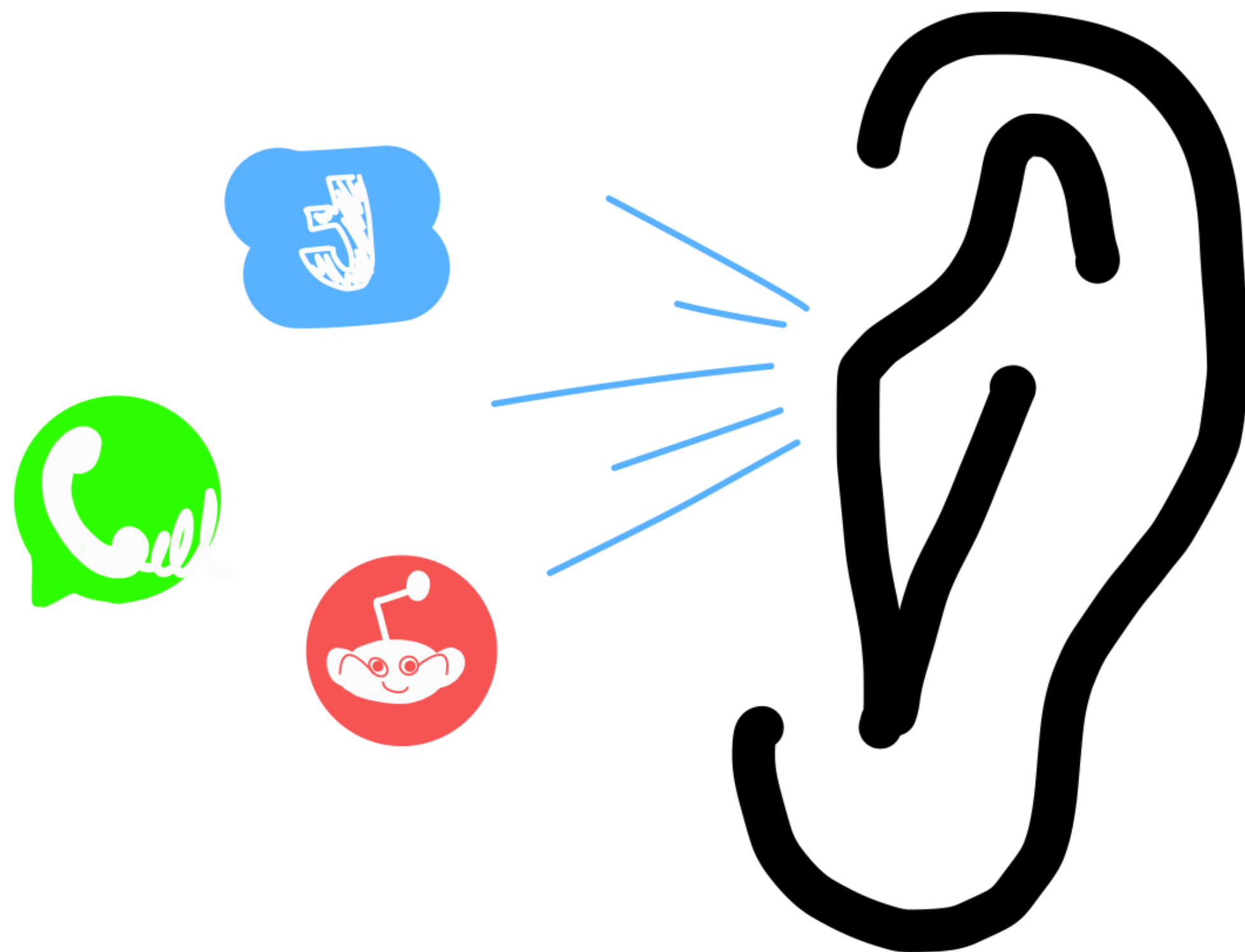
- Leverage the users dynamics to quantify cooccurrence of topics



## CONCLUSION

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- ❖ Tinnitus online data can be a **complementary** way to interact with the patients symptoms, provided that the large amount data can be **digested** comprehensively
- ❖ There is a lot of room for further **collaboration** with therapists and practitioners to make the most from these analyses



# THANK YOU!

*Virtual Conference on Computational Audiology  
June 25, 2021*

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Massachusetts Institute of Technology*