

Introduction to Computer Vision

硕士•科研•生活•视觉

Master•Research•Life•Vision

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2015.03.17

CONTENTS

- 硕士-Master
- 科研-Research
- 生活-Life
- 视觉-Vision

Chapter 1

Master

硕士

Why?

- Job => Future, really?
- PhD => But again, why?

Why?

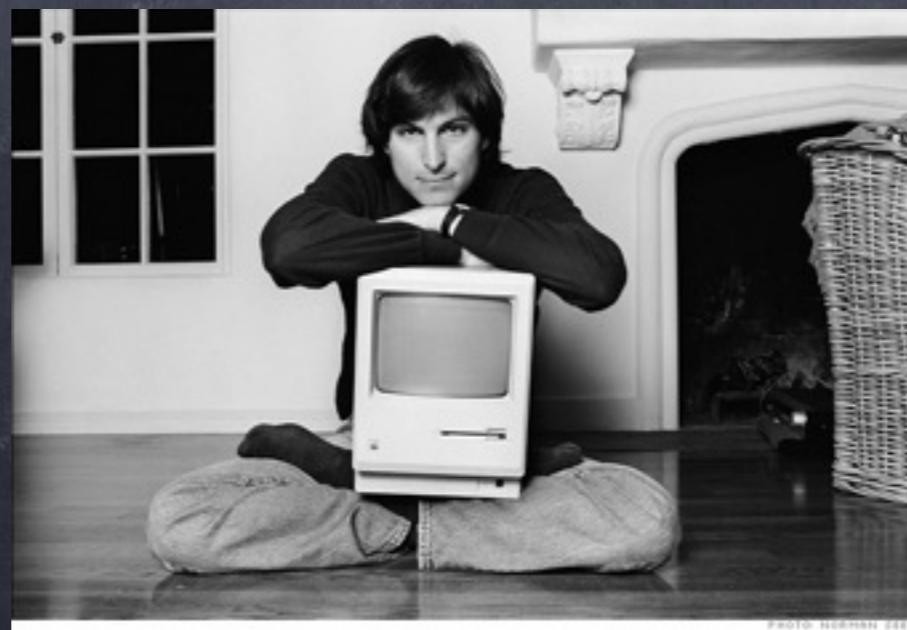
- Job => Future, really?
- PhD => But again, why?

Job - What's It

Function & Good Job
GOOD?

- Higher Salary
- Less Effort

1. Impossible or Invisible
2. ENJOY - Do You Love?



Job - How To

What Makes a GOOD Job?

Think Different, BE DIFFERENT!



Think different.

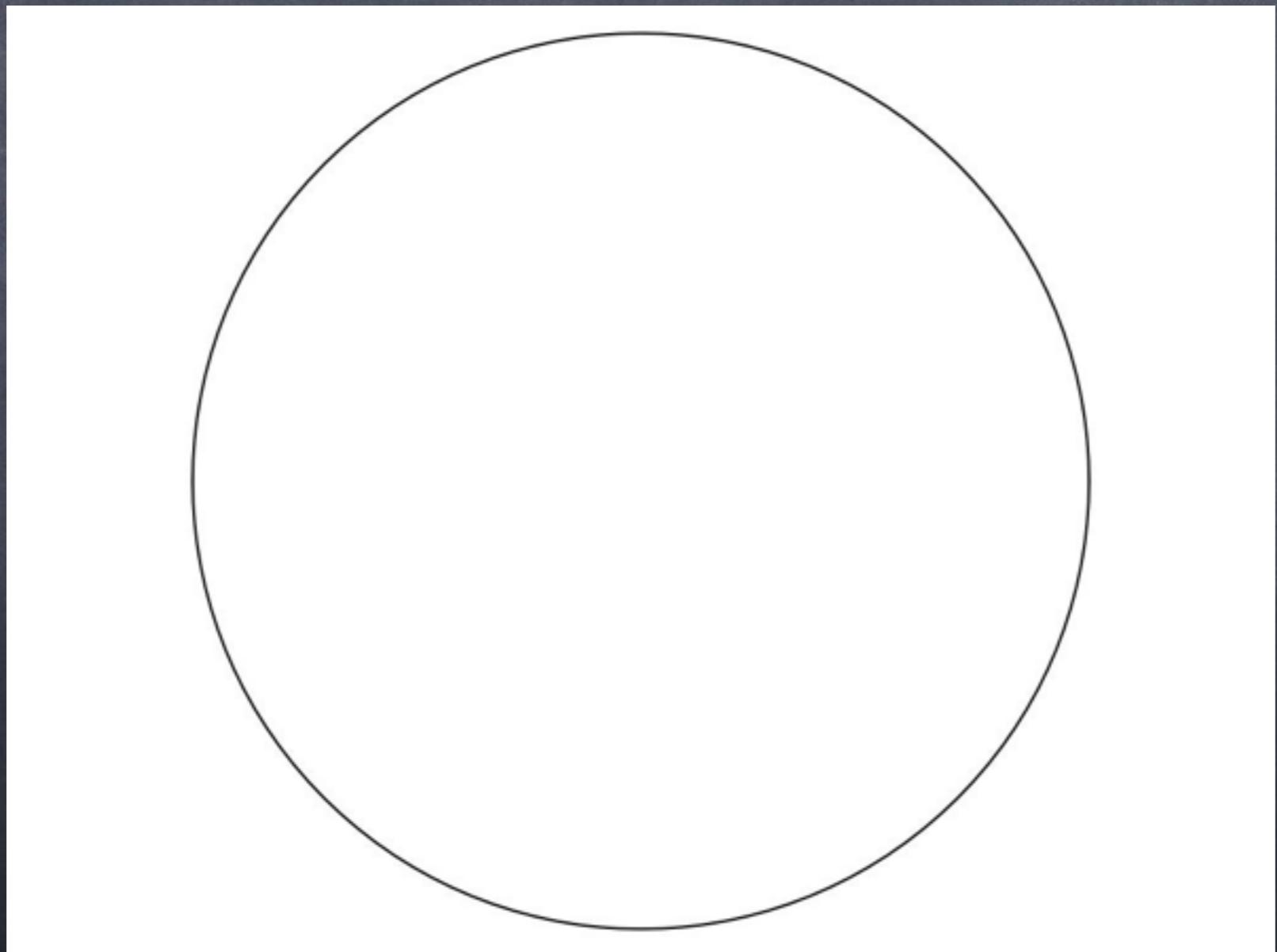


Why?

- Job => Future, really?
- PhD => But again, why?

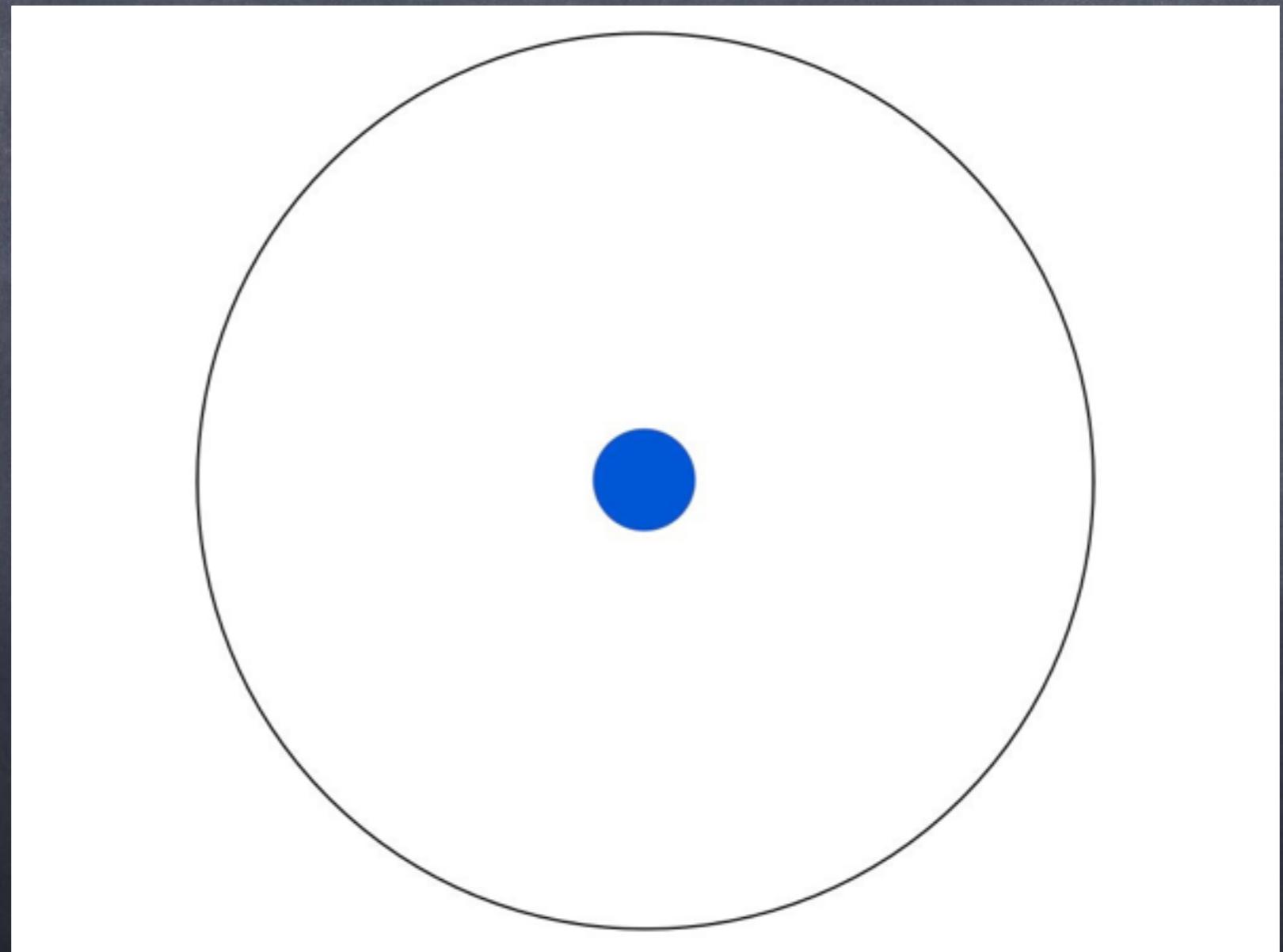
PhD - The Truth

Imagine a circle that contains all of human knowledge:
假设人类所有的知识就是一个圆（圆内代表已知，圆外代表未知）。



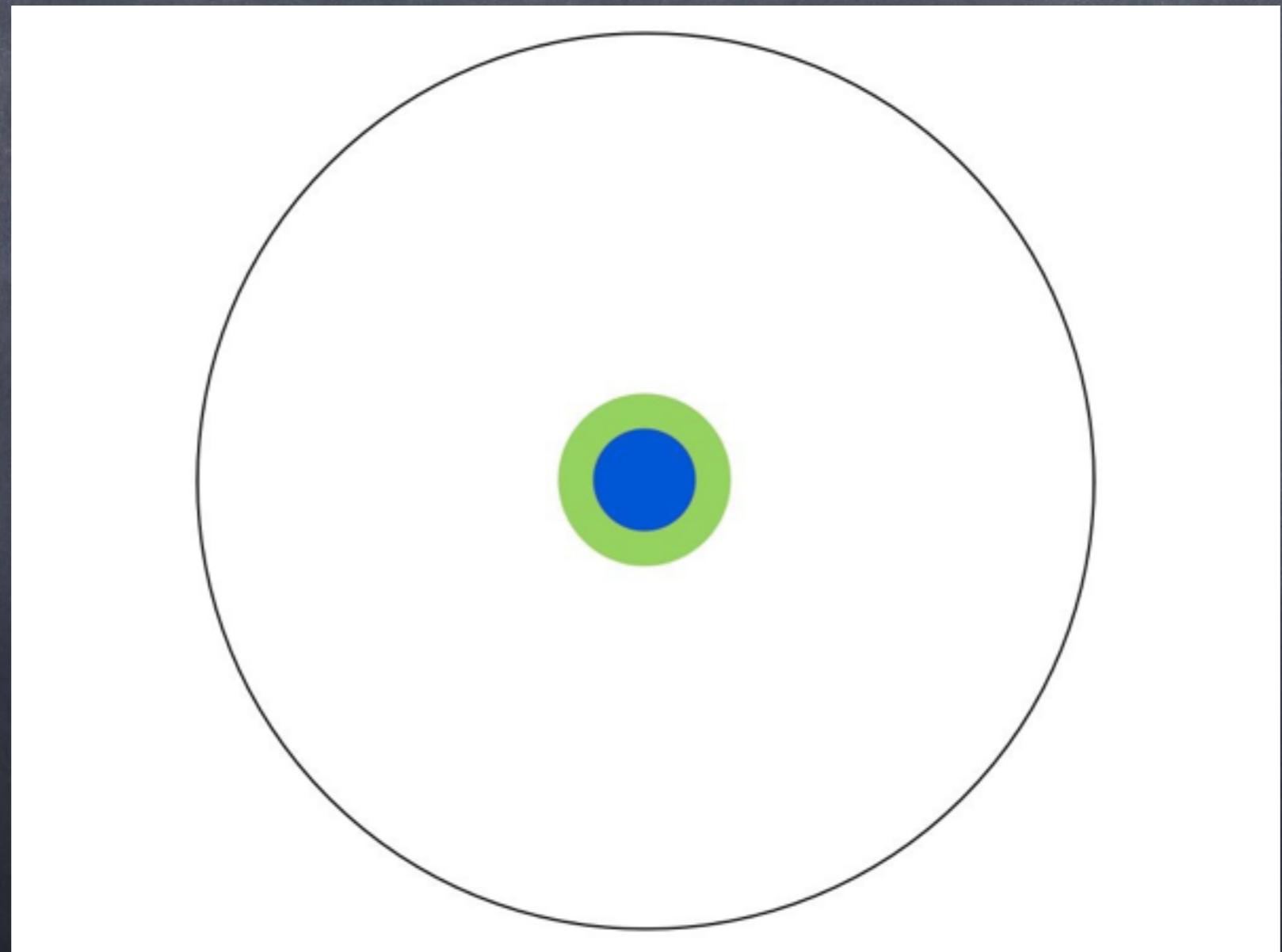
PKD - The Truth

By the time you finish elementary school, you know a little:
读完小学，你有了一些最基本的知识。



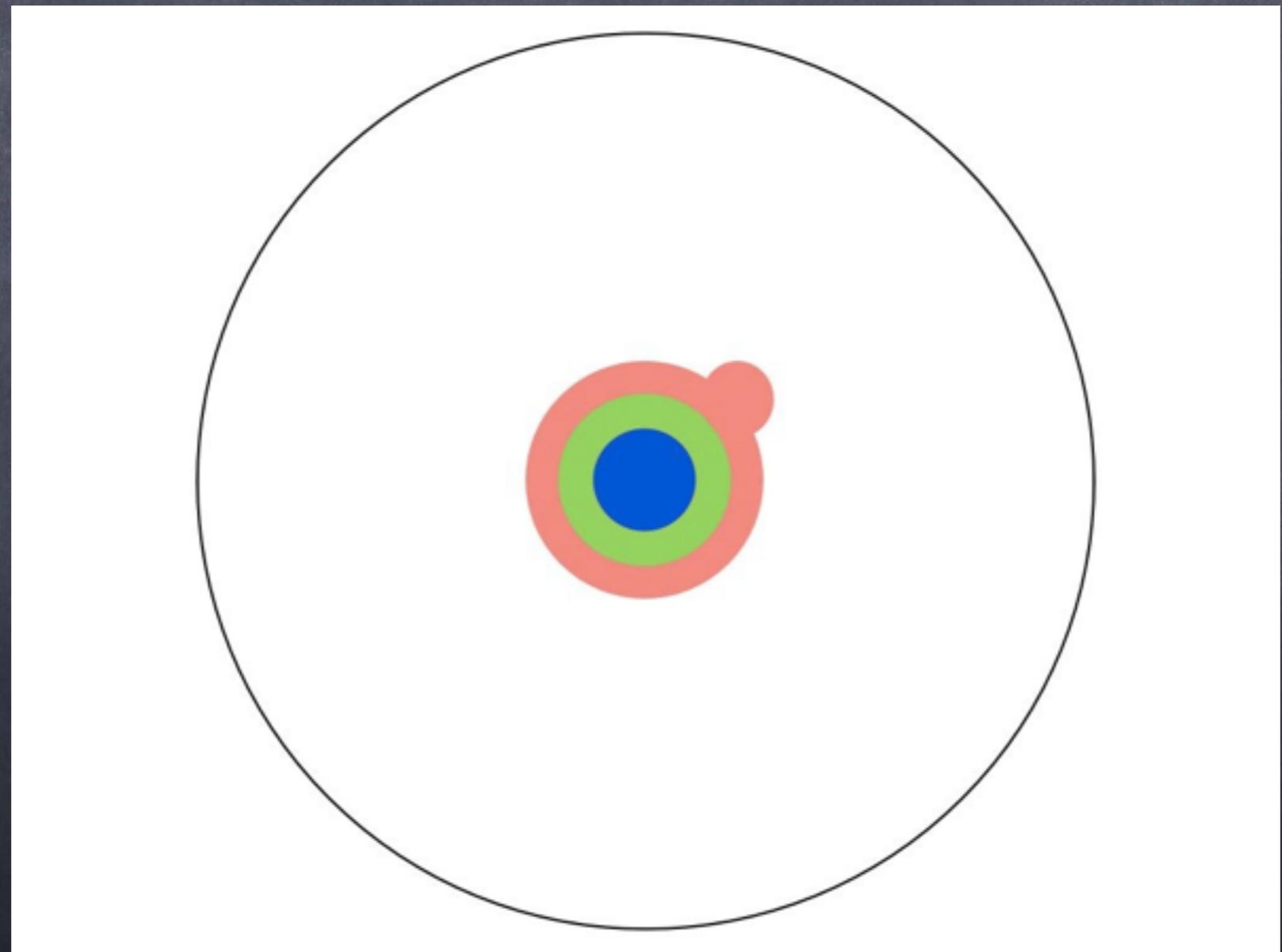
PKD - The Truth

By the time you finish high school, you know a bit more:
读完中学，你的知识又多了一点。



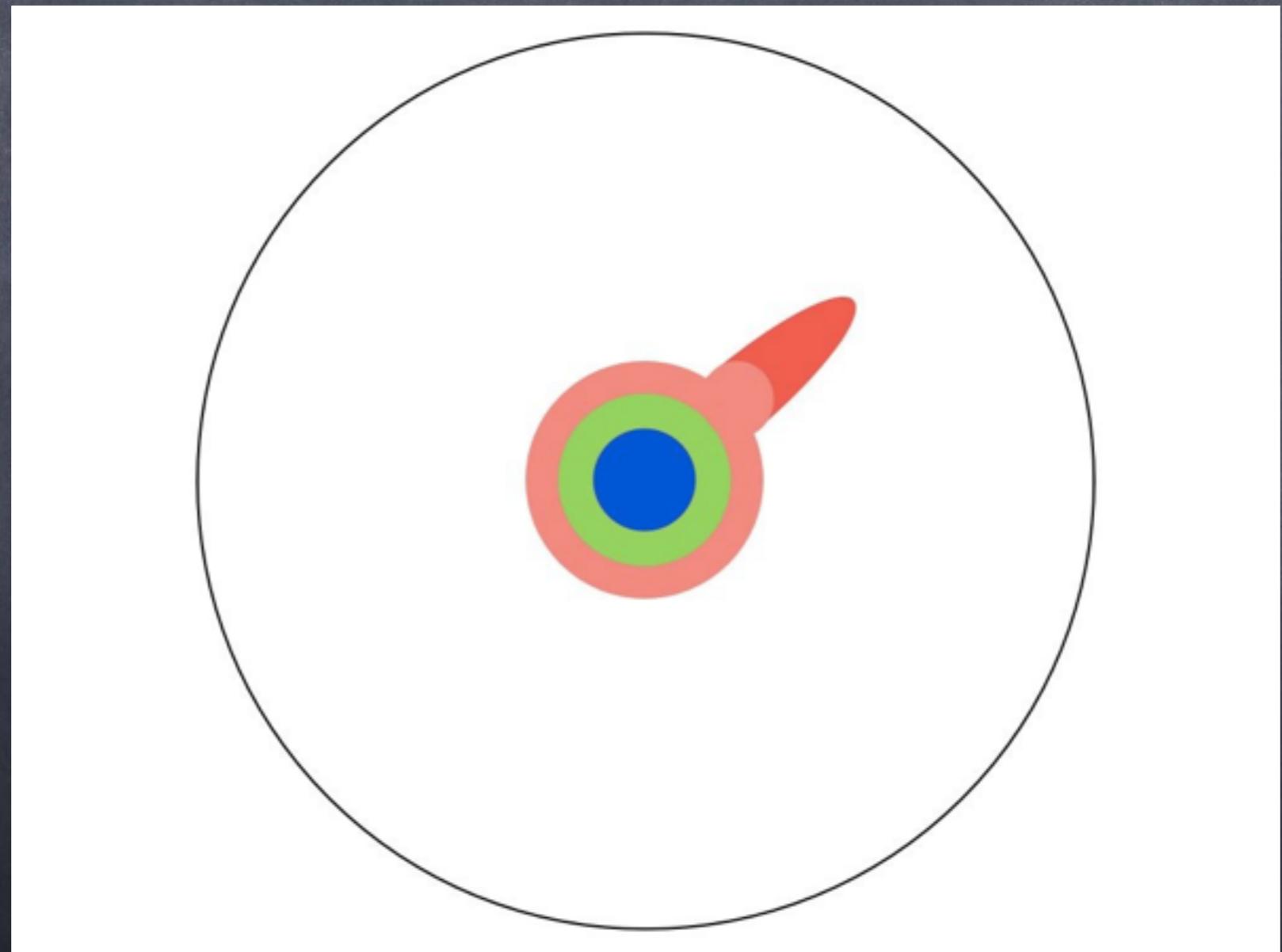
PhD - The Truth

With a bachelor's degree, you gain a specialty:
读完本科，你不仅有了更多的知识，而且还有一个专业方向。



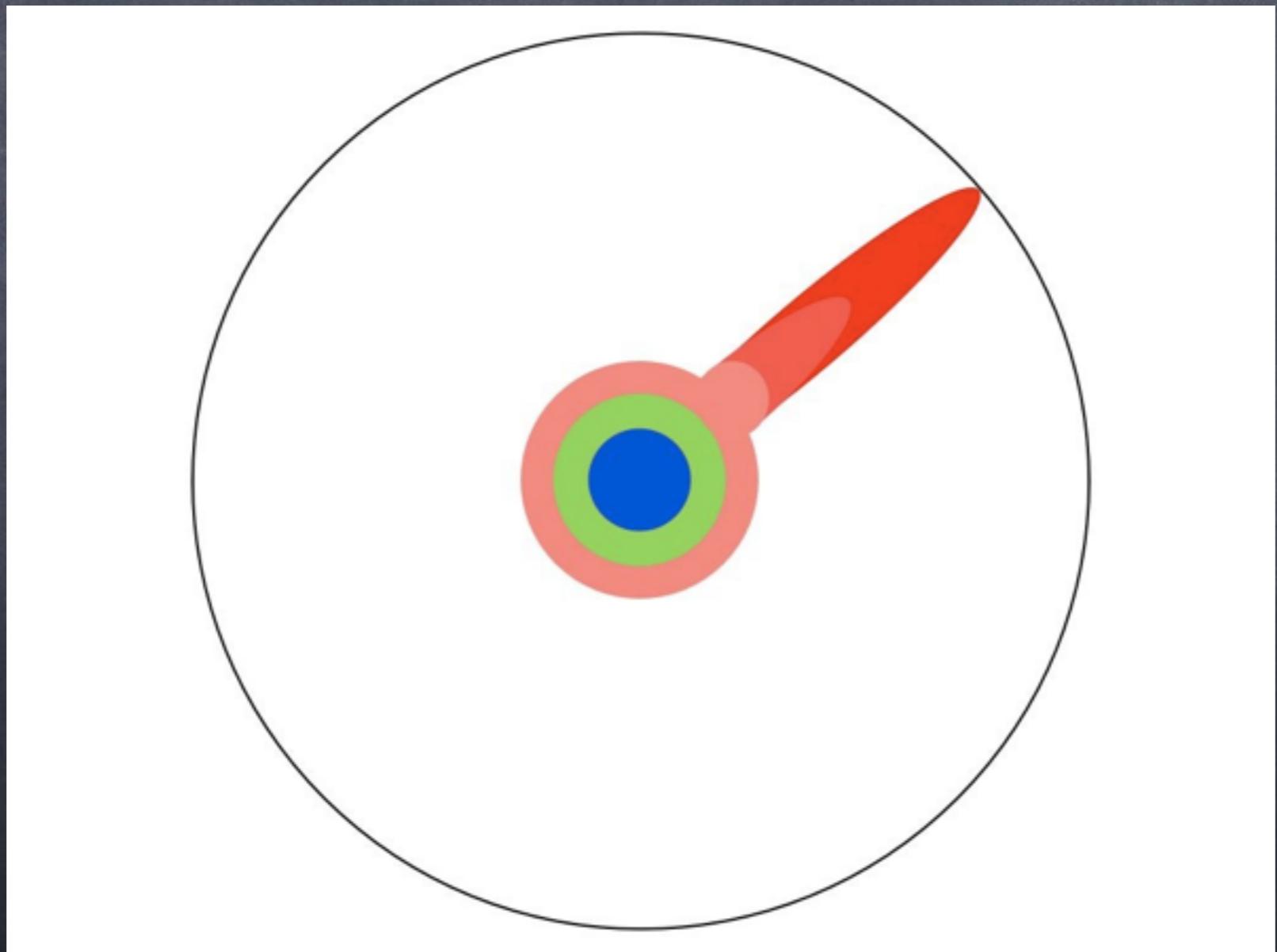
PhD - The Truth

A master's degree deepens that specialty:
读完硕士，你在专业上又前进了一大步。



PhD - The Truth

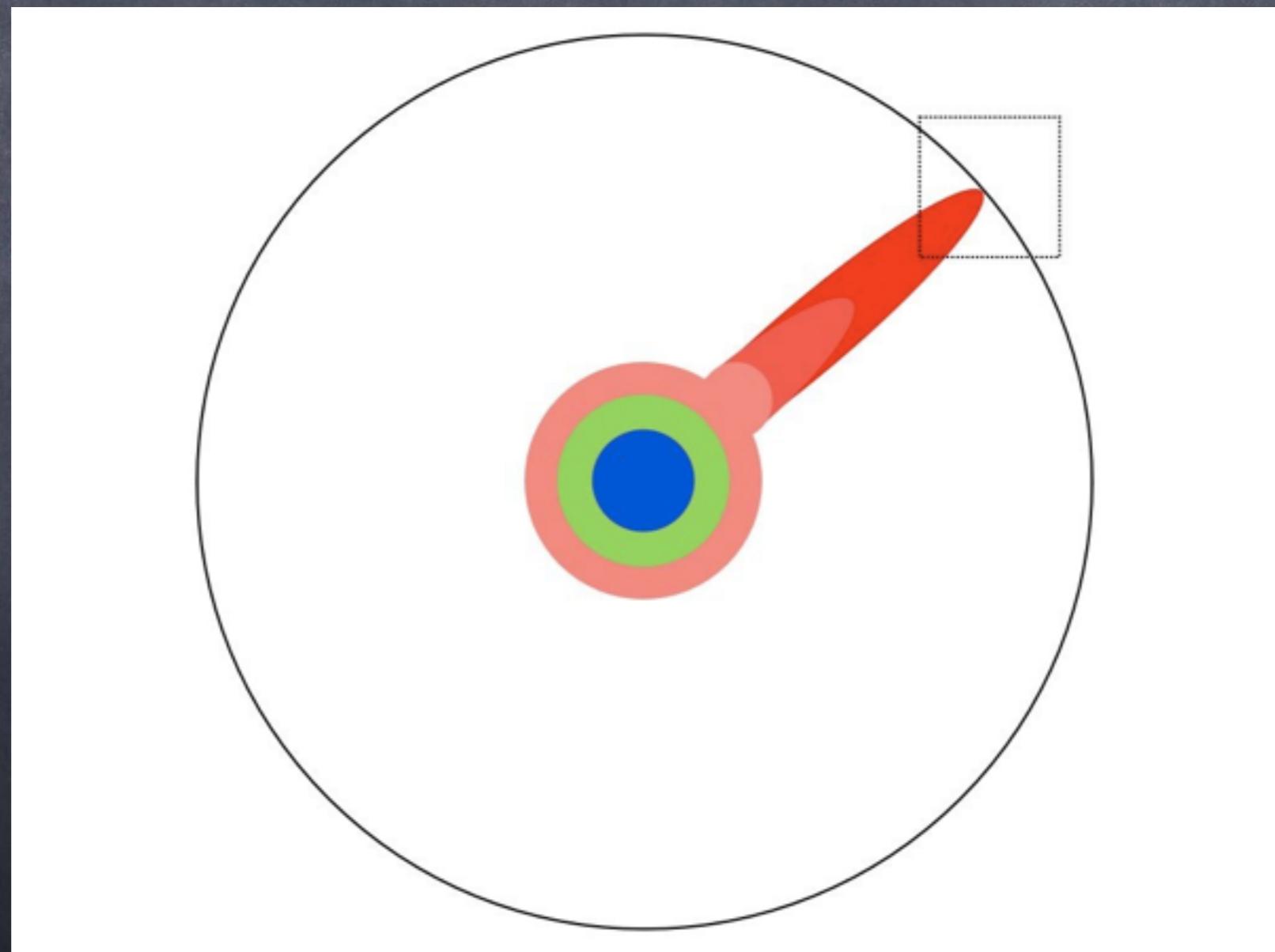
Reading research papers takes you to the edge of human knowledge:
进入博士生阶段，你大量阅读文献，接触到本专业的最前沿。



PhD - The Truth

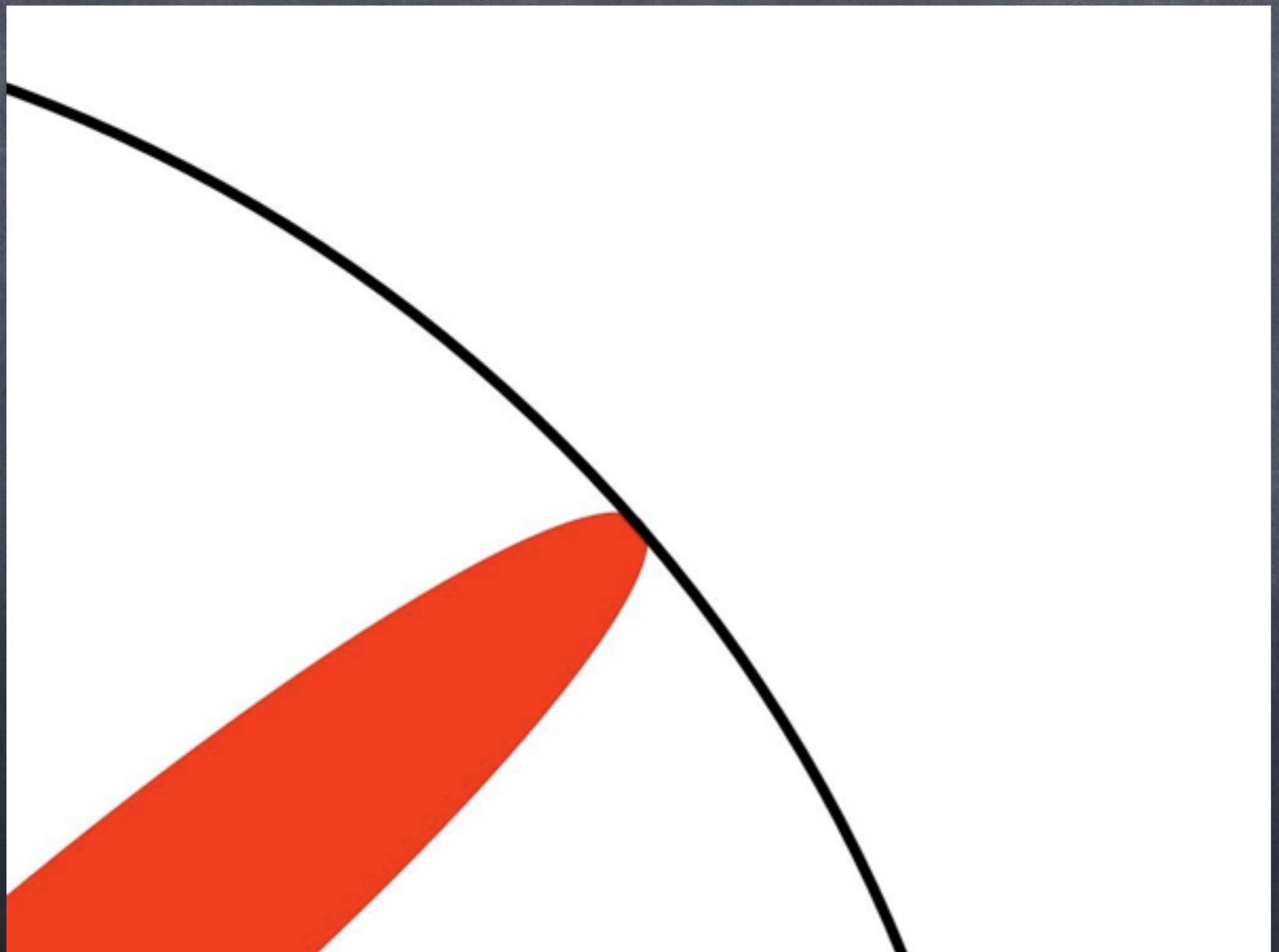
Once you're at the boundary, you focus:

你选择边界上的一个点，也就是一个非常专门的问题，作为自己的主攻方向。



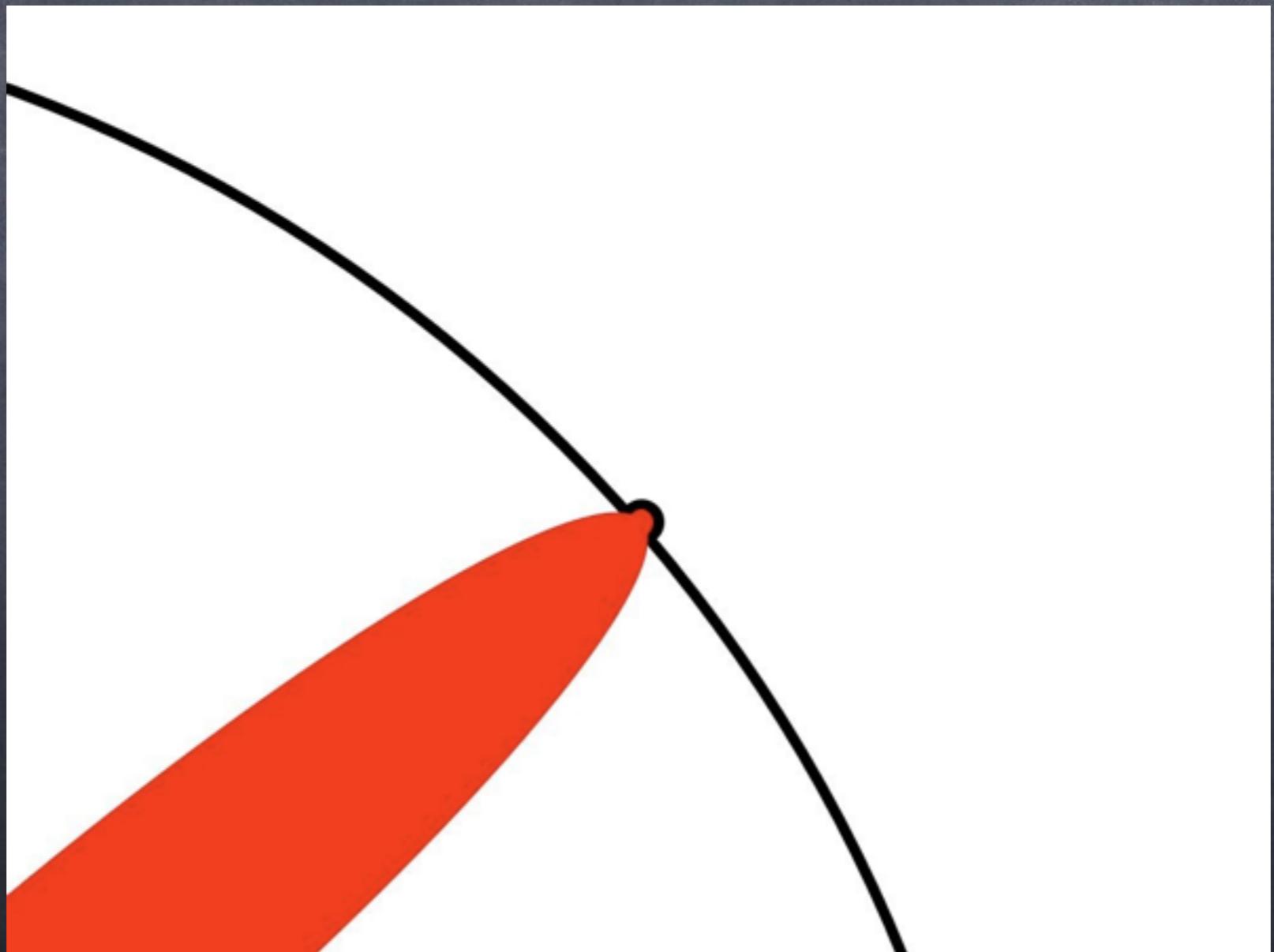
PhD - The Truth

You push at the boundary for a few years:
你在这个点上苦苦思索，也许需要好几年。



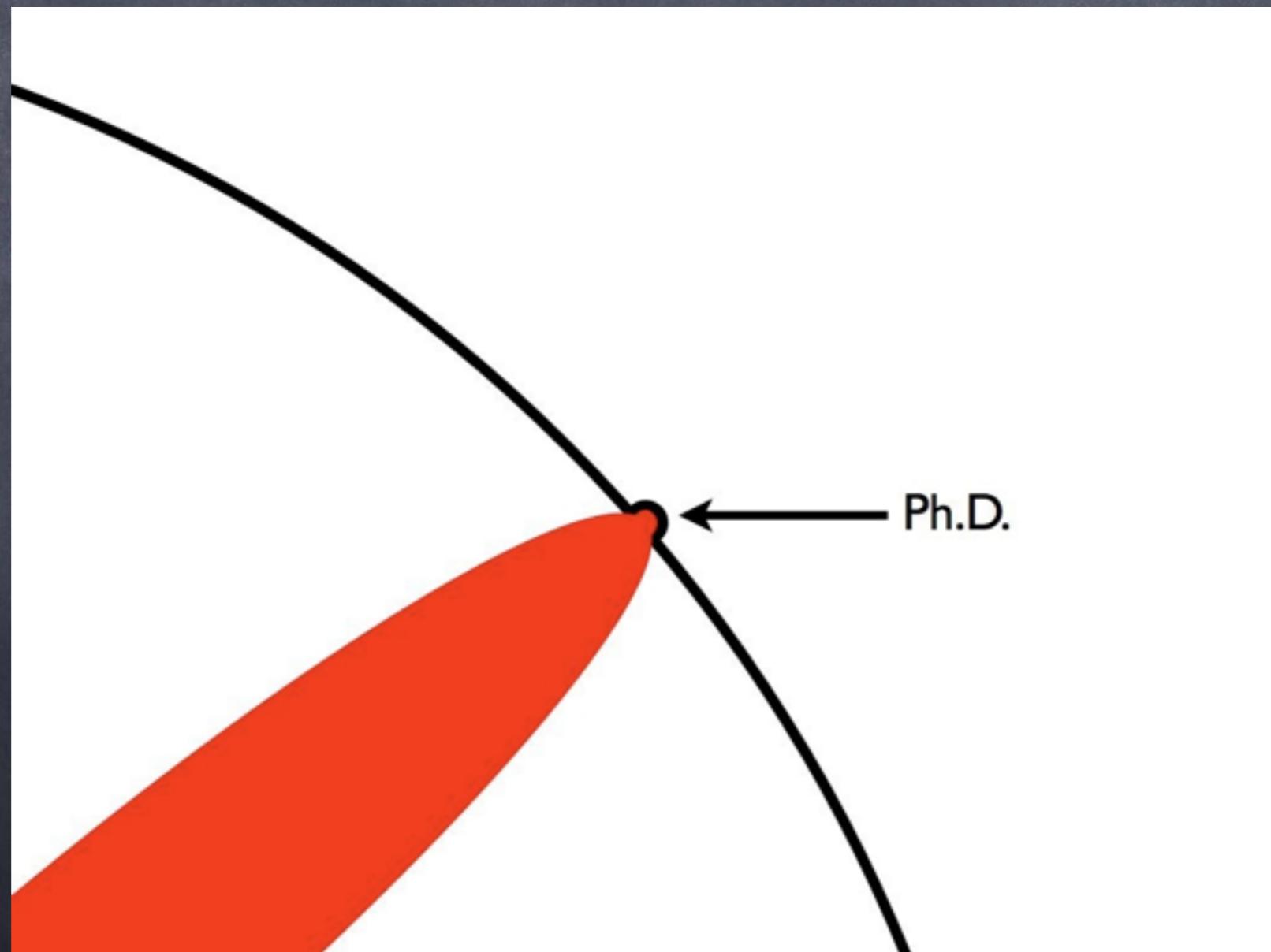
PhD - The Truth

Until one day, the boundary gives way:
终于有一天，你突破了这个点。



Ph.D. - The Truth

And, that dent you've made is called a Ph.D:
你把人类的知识向前推进了一小步，这时你就成为博士了。



PKD - The Truth

Of course, the world looks different to you now:
现在你就是最前沿，其他人都在你身后。



Ph.D. - The Truth

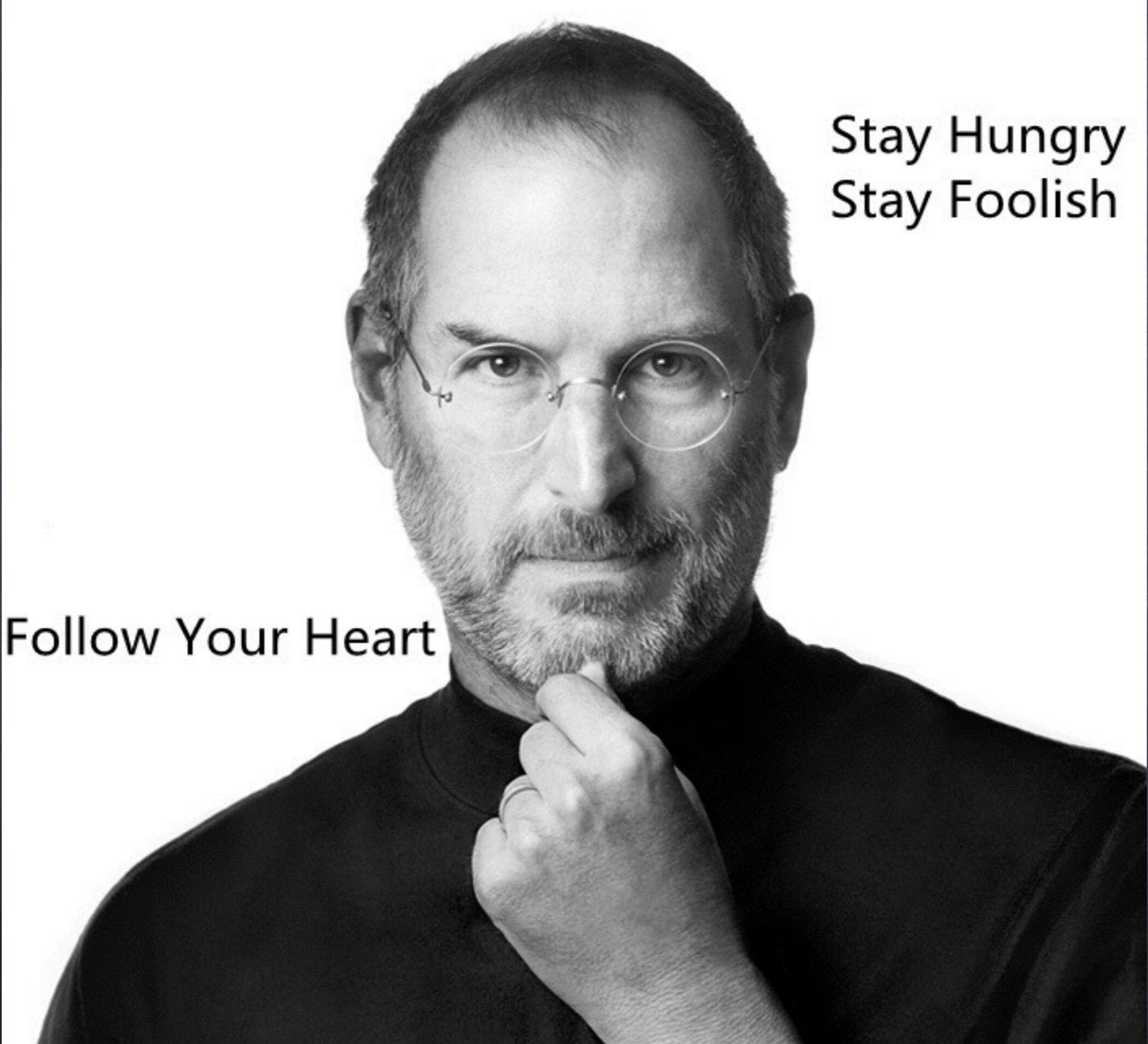
So, don't forget the bigger picture:

但是，不要陶醉在这个点上，不要把整张图的样子忘了。



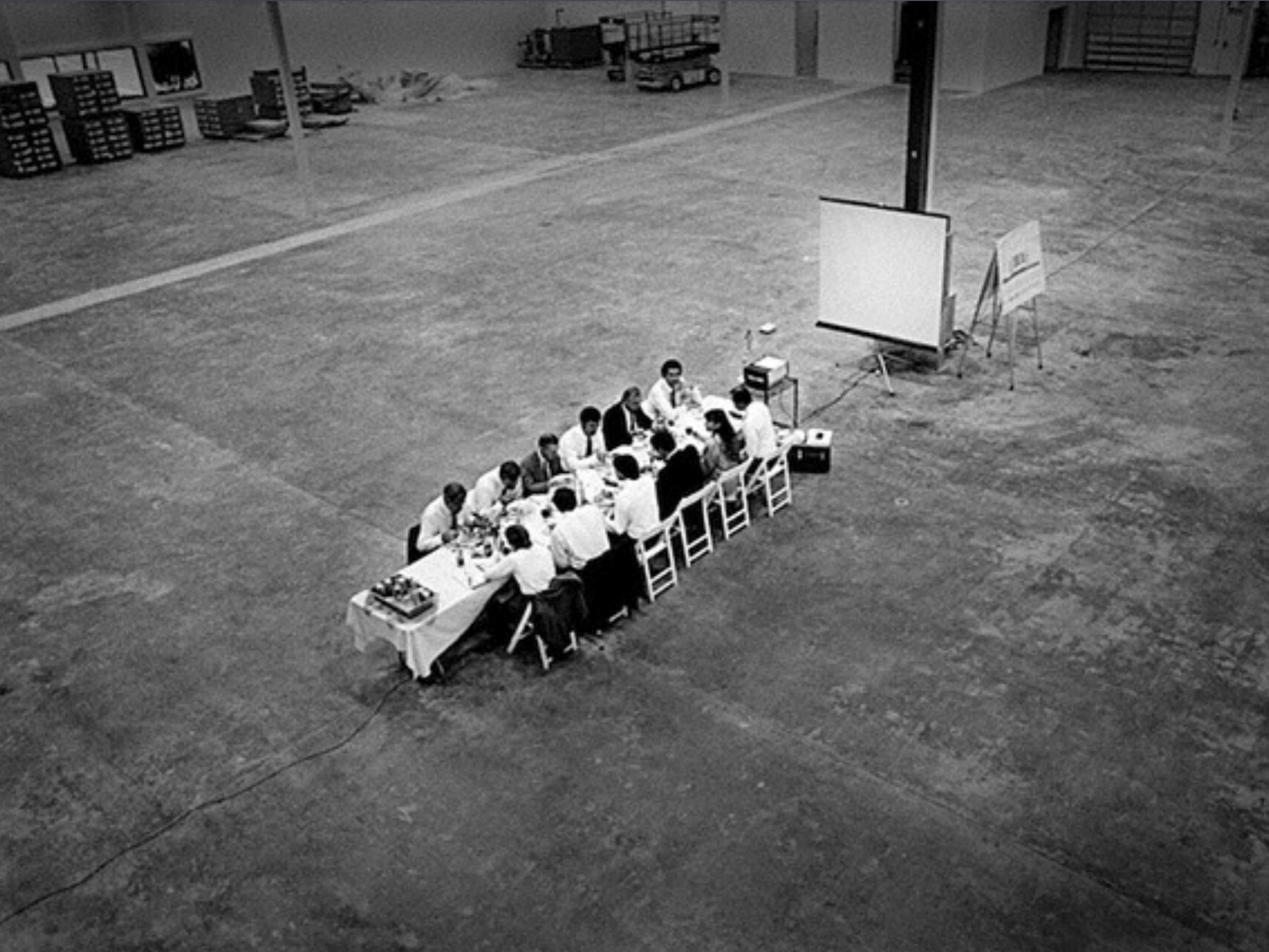
Keep pushing.
继续推进。

The illustrated guide to a Ph.D.
Matt Might



Stay Hungry
Stay Foolish

Follow Your Heart



Chapter 2

Research

科研

Why?

Master's DEGREE

Research is HARD

Research is FUN

MAKE IT FUN!

"So the secret to getting yourself to do something is not to convince yourself you have to do it, but to convince yourself that it's fun. And if it isn't, then you need to make it fun."

-Aaron Swartz

Why?



SCHOLARSHIPS

What?

Studying ≠ Research

Programming ≠ Research

Thinking ≠ Research

Training ≠ Research

..... ≠ Research

RESEARCH RE-SEARCH

What
Independent Working?
Team Work?
Communication & Discussion

HAPPINESS

PHOTO: DIANA WALKER/CONTOUR BY GETTY IMAGES

PHOTO: DIANA WALKER/CONTOUR BY GETTY IMAGES

PHOTO: GEORGE LANGE/CONTOUR BY GETTY IMAGES

What

- Investigating
- Studying
- Creating
- Innovating

How?



中国科学院自动化研究所
模式识别国家重点实验室
National Laboratory of Pattern Recognition
中国-法国信息、自动化与应用数学联合实验室 LIAMA



献给CV和CG入门者之
科研经验浅问细答兼与大家探讨

吴怀宇

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<http://www.sigvc.org>

中国科学院

How

- ◎ Journal Citation Reports - IF
- ◎ 中科院SCI期刊分区表 (1、2、3、4)
- ◎ 中国计算机学会推荐国际学术会议和期刊目录
- ◎

ESAT

LBE YOURSELF

Chapter 3

Life

生活

Yesterday
Past

小学上课费嘴
初中上课费笔
高中上课费脑
大学上课费流量



Tomorrow

Future

希望
梦想
美好
快乐



Today
Present

我可以输，
但我绝不放弃。



“那些比你累的人都没有说什么，那些比你优秀的人比你努力的多，你有什么资格在这里唉声

我们最后的话 — 刻骨

叹气？！”

“我从来不觉得人的成长

是为了证明之前的不切实际和幼稚，而是它会让自己知道自己失去梦想是用来自实现

当你在等以后
知道自己失去梦想

但是太容易实现的，那不叫梦想。”

OK, Let's start ...

但是，前沿在哪里？

Sorry, I don't know.

Computer Vision

Chapter 4

Vision

视觉

What?

A Dream in Computer Vision

Vision is the process of discovering from images what is present in the world, and where it is.

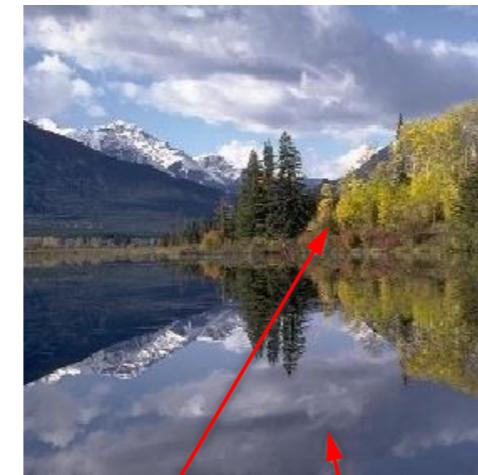


1945-1980

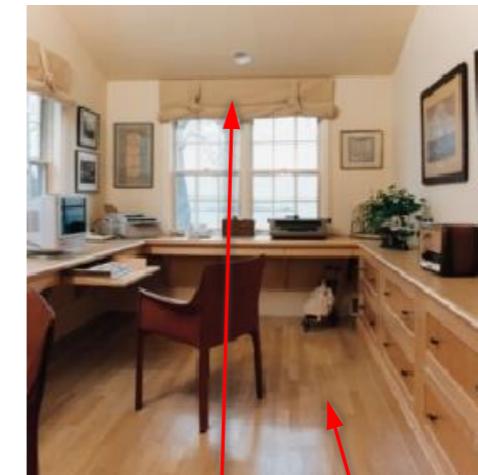
- David Marr



Building
Street
Road
Car



Mountain, lake
Tree
Lake



Office
Fabric
Floor

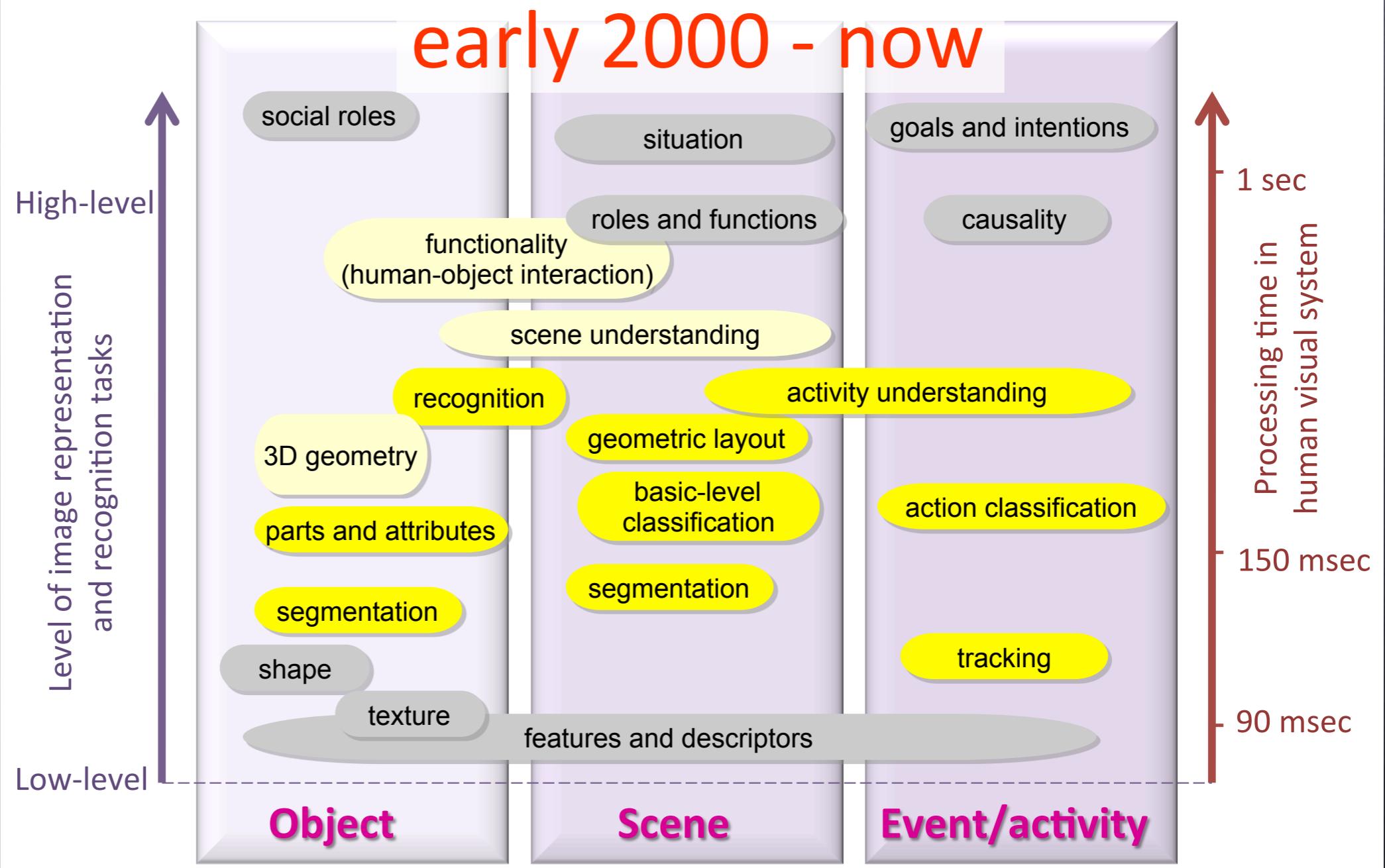
[1] D. Marr, Vision, 1982

Images courtesy of Dr. Ce Liu



Story telling in images

early 2000 - now



What

CS231-A 2015
Computer Vision:
From 3D Reconstruction
to Recognition

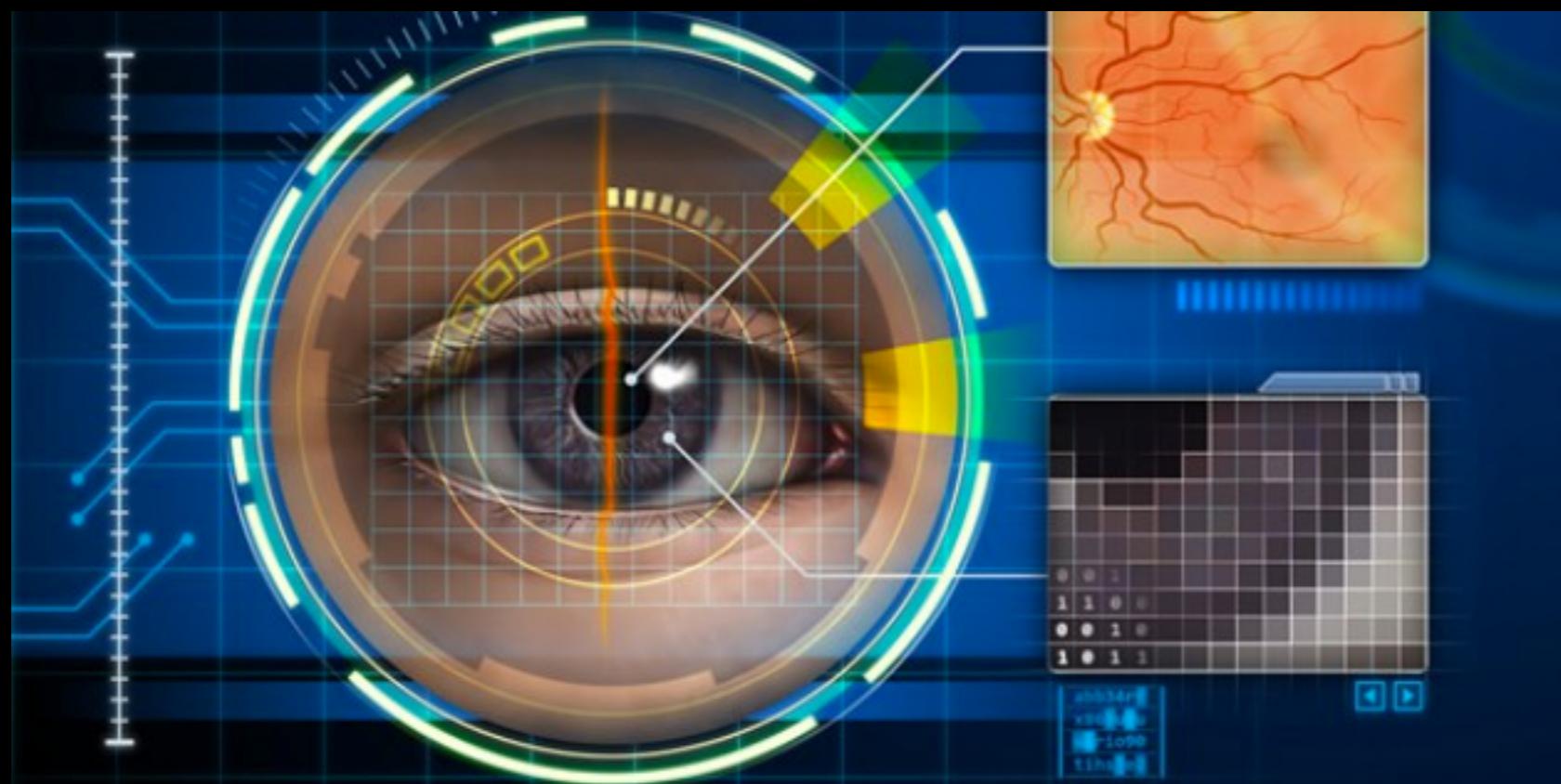


Professor Silvio Savarese

Computational Vision and Geometry Lab

What

CS 790: Introduction to Computational Vision



Instructor: Ali Borji
Mon, Wed 5:30 - 6:45 pm EMS 228

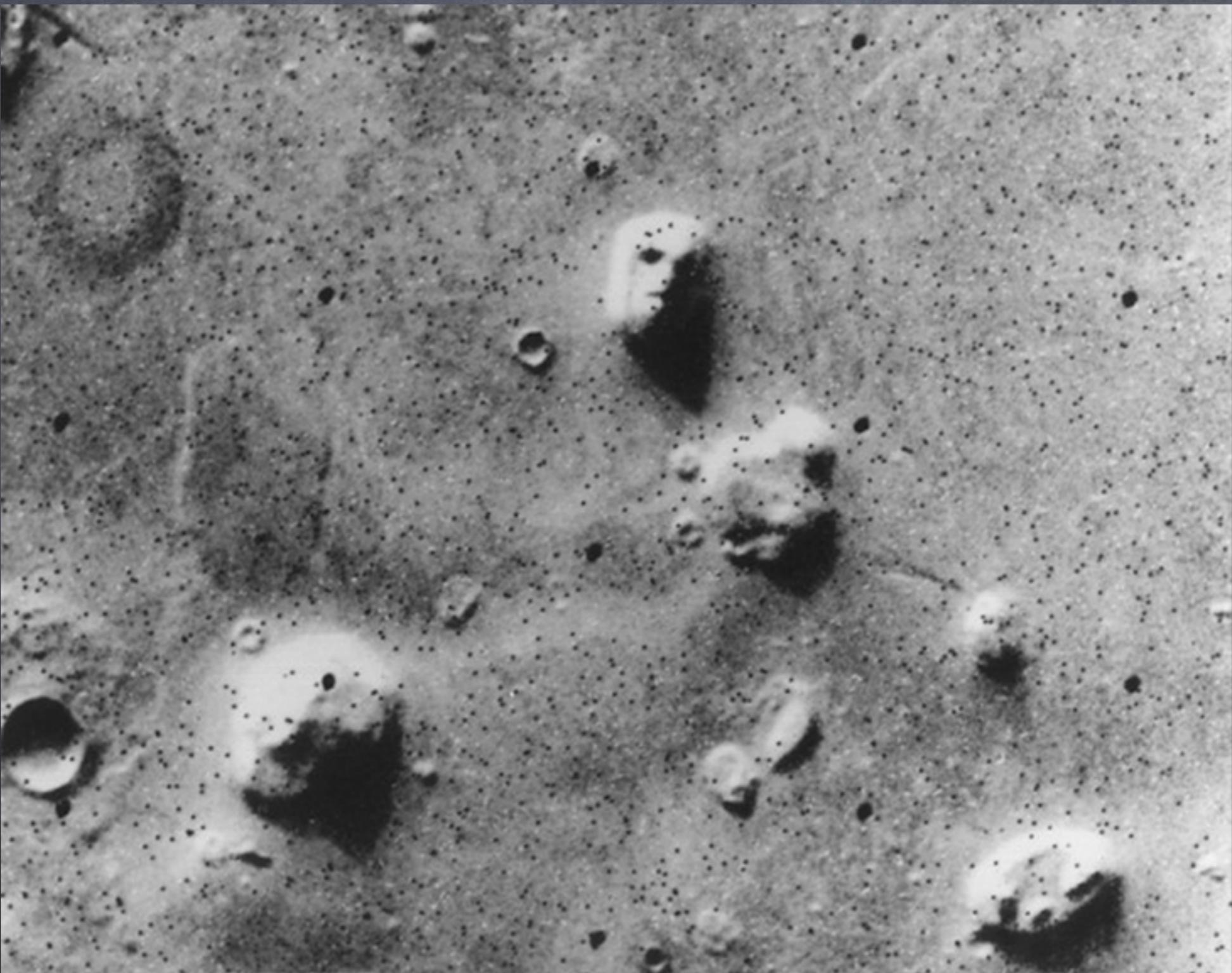
Some slides from
James Hayes, Steve Seitz, Antonio Torralba, Mobarak Shah, Kristen
Grauman, Fei Fei Li, Thomas Serre, ...

Face?

Face Detection



Face Recognition



Face X



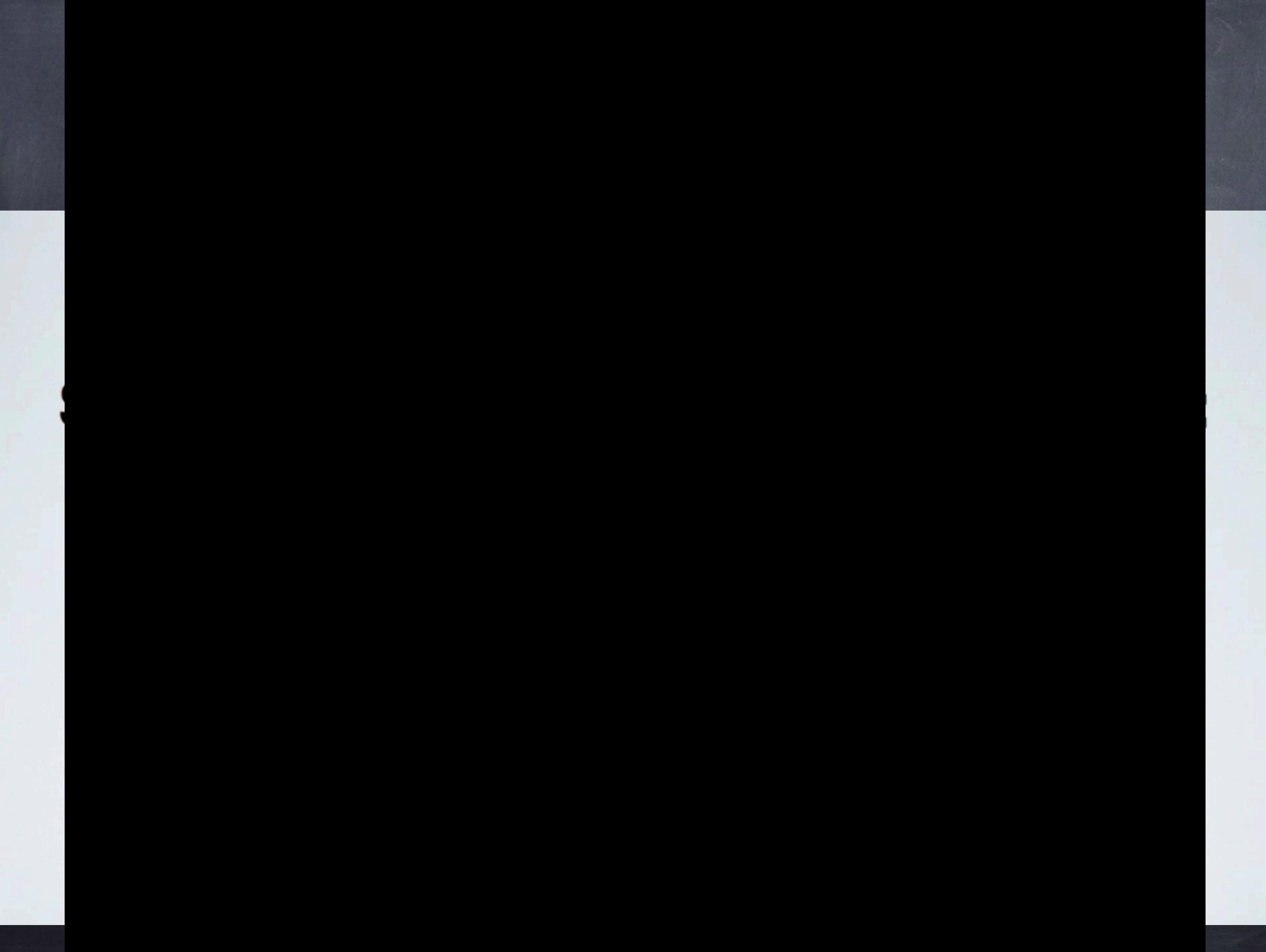
Neighborhood Repulsed Metric Learning for Kinship Verification

Jiwen Lu

Advanced Digital Sciences Center, Singapore



Shai Avidan
Mitsubishi Electric Research Lab
Ariel Shamir
The interdisciplinary Center & MERL



优酷

Finding Approximately Repeated Scene Elements for Image Editing

Submitted to SIGGRAPH 2010
Paper ID: 0133

Kinect

CBIR

优酷

Google Glass

优酷

Microsoft Hololens

MICROSOFT VIDEO
JANUARY 21, 2015
REDMOND, WA

优酷



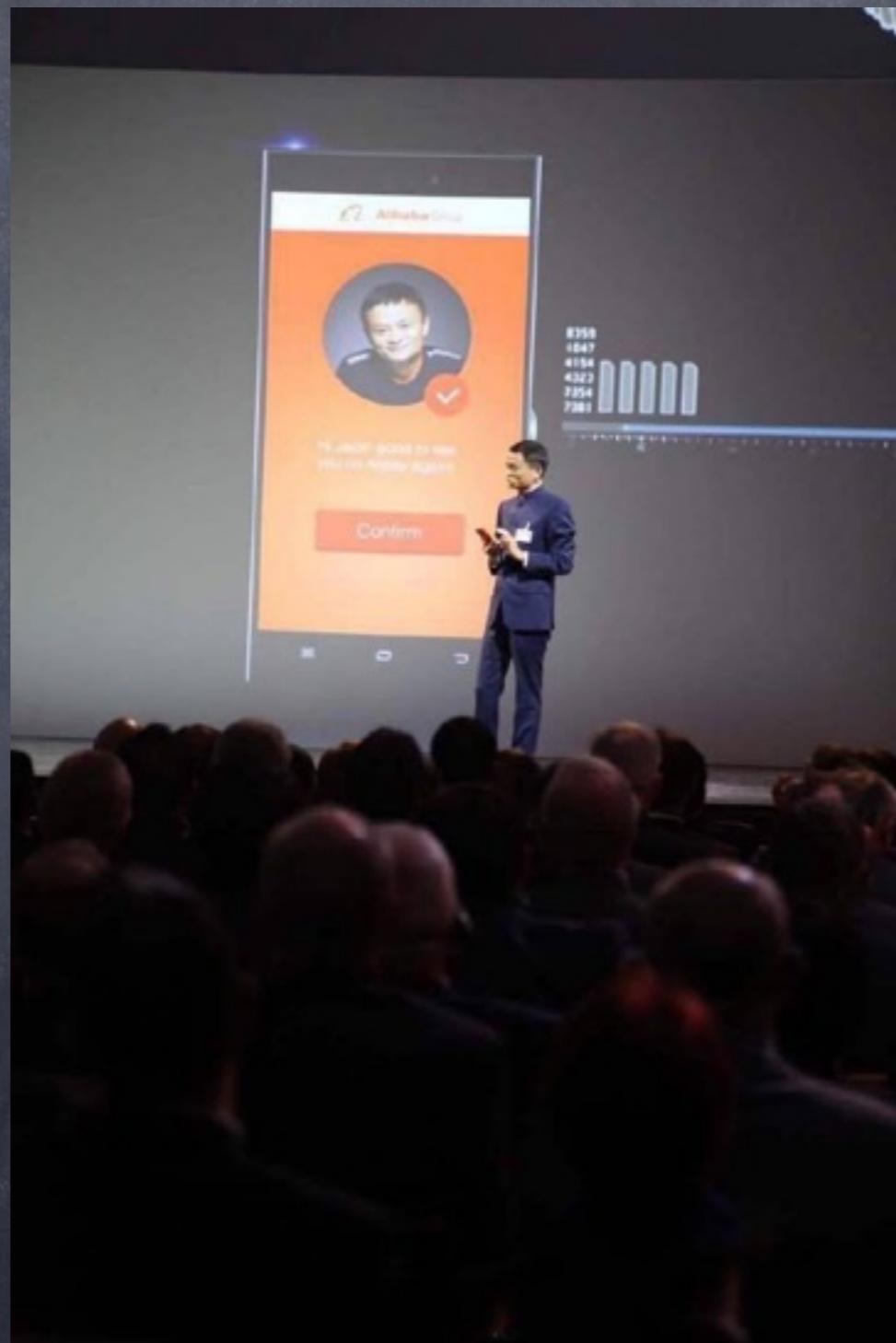
Google Deepmind

优酷

阿里巴巴“拍立淘”



阿里巴巴“扫脸支付”



百度“中国大脑”





Face++

技术 • 服务形式

- 技术服务简介 >

人脸识别

- 人脸检测、追踪 >

- 人脸关键点检测 >

人脸分析

- 微笑分析 >

- 性别、年龄、种族、表情 >

人脸识别

- 1:1人脸验证 >

- 1:N人脸识别 >

- 大规模人脸搜索 >

技术服务简介

Face++技术服务分为基础版和企业版。基础版通过API免费提供，企业版不仅有性能更好的API服务，还有离线SDK和定制化云服务等形式。



在线API

Face++提供人脸相关技术的在线API服务给开发者和企调用。企业版的API算法服务相对基础版会更好的性能。目前平台活跃着众多个人开发者，产生了大量新奇、有趣的应用。



离线SDK

Face++还提供了人脸相关技术的离线SDK授权给需要离线使用场景的企业和开发者付费使用。离线SDK可以灵活集成多种不同的人脸技术服务，并提供多种平台版本满足不同的需求。包括联想、360搜索、美图秀秀、Camera360等移动应用厂商正在使用此项服务。



定制云服务

Face++为有特殊需求的企业提供付费定制化的云服务。定制化云服务可以采用如下两种合作方式，Face++为企业开通专属调用地址，稳定使用Face++的人脸相关技术；企业亦可提供专属服务器资源，Face++提供专业的部署和维护人脸技术服务。目前Face++已经为世纪佳缘、珍爱网等互联网企业提供了此项服务。

格灵深瞳

深瞳消费者行为分析系统

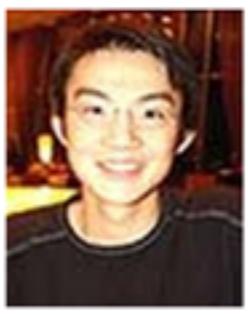
在电商大行其道的今天，我们为传统零售商提供更精准的数据和
更加客观的消费者行为分析，使得零售商能够为消费者提供更加精准高效的服务。





联合创始人 孟醒

- 全球最大博彩娱乐公司凯撒集团亚太区总经理，最年轻的财富500强亚太负责人
- 美国Orbeus计算机视觉公司创始CEO，世界领先的图像识别技术提供商
- 摩根大通亚洲投行部负责并购及IPO项目，完成项目总金额超600亿美金
- 麻省理工大学MBA，加州大学伯克利分校本科



联合创始人 侯晓迪

- 计算机视觉(Computer Vision)和神经学领域专家,11年计算机视觉领域研究经验
- 创立了基于频域的视觉注意机制分析理论 (Spectral Saliency Theory) , 在视觉注意机制领域最有影响力的研究。其学术文章被引用1500多次,为计算机视觉领域全世界华人博士生中被引用最多的作者
- 加州理工大学博士，上海交通大学本科

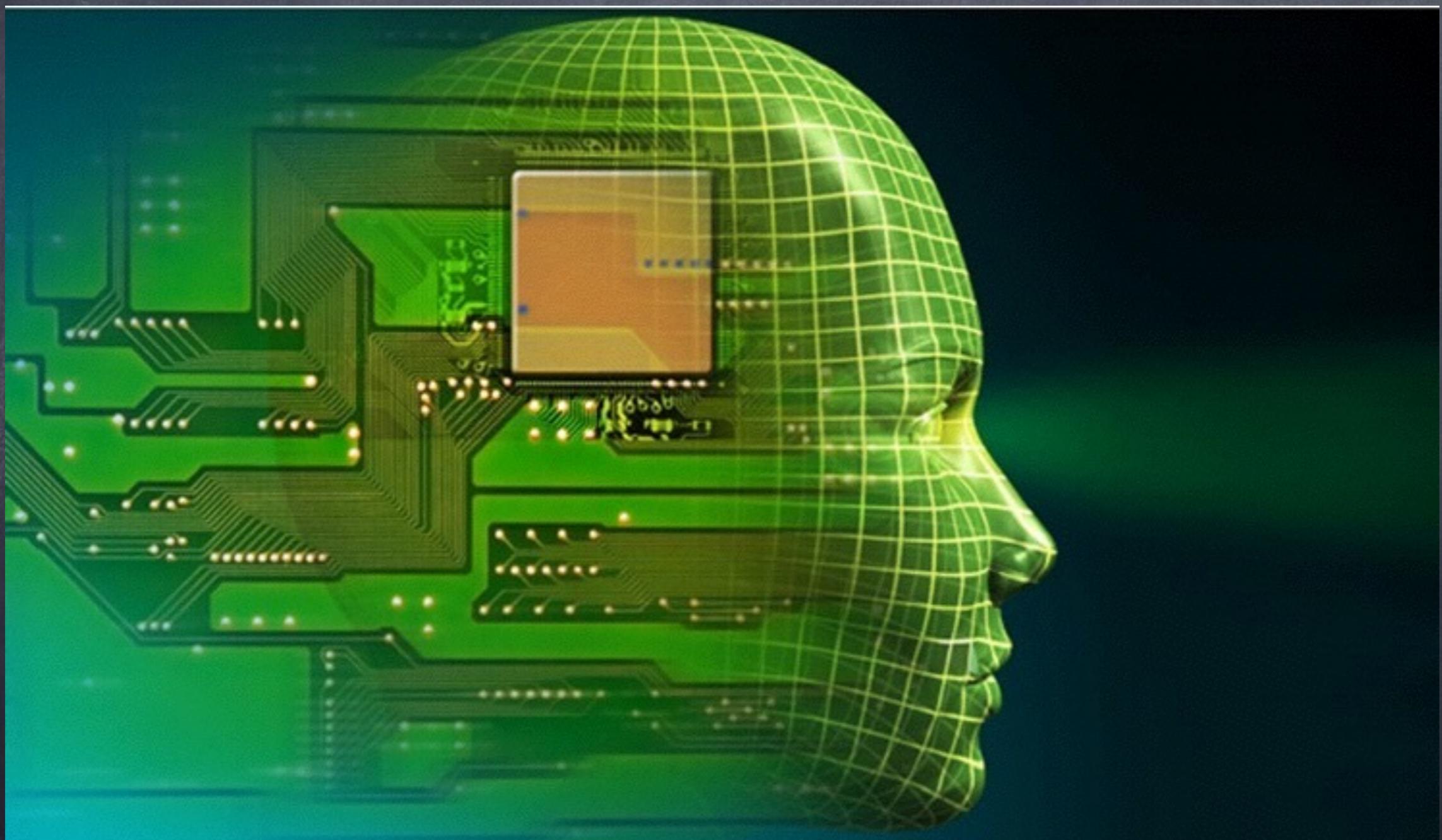


联合创始人 陈默

- 10年创业经历，曾经创立运营3家公司
- 苍穹广告创始人/CEO（国内最早的楼宇广告平台），公司成功出售
- 深蓝兄弟创始人/CEO（国内第二大的页游棋牌平台），公司成功出售
- 车国网创始人/CEO（国内最早的汽车O2O汽车交易平台）

当
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七

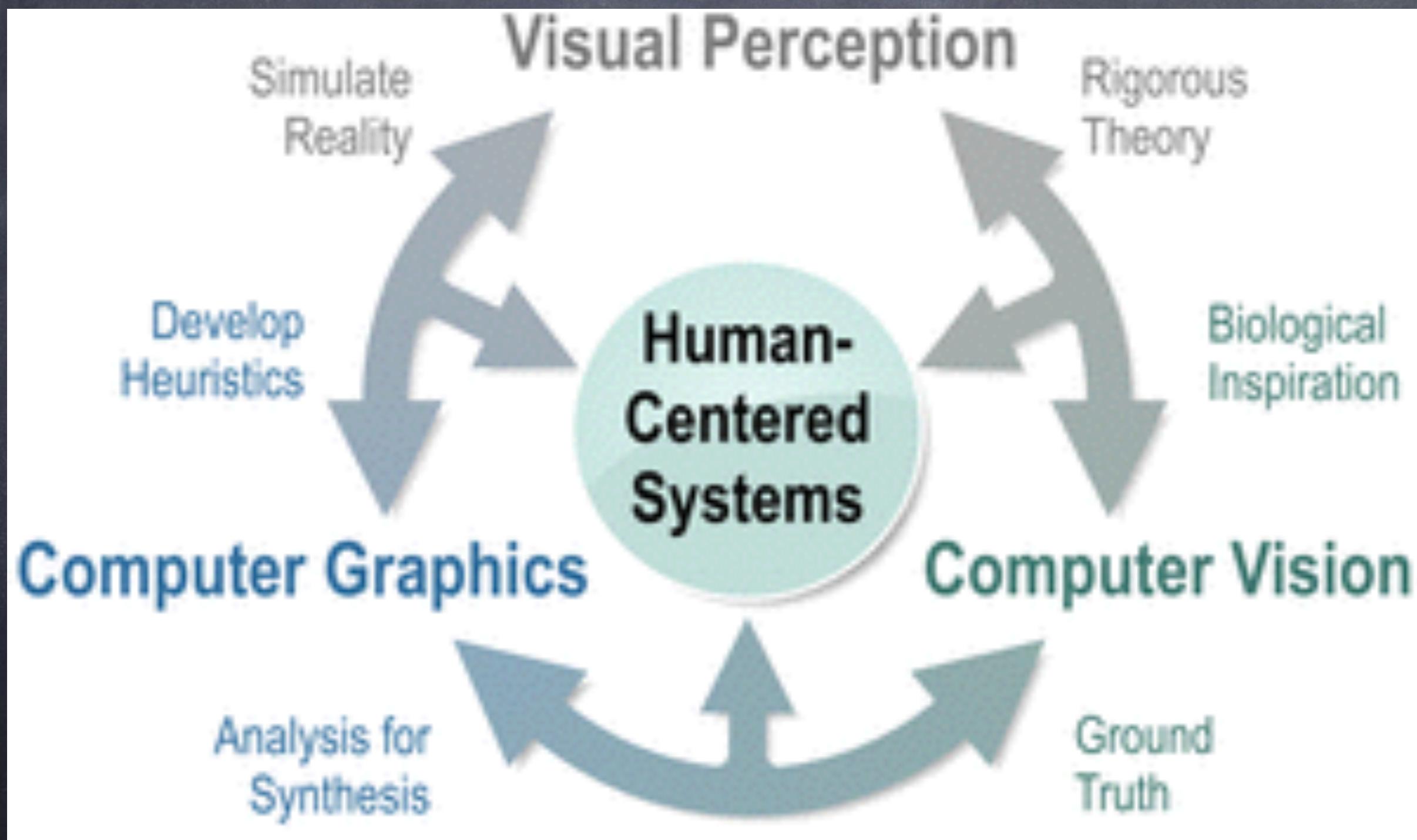
深度科学

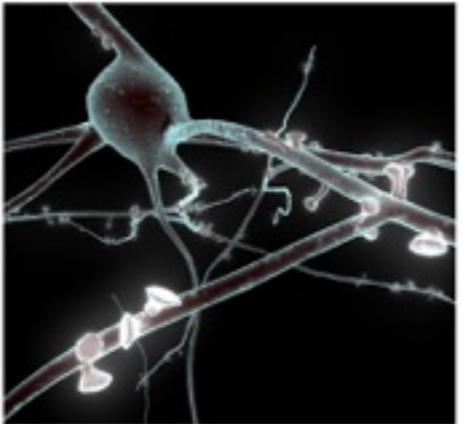


AI Spring ...



Human Vision

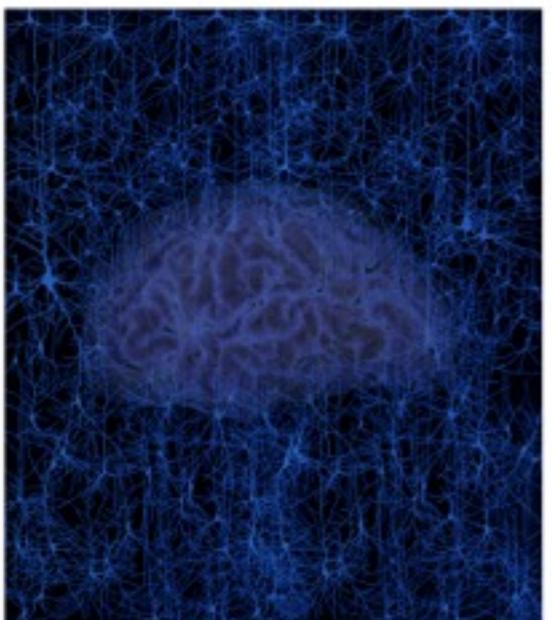




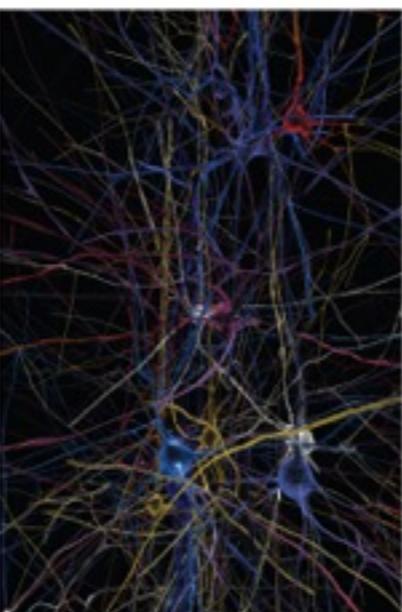
Single Neuron ©Blue Brain/HBP



Blue Brain Laboratory ©Thierry Parel/HBP



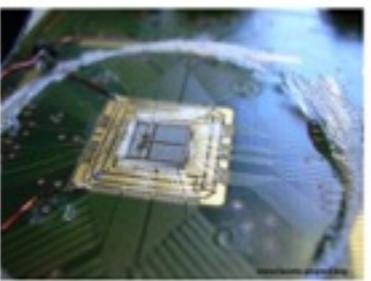
Brain and Neurons ©Defelipe Spain/HBP



Simulated Neural Network ©Blue Brain/HBP



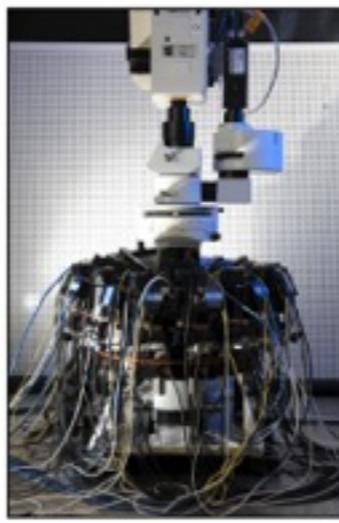
Petaflop Super Computer ©HPC Jülich/HBP



Neuromorphic Microchip ©Universität Heidelberg/HBP



IBM Blue Gene Super Computer ©Thierry Parel/HBP

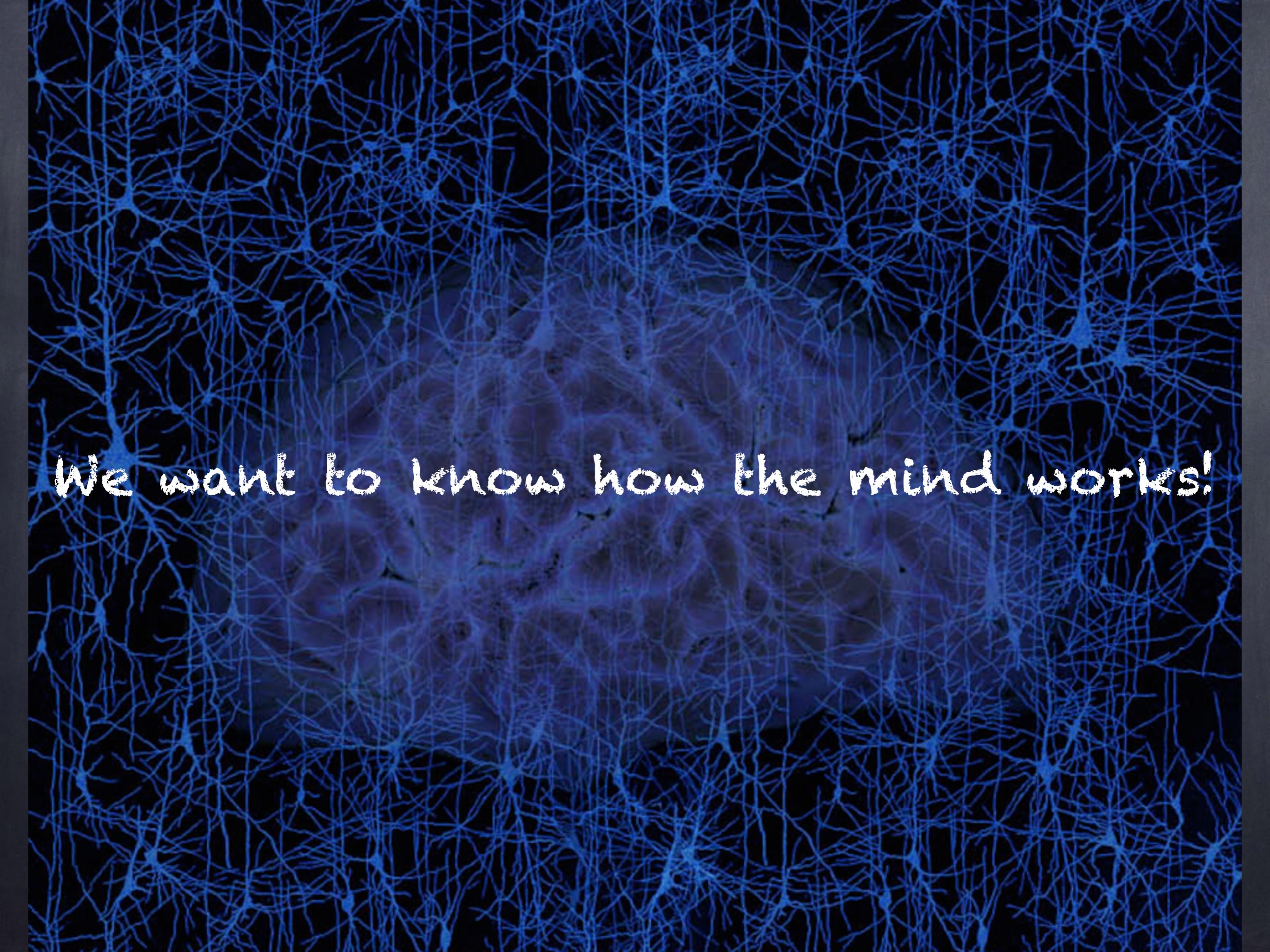


Patchclamp at EPFL ©Thierry Parel/HBP

HBP



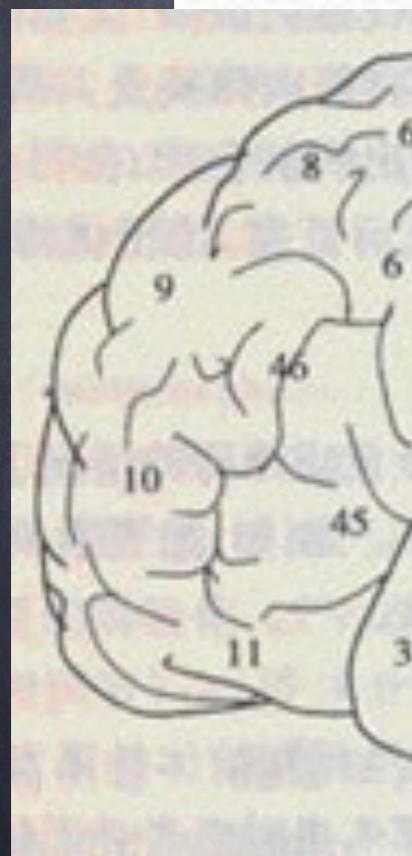
ne • Health Risks



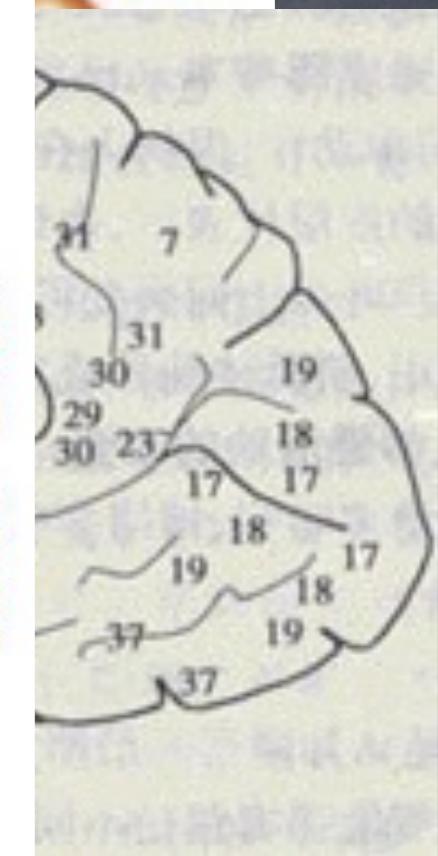
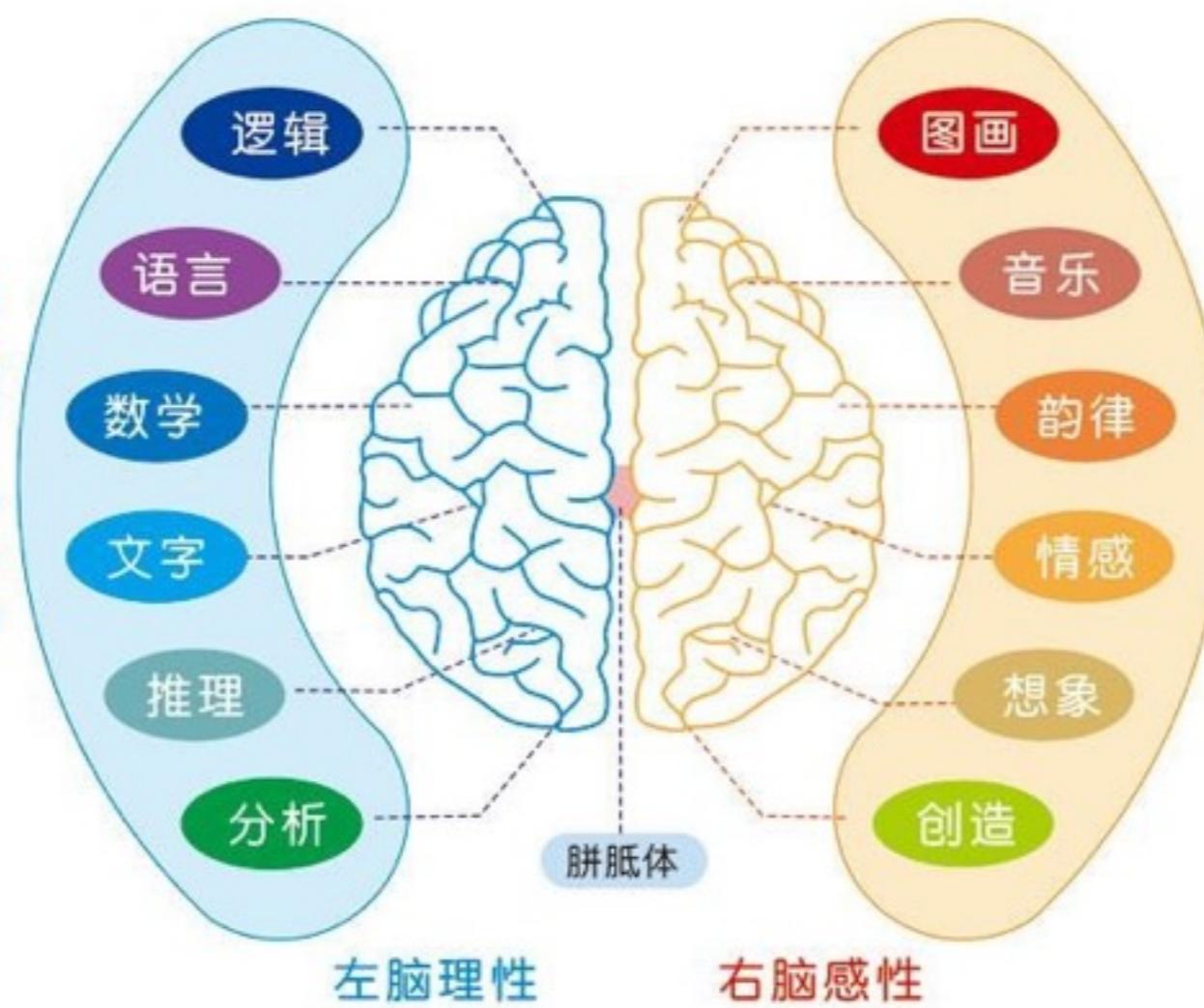
We want to know how the mind works!

Brain

左右脑功能图



抽象脑·学术脑



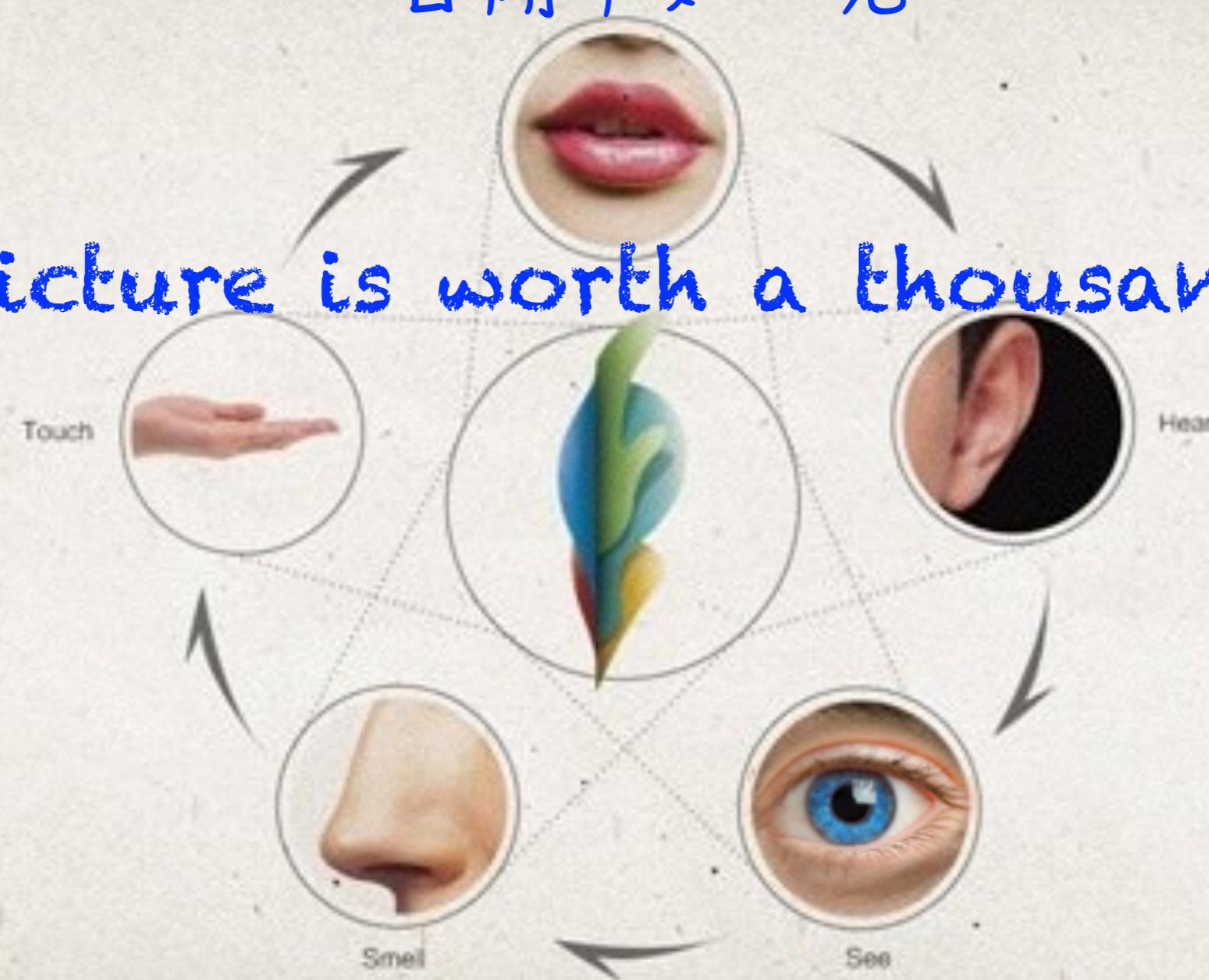
艺术脑·创造脑

【注】本图根据美国加州大学医学博士斯佩里教授的“左右脑分工”论文理论绘制。

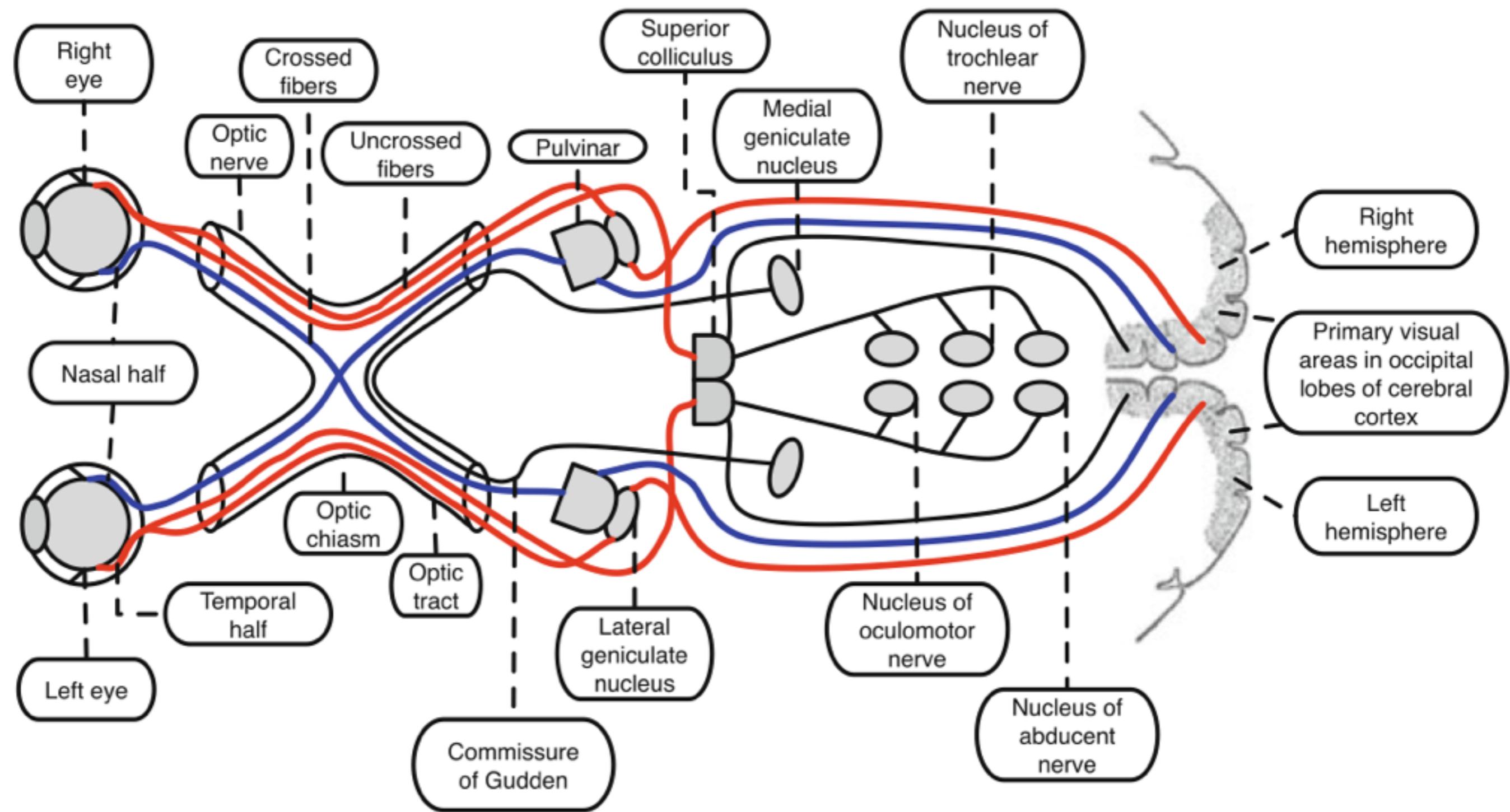
"Vision Animal"

百闻不如一见

a picture is worth a thousand words

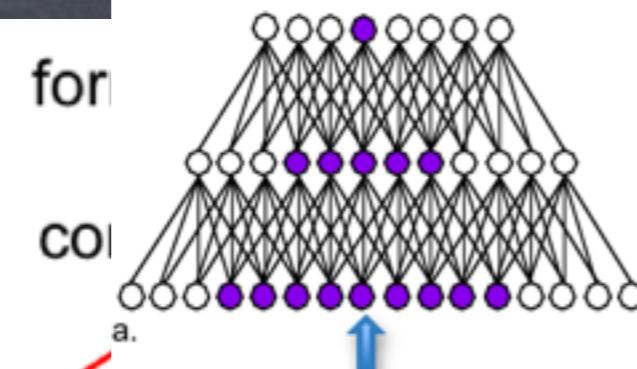


Visual Pathway

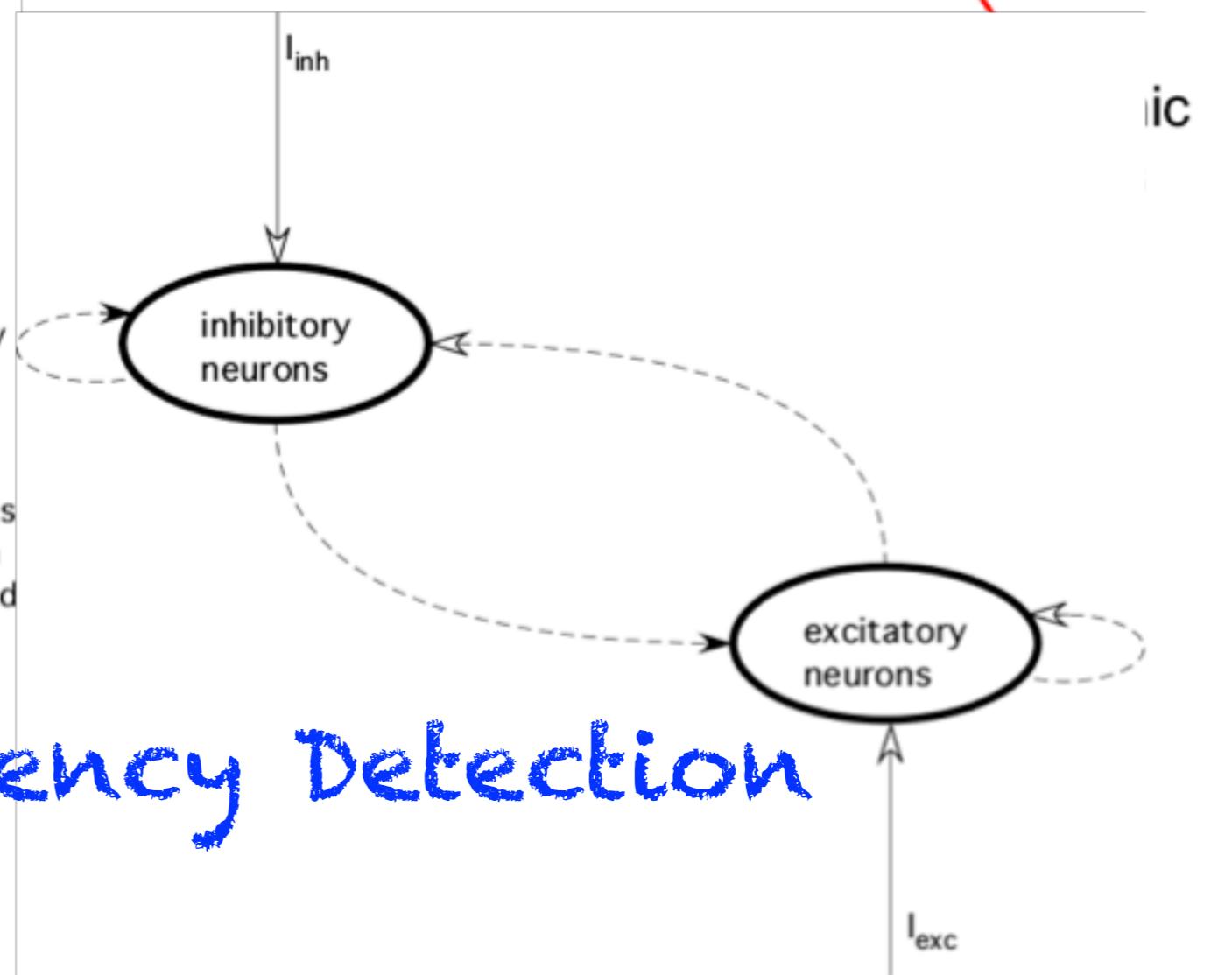
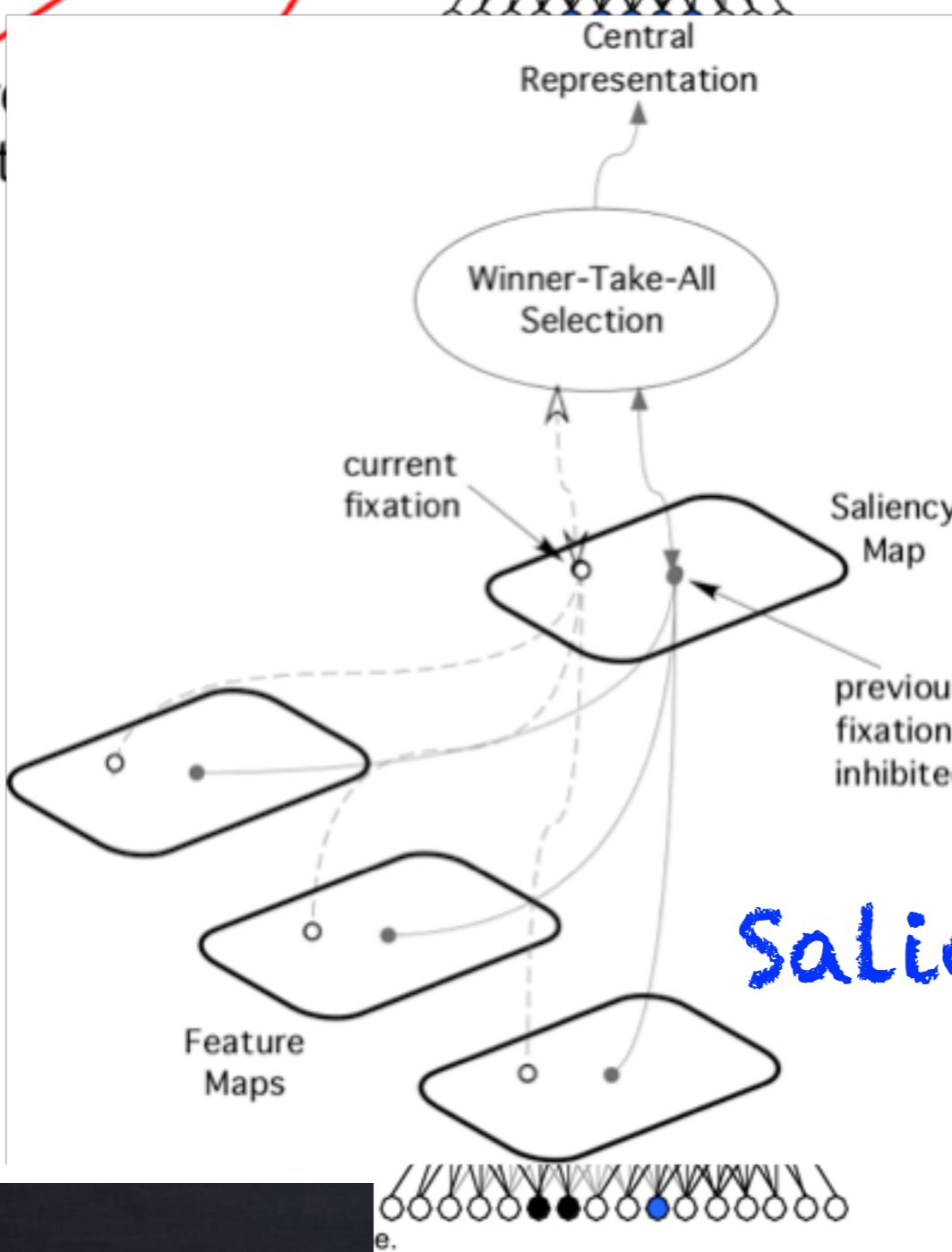




Deep Learning



inter
operat



Saliency Detection

tention in
vision

descriptive
models

ic

Vision & Learning

- ⦿ Computer Vision
- ⦿ Machine Learning
- ⦿ Machine Vision
- ⦿ Computer Graphics
- ⦿

REFERENCES

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- Aaron Swartz, "HOWTO: Be more productive".
- Image Search from Google, BaiDu and Bing.
- [http://www.scholarpedia.org/article/
Computational_models_of_visual_attention](http://www.scholarpedia.org/article/Computational_models_of_visual_attention)
- <http://vision.stanford.edu>
- <http://mmcheng.net>
-

The End

Get Started to

THINK DIFFERENTLY, IS BECDIFFERENT!

Thanks

Q&A



zhenghaiyong@gmail.com