

How to Give a Good (Research) Talk

Alexandra Silva

Before we start...

DISCLAIMER

Why should we care?

Twelve Tips on Writing a Good Scientific Paper

John A. Eleftheriades, M.D., F.I.C.A.

Department of Cardiothoracic Surgery, Yale University School of Medicine, New Haven, Connecticut

It is an indication of Dr. Chang's wisdom and experience in academic matters that he should commission an article on the technique of writing a good scientific paper. There are many pitfalls to which the new or occasional writer is prone. Also, the manner of presentation can make a great deal of difference as to how favorably research information is received by editors and can impact the usefulness of the paper to readers.

The compilation which follows incorporates suggestions which the author hopes will be of use in writing scientific papers. Much of this was taught to the author by his mentors, and much was learned (the hard way) by experience. This list is not meant to be exhaustive, but rather to cover certain important general principles regarding how to present one's research data for scientific publication.

Good Underlying Research Question

1. A good research paper needs to start with a good research question—a question to which the reader wants to know the answer. If the underlying question is not pertinent or interesting or of clinical importance, no one will want to know the answer, and no one will be interested in accepting or reading the resulting paper. At what size does an aneurysmal aorta rupture? How often are infectious pathogens found in atheroma removed at surgery? Does revascularization improve ventricular function in patients with ischemic cardiomyopathy? What is the influence of antecedent pulmonary hypertension on mortality in heart transplantation? Can arteriosclerosis occur in the absence of interferon- γ ? These are all examples of research questions in angiology that produced published papers which proved of interest to readers. Good basic questions that stimulate research—both in the laboratory and the clinic—arise from the investigator's experience and creativity. With-

out such worthy underlying questions, the resulting manuscript will not be of interest to editors, nor will the paper capture readers' attention. Most often, for clinical papers, a well-chosen question will impact substantially on clinical management of real-world patients.

Brevity

2. The paper must be concise. This is often a hard concept for scientific writers just starting out. The new scientific writer is often not accustomed to the brevity of scientific communication, which is very different from other forums. Excess length is not as much an issue for a thesis or for general prose or fiction. But, the scientific reader is hard-pressed for time. For scientific journals, space is at a premium. You must state your concept, methods, results, conclusions, and discussion succinctly, with as few words, Tables, Figures, and References as possible. With experience, you will come to realize just how much can be cut without adversely affecting conveyance of your message. I learned this concept from Dr. Arthur Baue, my former Chairman, who cut a chapter I had written on diaphragm pacing dramatically without curtailing its message whatsoever. Dr. Baue, editor of Glenn's Textbook of Thoracic and Cardiovascular Surgery, taught me just how much of what we put on paper is repetitious or unnecessary to convey our meaning. I learned this concept also from Dr. William Roberts, editor of the American Journal of Cardiology. Dr. Roberts has a reputation for cutting and cutting without detracting in any way from the substance of a report. This is a very important talent for the novice scientific writer to learn.

Abstract Conveys All Critical Information

3. The abstract must convey all the cardinal findings and messages. Please remember that even the an avid reader of your work will read your abstract and at most look at some of your figures, skim your methods and results, and glance at your discussion and con-

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Target audience



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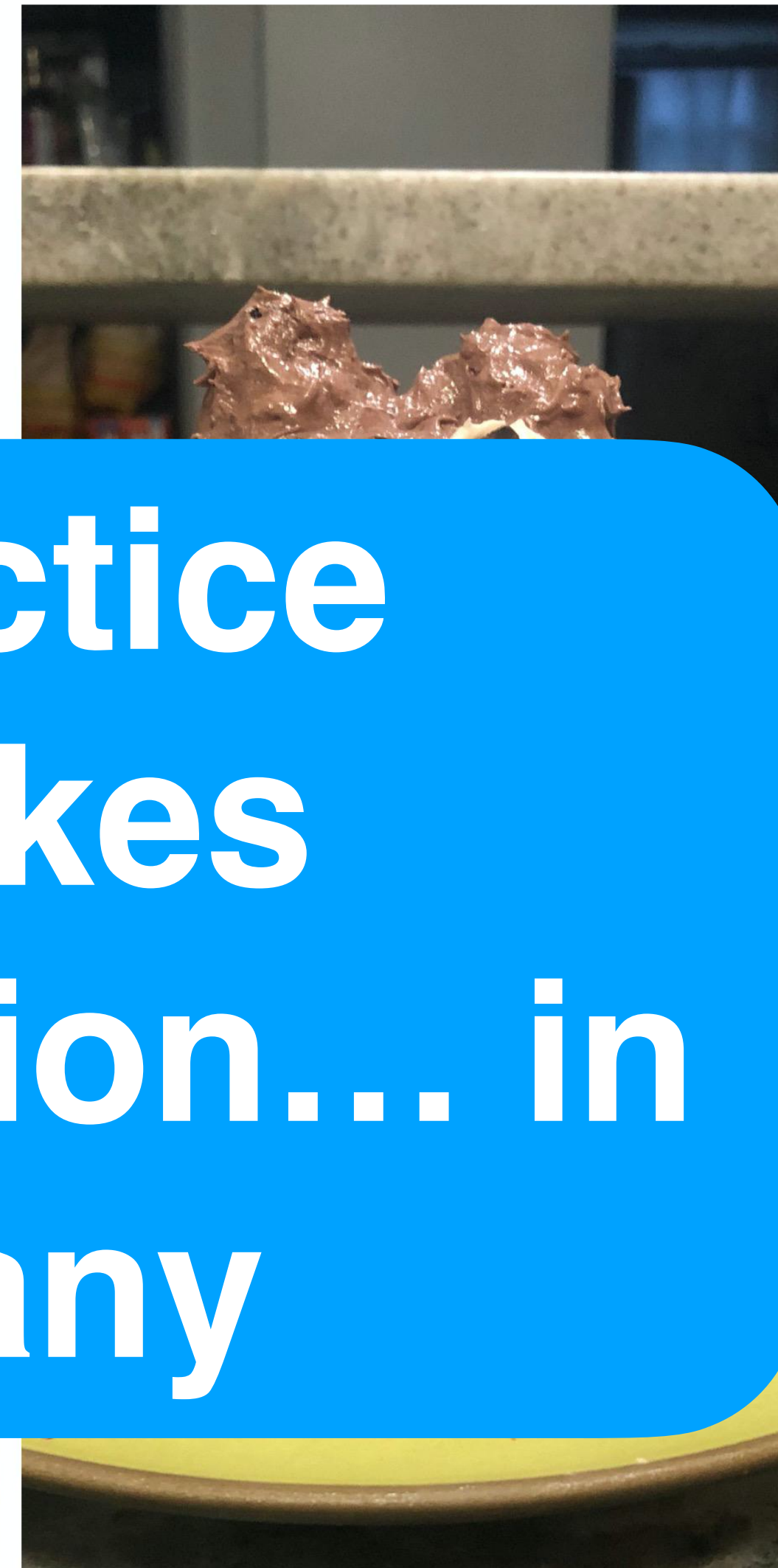
Potentially broader audience



The recipe



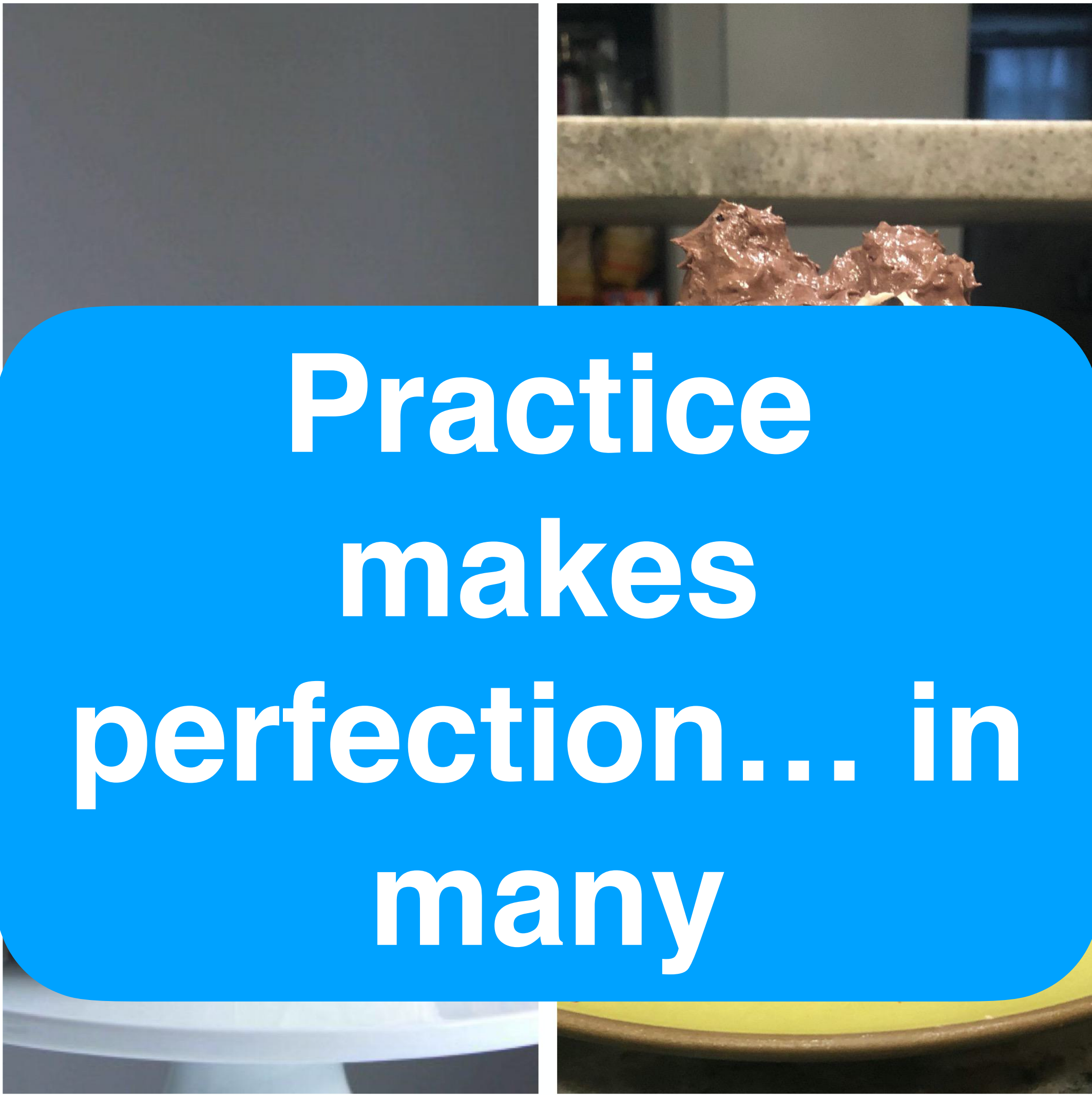
Practice
makes
perfection... in
many



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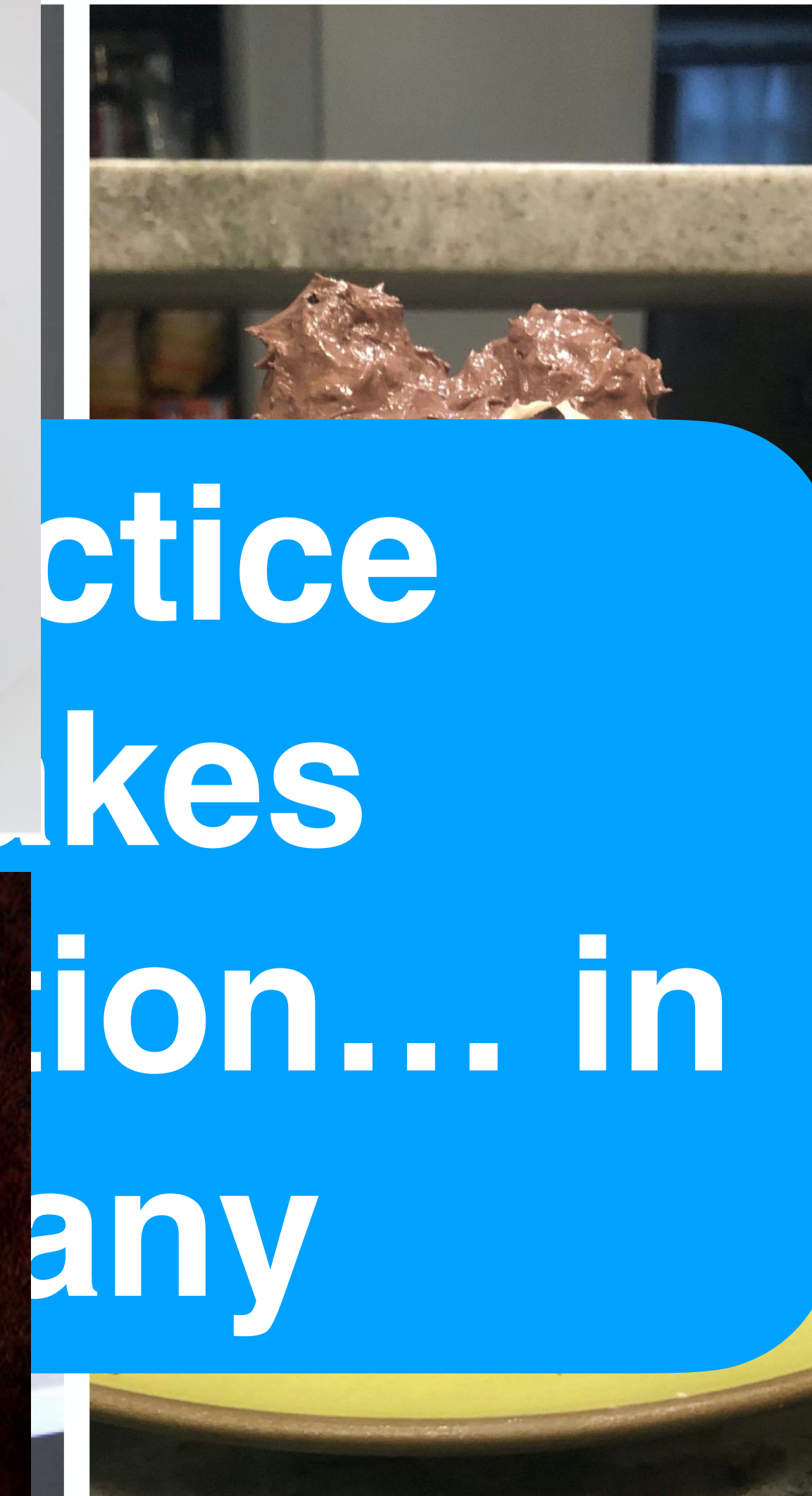
**Different styles
and forms for
same
ingredients!**



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The recipe

Different styles
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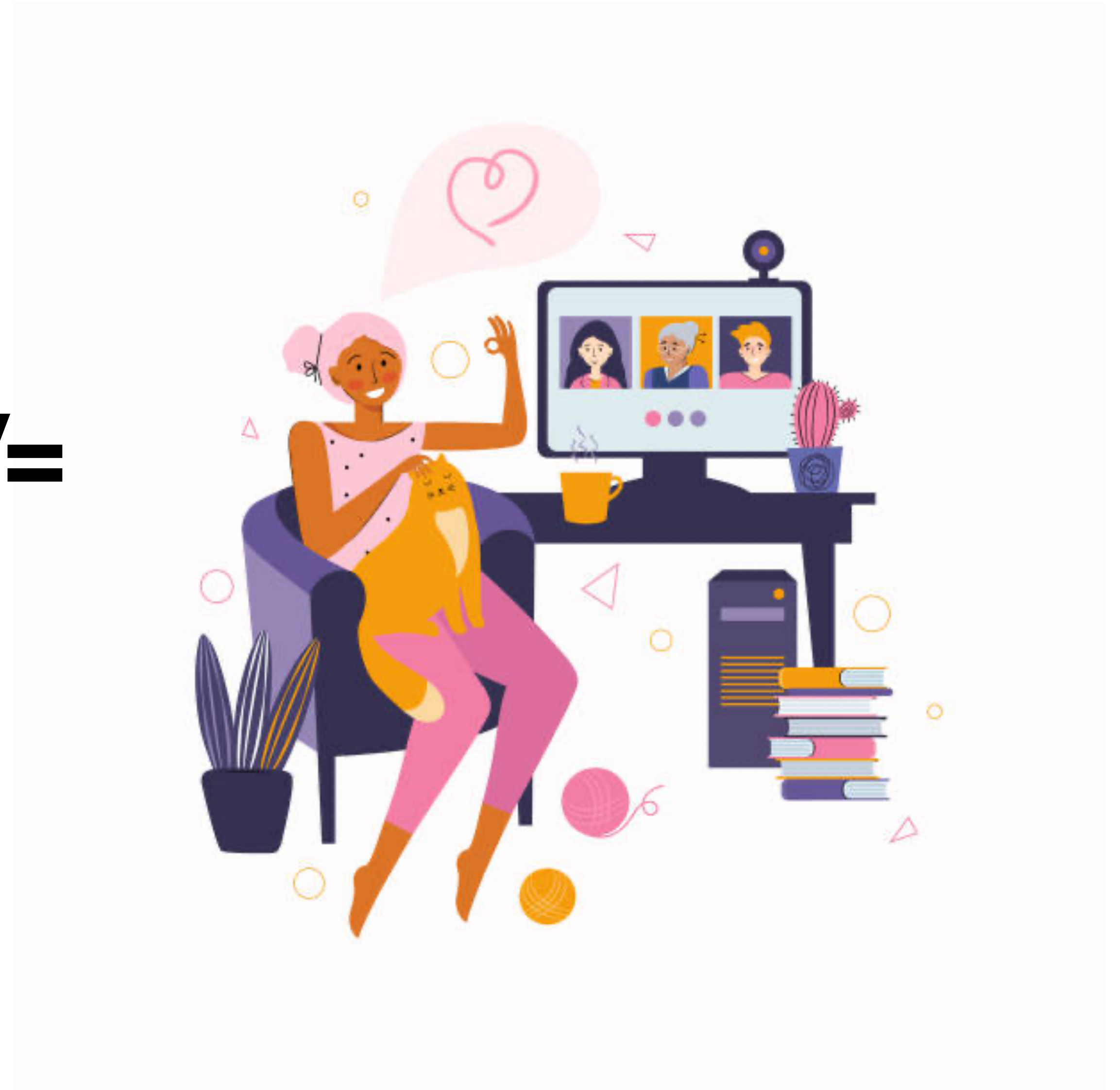
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The ingredients

The ingredients



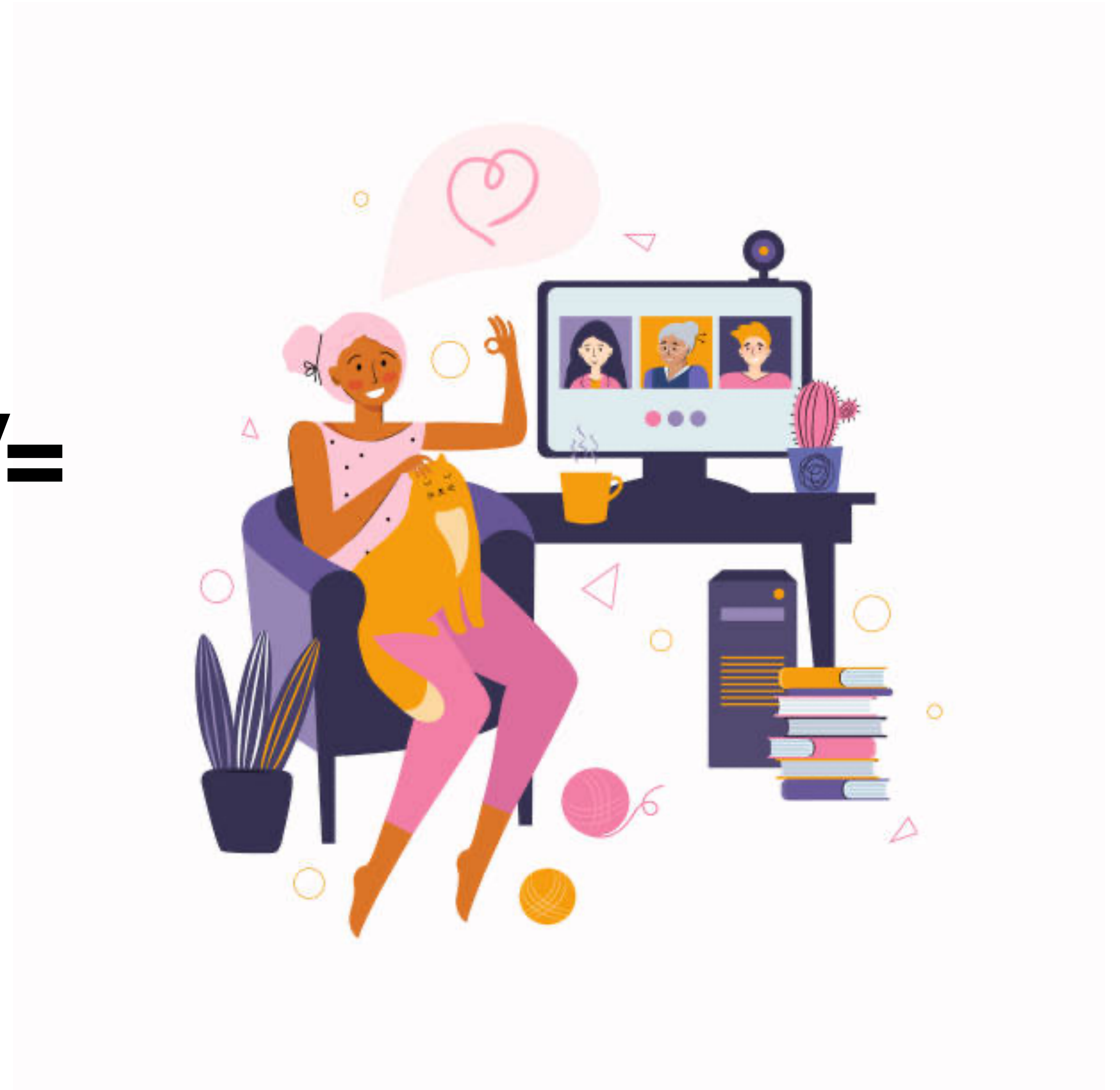
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The ingredients



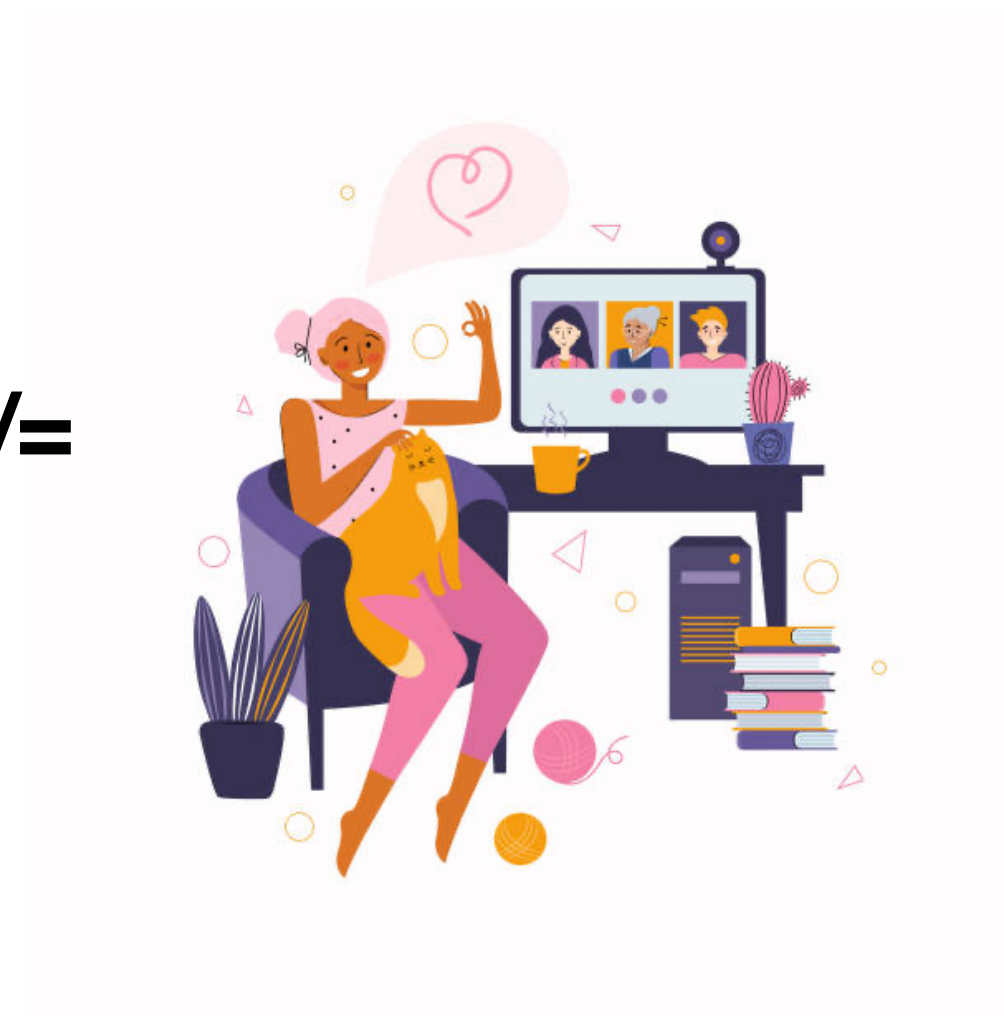
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The ingredients



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The ingredients

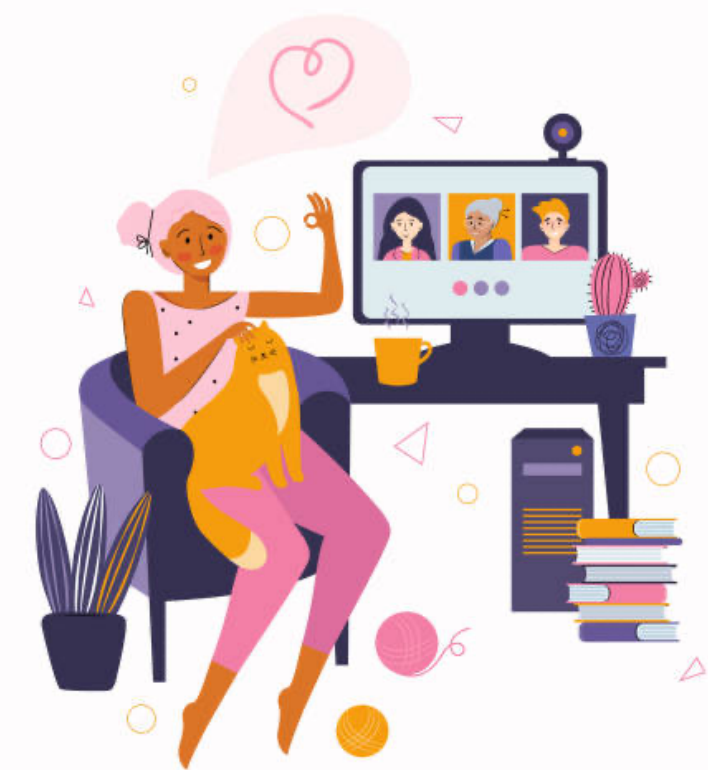
Speaker

Slides

Context



=/=



Speaker

Speaker

**Individual
Style**

Speaker

**Individual
Style**

Engagement

Speaker

**Individual
Style**

Engagement

**Cues
(visual, voice)**

Speaker

**Individual
Style**

Engagement

**Cues
(visual, voice)**

Speaker

How?

**Individual
Style**

Engagement

**Cues
(visual, voice)**

Speaker

How?

**Feedback loop:
Examples,
Practice,
Repeat**

**Individual
Style**

Engagement

**Cues
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Engagement

- **Simon Peyton Jones.** How to give a great research talk. (MSR Summer School, 2016)
 - “Your mission is to **wake them up!**”
 - “Your most potent weapon, by far, is **your enthusiasm!**”
- **John Hughes.** Unaccustomed as I am to public speaking. (PLMW, 2016)
 - “**Put on a show!**”



Slides

What is the goal of your talk?

Slides

What is the goal of your talk?

The slides are not the paper

Slides

What is the goal of your talk?

The slides are **not** the paper

The slides are **not** a summary of paper

Slides

What is the goal of your talk?

The slides are **not** the paper

The slides are **not** a summary of paper

The slides are **not** a speaker prompt

Slides

What is the goal of your conference talk?

Slides

What is the goal of your conference talk?

Advertise your work!

Slides

What is the goal of your conference talk?

Advertise your work!

Little time for details

A talk structure that works

Abstract

Intro

Key ideas

Technical meat

Related work

A talk structure that works

~~Abstract~~

Intro

Key ideas

~~Technical meat~~

~~Related work~~

A talk structure that works

~~Abstract~~

Intro (6 min)

Key ideas (10 min)

~~Technical meat~~

~~Related work~~

What else in the paper (1-2min)

Key ideas

Get to a problem.



Get to the problem.

Key ideas

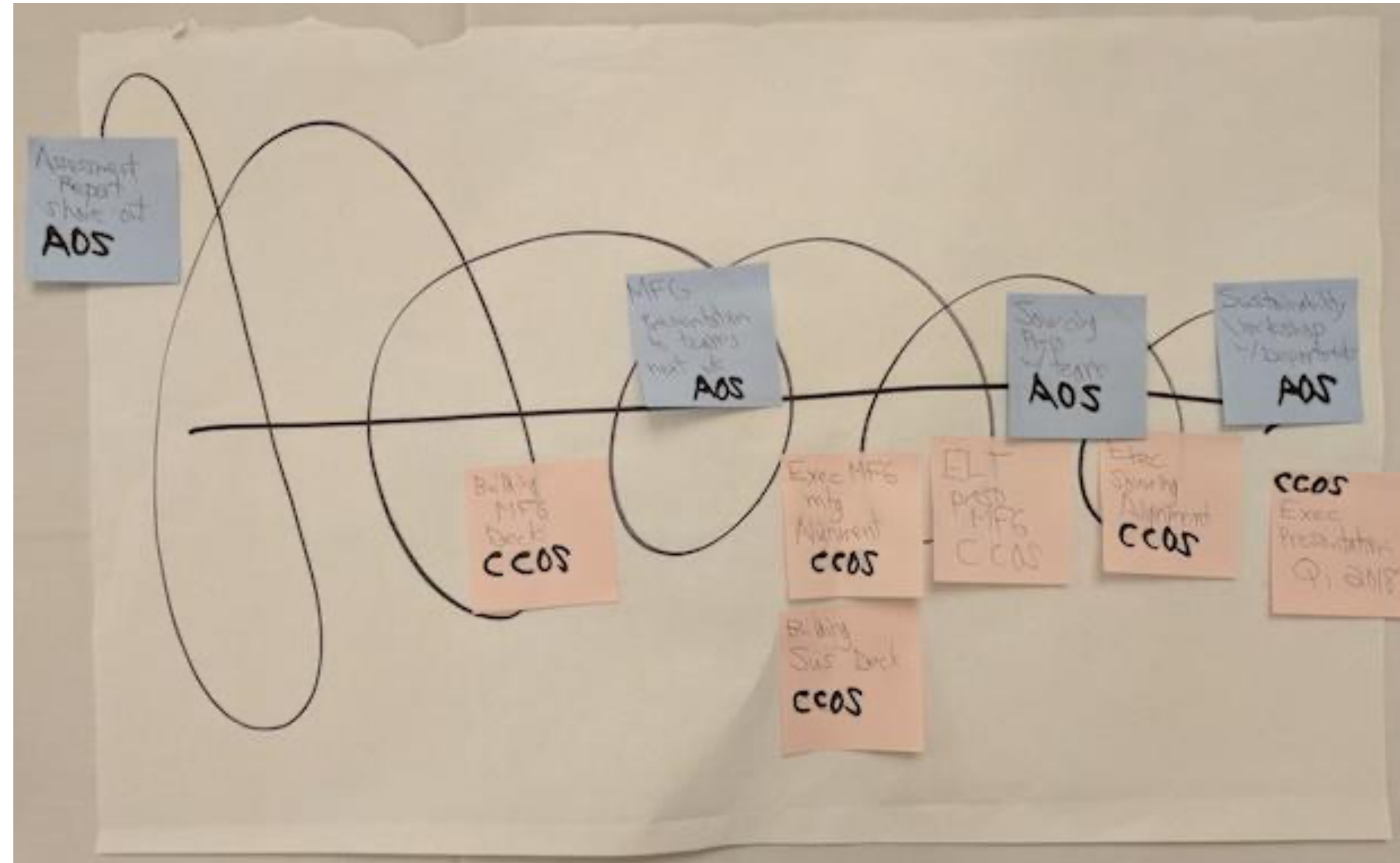
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Get to the problem.

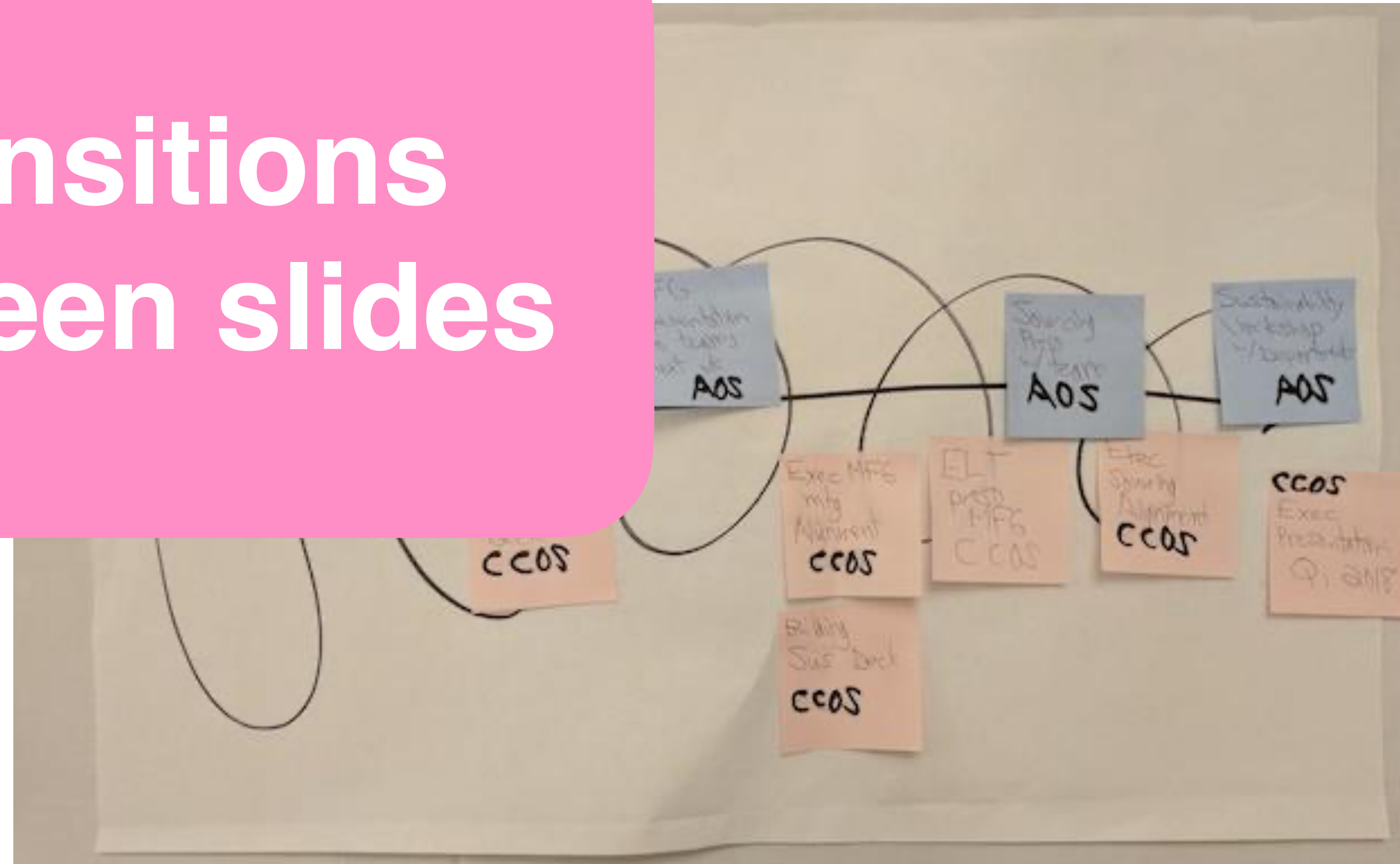
Examples, examples, examples!

Plan the talk



Plan the talk

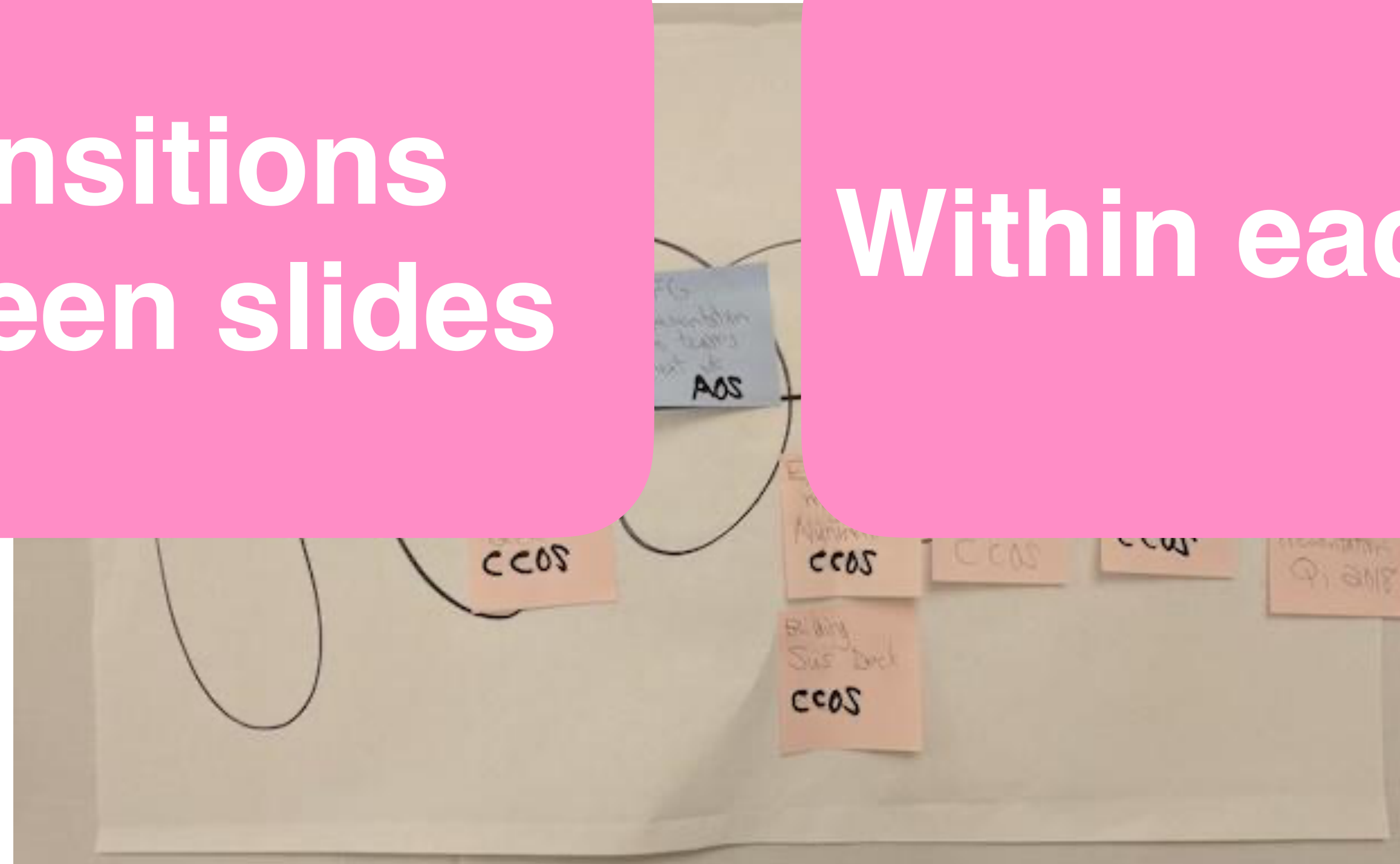
Transitions
between slides



Plan the talk

**Transitions
between slides**

Within each slide

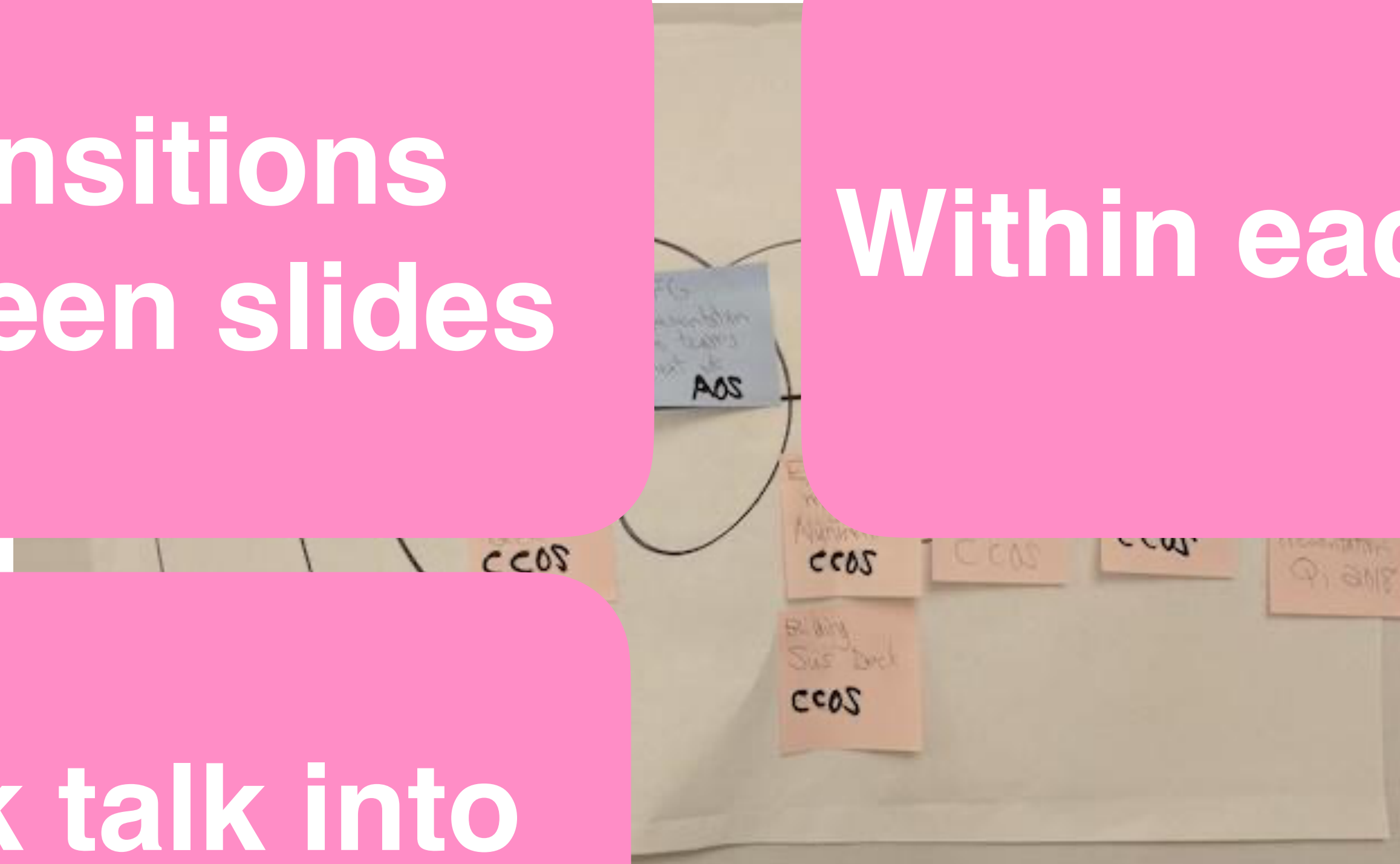


Plan the talk

**Transitions
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Within each slide

**Break talk into
talklets**



Plan the talk

**Transitions
between slides**

Within each slide

**Break talk into
talklets**

**Between
talklets: remind
audience big
picture!**

Plan the talk

Transitions
between slides

Within each slide

**Flow and
Coherence**

Break talk into
talklets

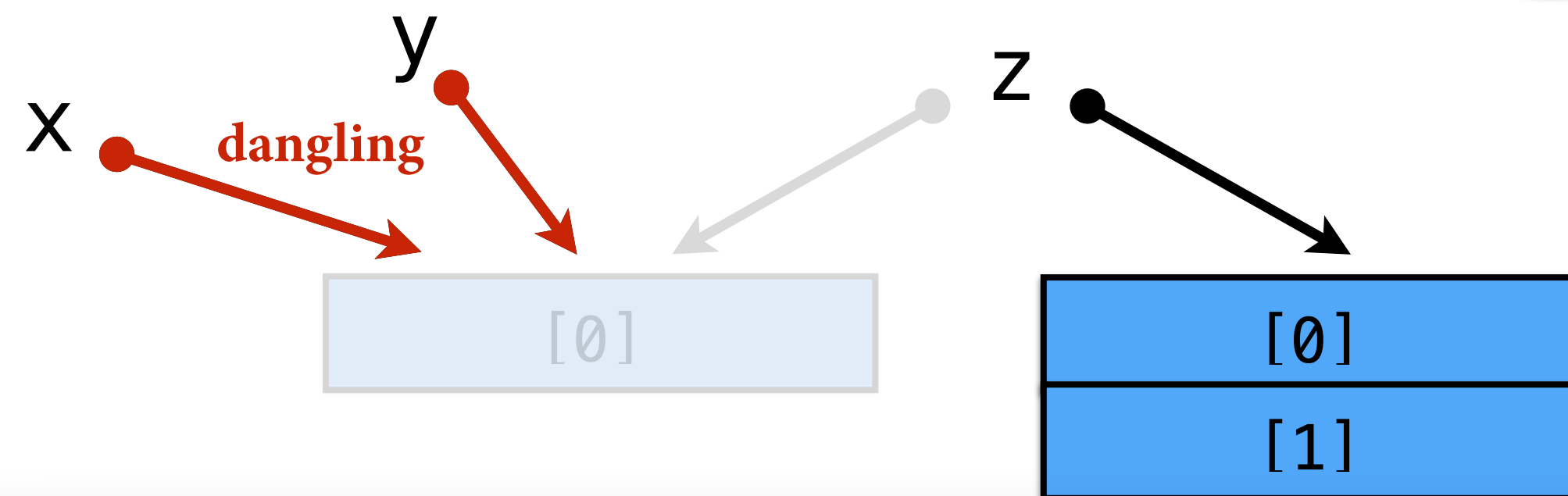
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Slides are a **visual** medium

Core Idea of Rust

Unrestricted mutation and aliasing lead to:

- use-after-free errors (dangling references)
- data races
- iterator invalidation



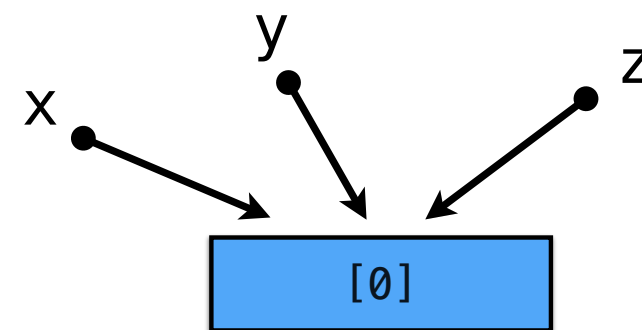
Rust prevents all these errors using
a sophisticated **“ownership” type system**

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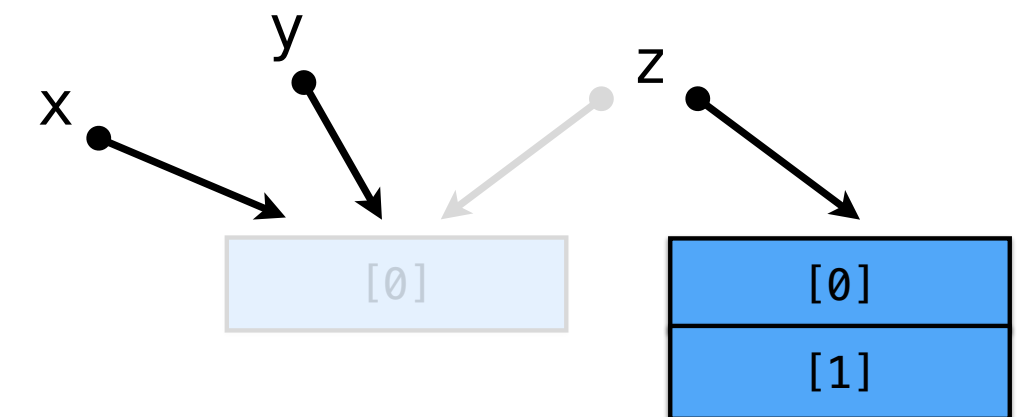
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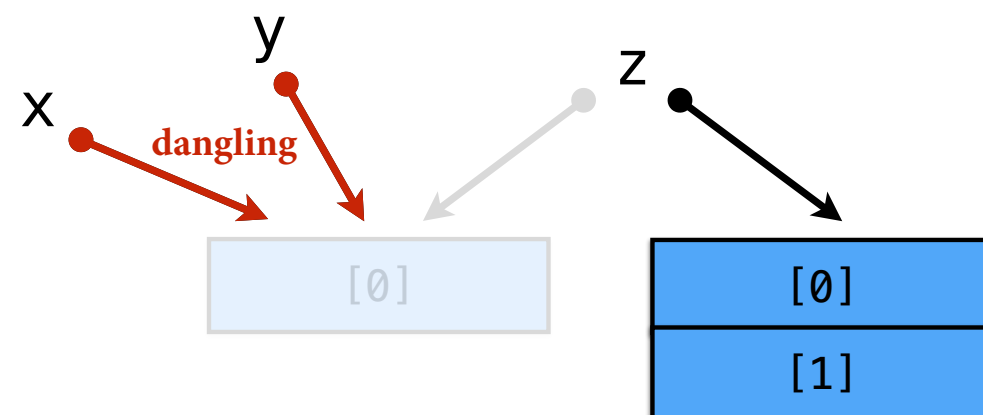
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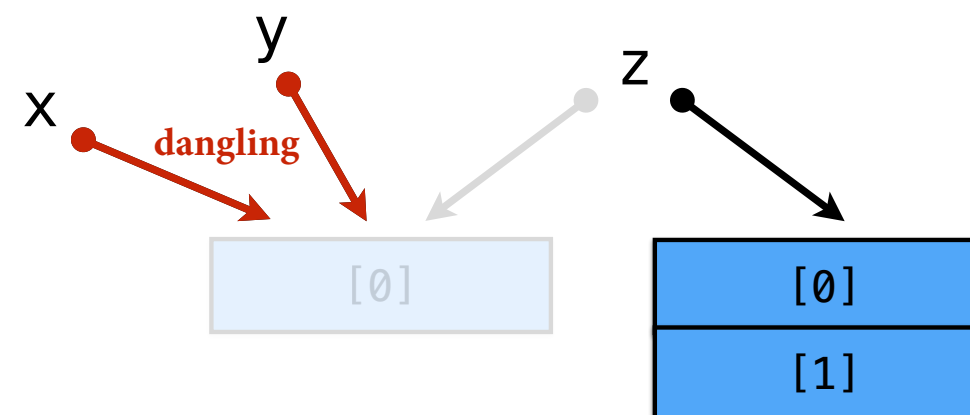
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Core Idea of Rust



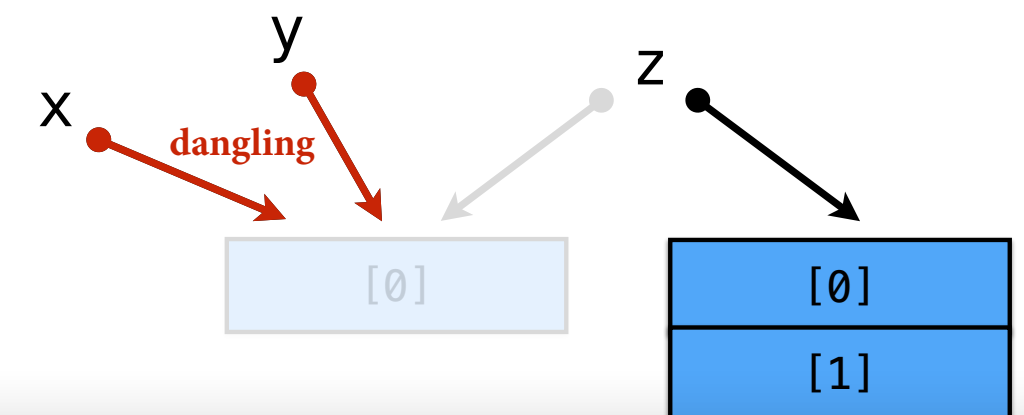
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Build slide visuals incrementally

Use smooth animations to clarify transitions

Do not forget about the focus of each slide

A slide does not have to be full

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Build slide visuals incrementally
Use smooth animations to clarify transitions
Do not forget about the focus of each slide
A slide does not have to be full

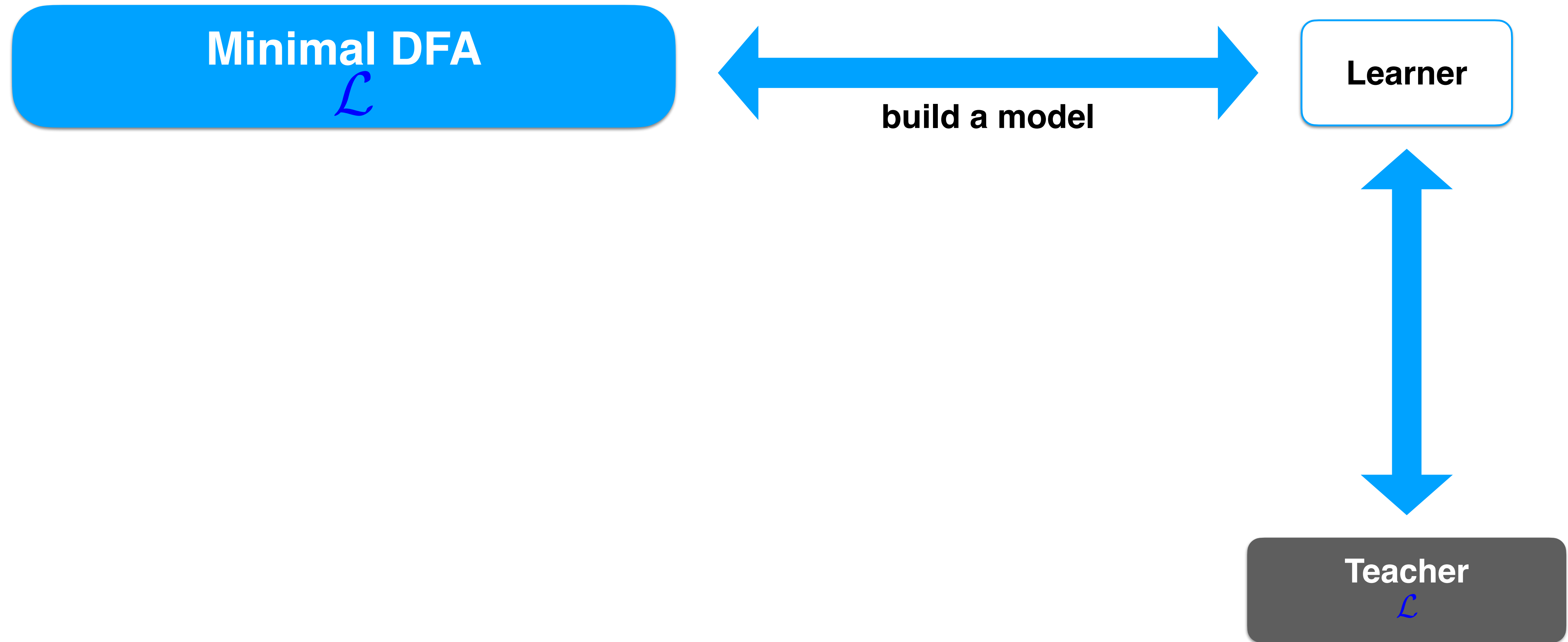
Reveal bullet points one at a time
Add text to be read later
C&P text directly from the paper
Be too precise

L^* - algorithm [Angluin'87]

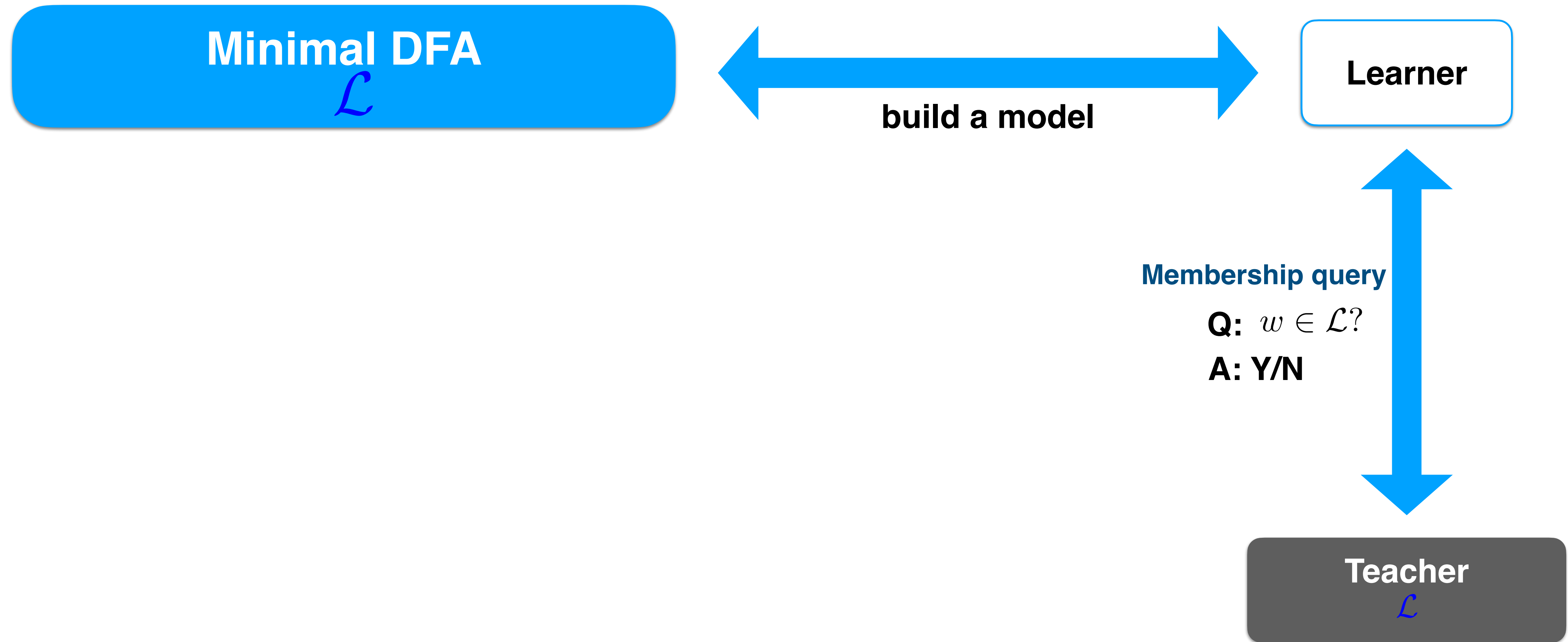
L^* LEARNER

```
1   $S, E \leftarrow \{\epsilon\}$ 
2  repeat
3      while  $(S, E)$  is not closed or not consistent
4      if  $(S, E)$  is not closed
5          find  $s_1 \in S, a \in A$  such that
               $row(s_1 a) \neq row(s), \text{ for all } s \in S$ 
6           $S \leftarrow S \cup \{s_1 a\}$ 
7      if  $(S, E)$  is not consistent
8          find  $s_1, s_2 \in S, a \in A, \text{ and } e \in E$  such that
               $row(s_1) = row(s_2) \text{ and } \mathcal{L}(s_1 a e) \neq \mathcal{L}(s_2 a e)$ 
9           $E \leftarrow E \cup \{a e\}$ 
10     Make the conjecture  $M(S, E)$ 
11     if the Teacher replies no, with a counter-example  $t$ 
12          $S \leftarrow S \cup \text{prefixes}(t)$ 
13 until the Teacher replies yes to the conjecture  $M(S, E)$ .
14 return  $M(S, E)$ 
```

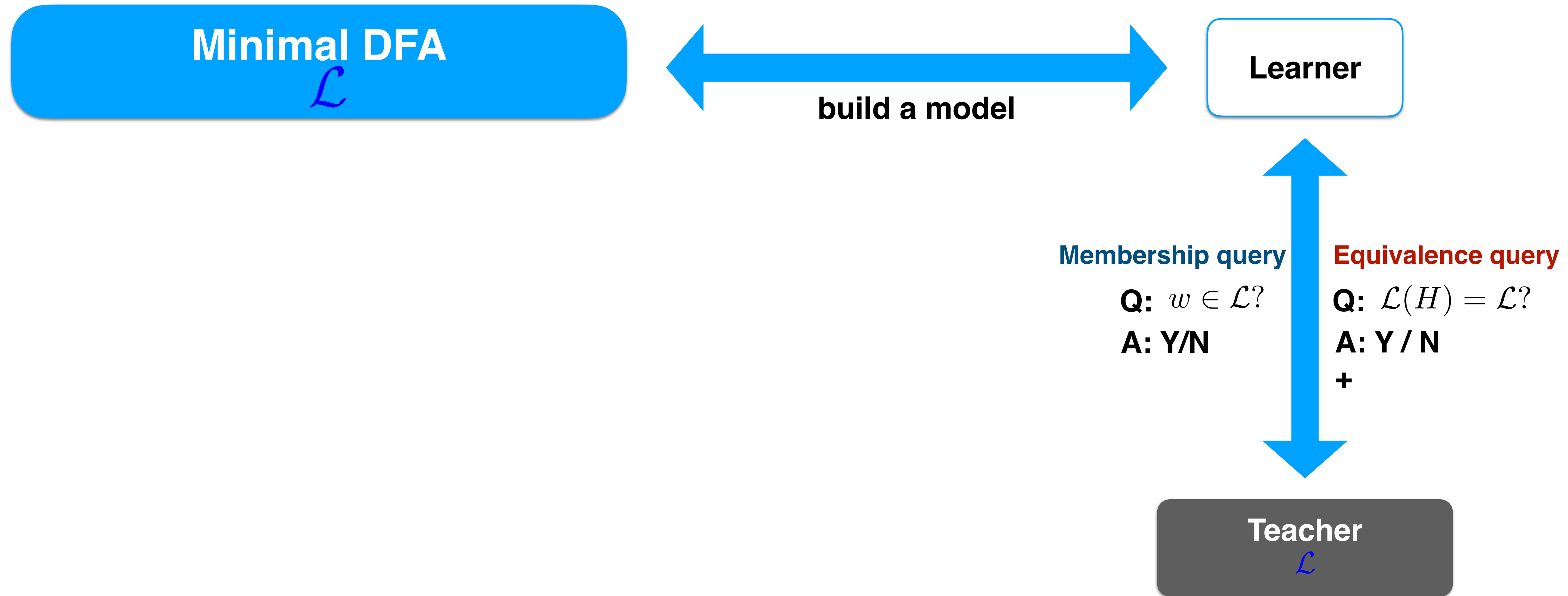
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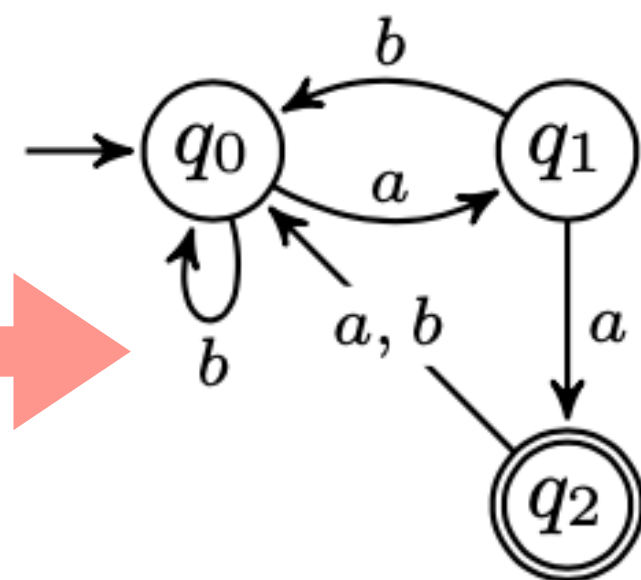
L^* - algorithm [Angluin'87]

Minimal DFA
 \mathcal{L}

build a model

Learner

	ϵ	a
ϵ	0	0
a	0	1
aa	1	0
b	0	0
ab	0	0
aaa	0	0
aab	0	0



Membership query

Q: $w \in \mathcal{L}$?
A: Y/N

Equivalence query

Q: $\mathcal{L}(H) = \mathcal{L}$?
A: Y / N
+

Observation table

Teacher
 \mathcal{L}

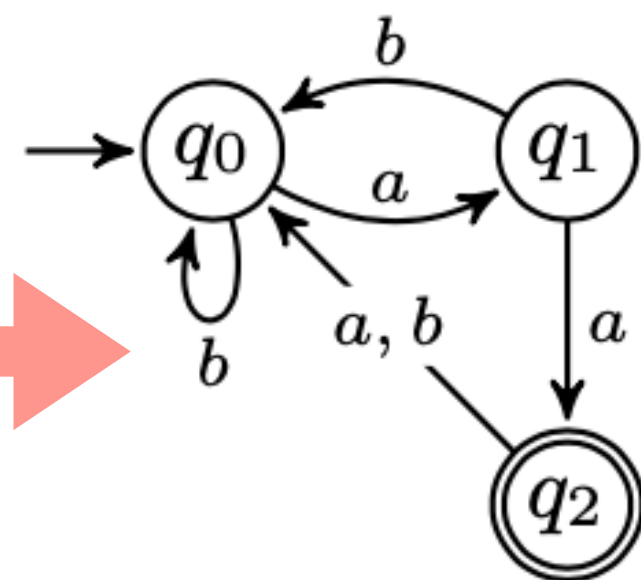
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Teacher
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Observation table

Slides are a **visual** medium

Make the
focus obvious!



(h/t Ranjit Jhala, “How to Design Talks”)

Slides are a **visual** medium

Access control is inadequate, scenario 2: Facebook timeline

- Facebook introduced timeline in 2011 end
 - Chronologically order all the information on your profile
 - Make them easily searchable for other users
- Easier to search Potentially embarrassing older content
- Users were afraid of privacy violation

Access control was not changed !

LSRC, February 2021

5

Access control is inadequate, scenario 3: Spokeo

- Service aggregating information about individuals
 - Each individual information is public content
 - E.g., your Facebook profile, address
- One can infer new non public information
 - Estimating wealth using address and public property records
- Users complain of privacy violation

Access control was not changed !

LSRC, February 2021

6

Access control is inadequate: Summary

- User reaction suggests each of the cases violate privacy
- However in none of the cases access control is violated
- We propose a new model to reason about privacy

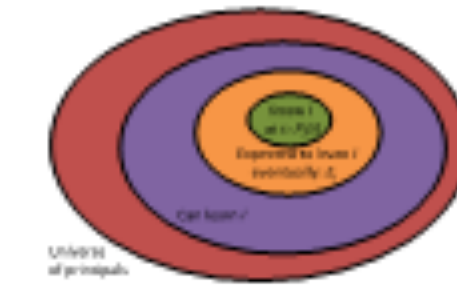
LSRC, February 2021

7

Exposure : Definition

- We define Prominence of information I at time t or $P_I(t)$
 $P_I(t) = \{U \mid U \text{ is aware of } I \text{ at time } t\}$
- Then E_I , exposure of I is:

$$E_I = \lim_{t \rightarrow \infty} P_I(t)$$



LSRC, February 2021

8

Modeling user privacy using exposure

- For each content users have an expected exposure
 - How many other users are likely to access the content
- We can model privacy violation for an information as
 - Large deviation of actual exposure from expected exposure

LSRC, February 2021

9

Revisiting scenario 1: Facebook newsfeed

- Before newsfeed was introduced
 - Expected exposure: Friends who will visit user's profile
 - Actual exposure was same as expected exposure
- After newsfeed was introduced
 - Actual exposure: All friends to whom the information is pushed
 - Actual exposure is much higher than the expected exposure

LSRC, February 2021

10

Revisiting scenario 2: Facebook timeline

- Before timeline was introduced
 - Expected exposure for older data: Friends who will scroll to find a old content
 - Actual exposure for older data was same as expected exposure
- After timeline was introduced
 - Actual exposure for older data: All friends who visit the profile
 - Actual exposure is much higher than the expected exposure

LSRC, February 2021

11

Revisiting scenario 3: Spokeo

- Before spokeo aggregated data
 - Expected exposure for new inferred data: Users who dig up each individual pieces of content from different sources
 - Actual exposure for older data was same as expected exposure
- After spokeo aggregated data
 - Actual exposure for new inferred data: All users who visit public spokeo website
 - Actual exposure is much higher than the expected exposure

LSRC, February 2021

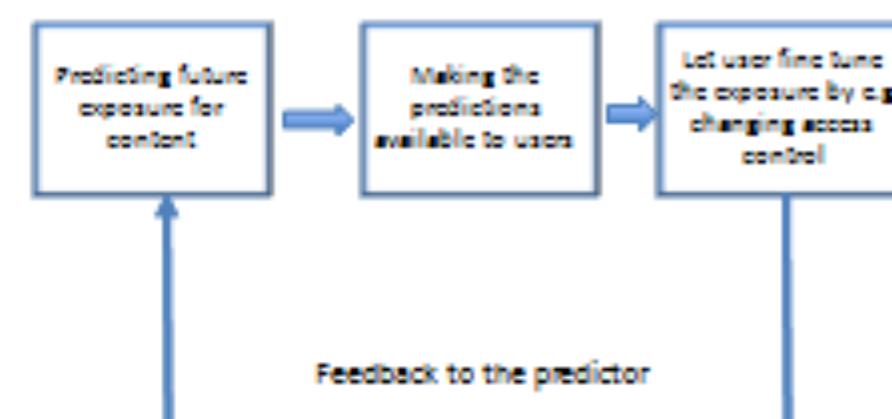
12

Major Deviation from expected exposure can capture the privacy violations not covered by access control

LSRC, February 2021

13

Proposed model: managing privacy via exposure



LSRC, February 2021

14

Key challenge: Predicting future exposure

- Huge existing work for predicting growth in content popularity
 - Future YouTube views, Facebook likes, Retweets
 - Use machine learning, regression techniques
 - We can leverage advances in those fields to predict exposure
- OSN operators are best positioned to do the predictions
 - Empirical data on how information disseminates in their sites
 - Facebook or Youtube already provide number of likes or views

LSRC, February 2021

15

Limitations of our model

- Privacy violation by inference using available data
 - It is extremely hard to enumerate all possible inference
- Privacy violation using cross site prediction
 - Prediction across multiple systems
 - E.g., posting a picture taken from Facebook in twitter

LSRC, February 2021

16

Slides are a **visual** medium

Introduction

- Like an expanded version of the abstract
- Alternative approach (SPJ): Eliminate Context
 - Start with a concrete example, e.g. “Consider this Haskell code...”
 - If this works, it can be effective, but I find it often doesn't work
 - It assumes reader already knows context



53

A structure that works

- Abstract (1-2 paragraphs, 1000 readers)
- Intro (1-2 pages, 100 readers)
- **Key ideas** (2-3 pages, 50 readers)
- Technical meat (4-6 pages, 5 readers)
- Related work (1-2 pages, 100 readers)

54

“Key ideas” section



- Use **concrete illustrative examples** and high-level intuition
- Do **not** have to show the general solution (that's what the technical section is for)

55

Why have a “key ideas” section at all?



1. Forces you to have a **“takeaway”**
2. Many readers only care about the takeaway, not the technical details
3. For those who want the technical details, the key ideas are still useful as “scaffolding”

56

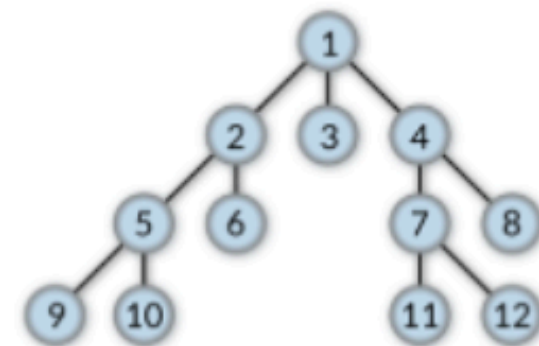
A confession



I don't always have a key ideas section.

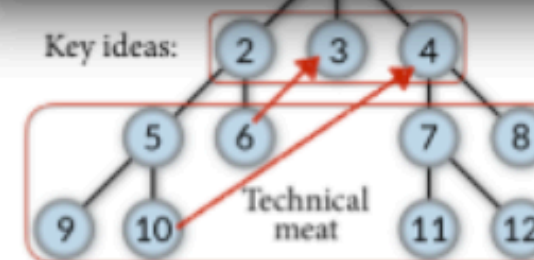
57

Breadth-first traversal



58

Sometimes breadth-first doesn't work!
e.g., if explaining 3 & 4 requires first explaining subtree rooted at 2



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Layering the presentation

“The paper is extremely well written.”
“The presentation of the semantics is well-motivated and understandable.”

- **Section 3-4:** Presented **other key ideas** and built up to the full semantics **incrementally**

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Layering the presentation

- **What if you don't have enough space for such a layered presentation?**
 - Move some technical details to appendix
 - Submit to a better conference (i.e. a conference with a higher page limit)

A structure that works

- Abstract (1-2 paragraphs, 1000 readers)
- Intro (1-2 pages, 100 readers)
- **Key ideas** (2-3 pages, 50 readers)
- Technical meat (4-6 pages, 5 readers)
- **Related work** (1-2 pages, 100 readers)

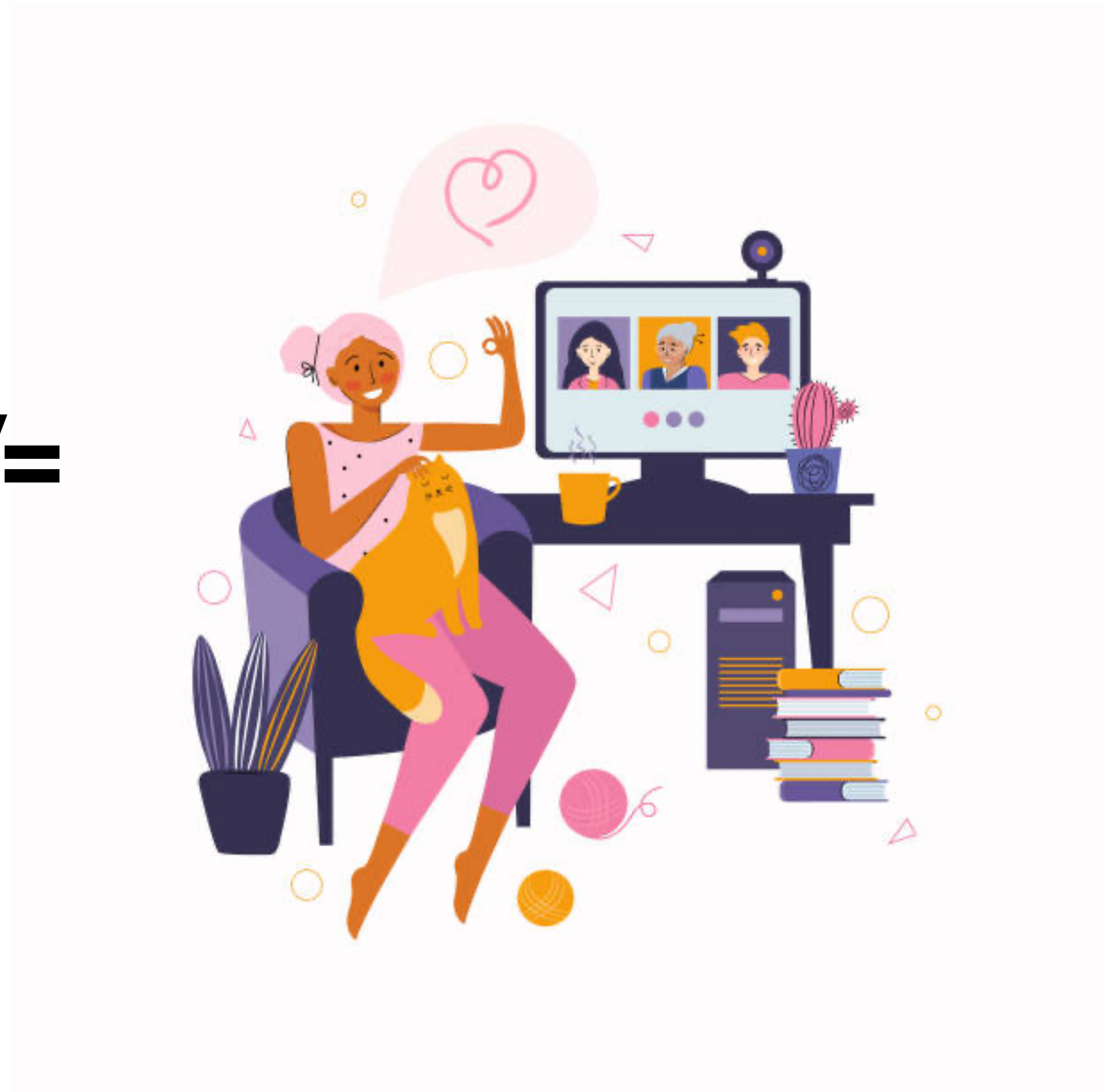
Change the focus as needed!

Context

Context



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Context



Context

Target audience



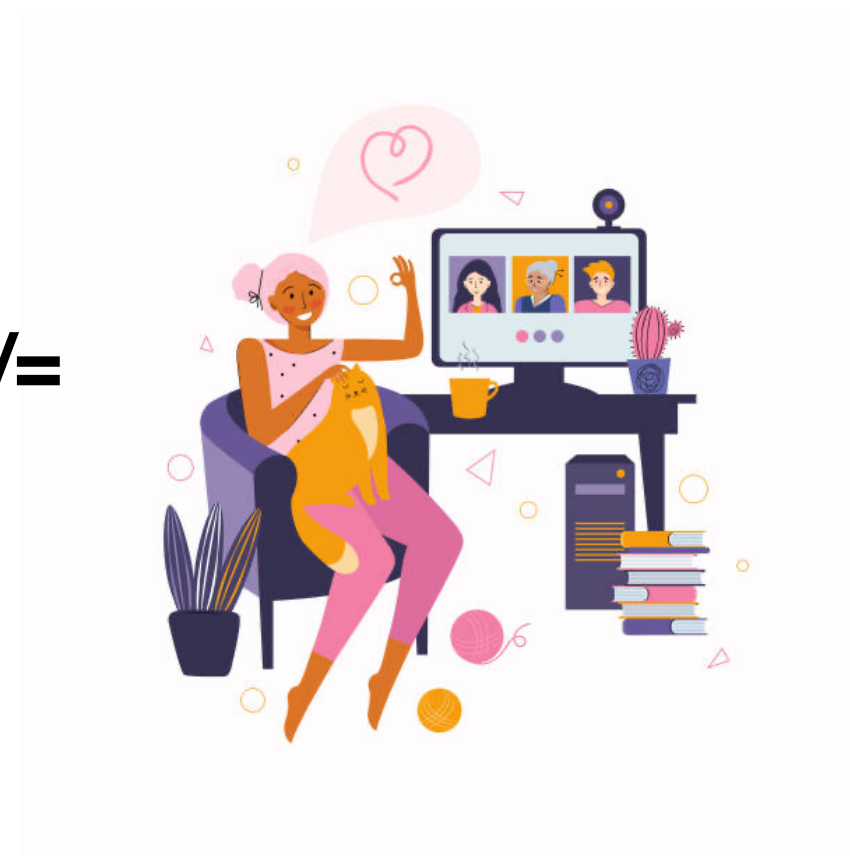
Potentially broader audience



vs



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Summary

Summary

Speaker

Slides

Context





Same Ingredients = Many recipes = Personal preference



