national center for ontological research
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Social & Knowledge Engineering

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Outline

- Foundations
- System 1 and System 2
- Basic Model of Cognition

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ARGUMENTS RARELY CHANGE MINDS

Central Conceit

- Our focus will not be argumentation here

- Our concern will be the arts of persuasion, rhetoric, and social engineering in the context of knowledge engineering

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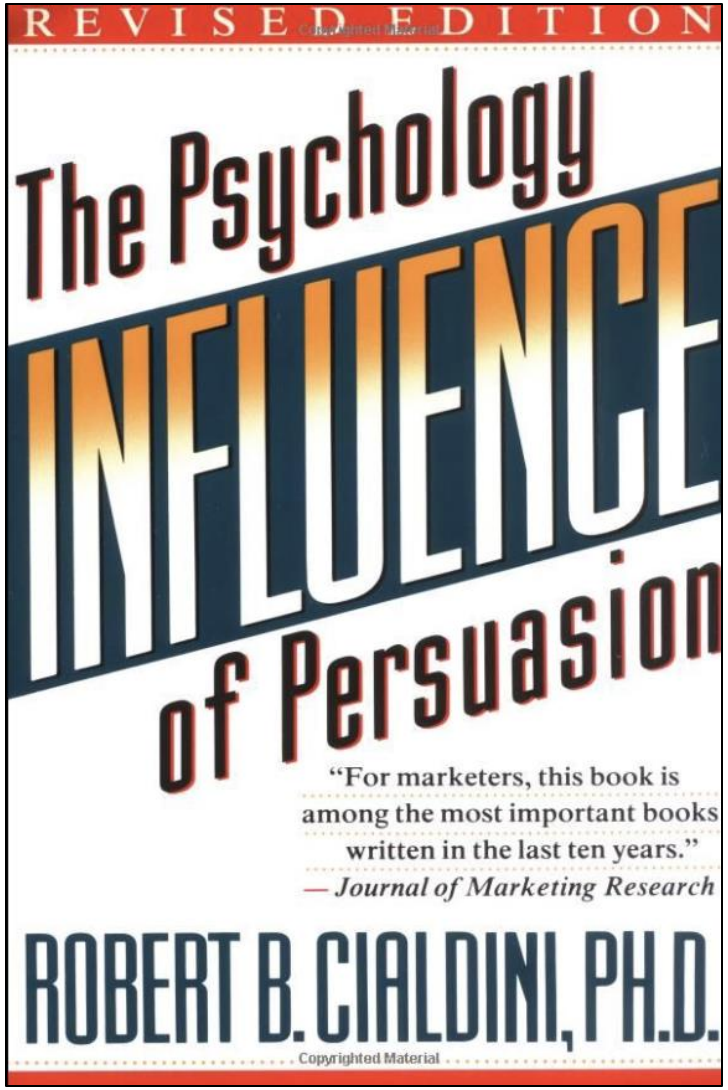
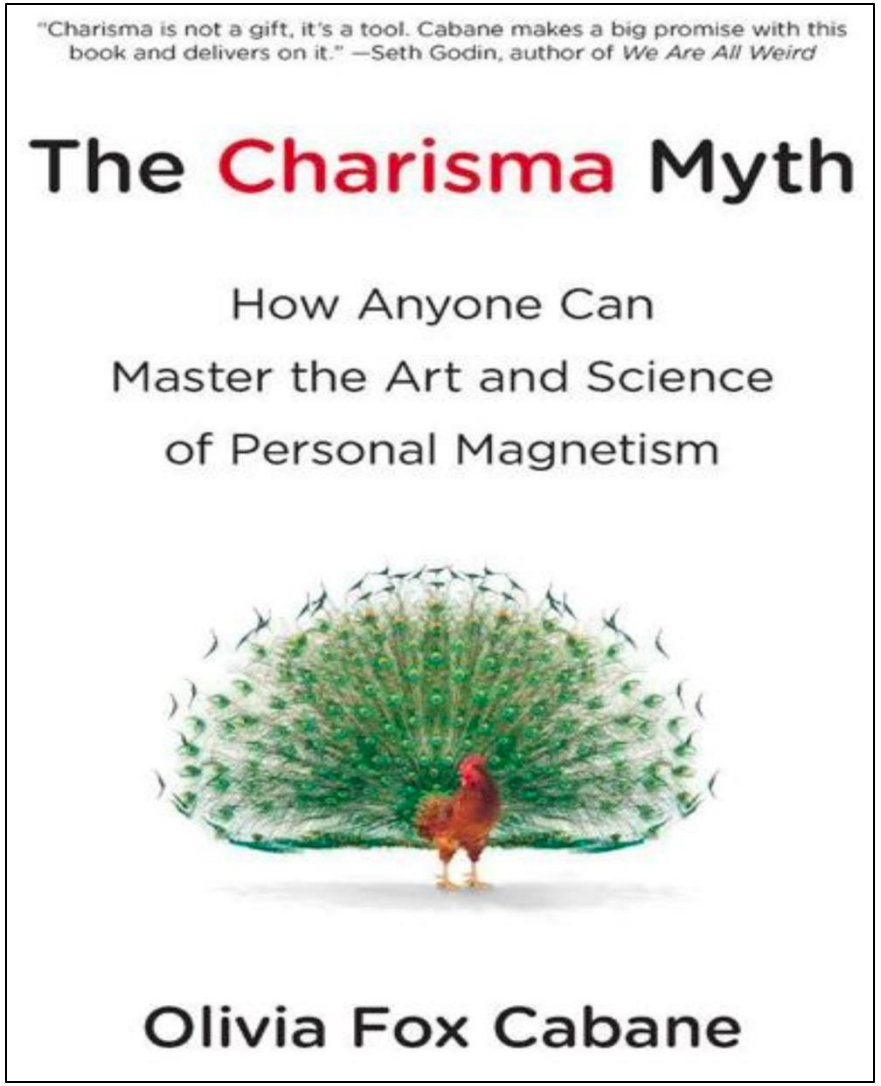
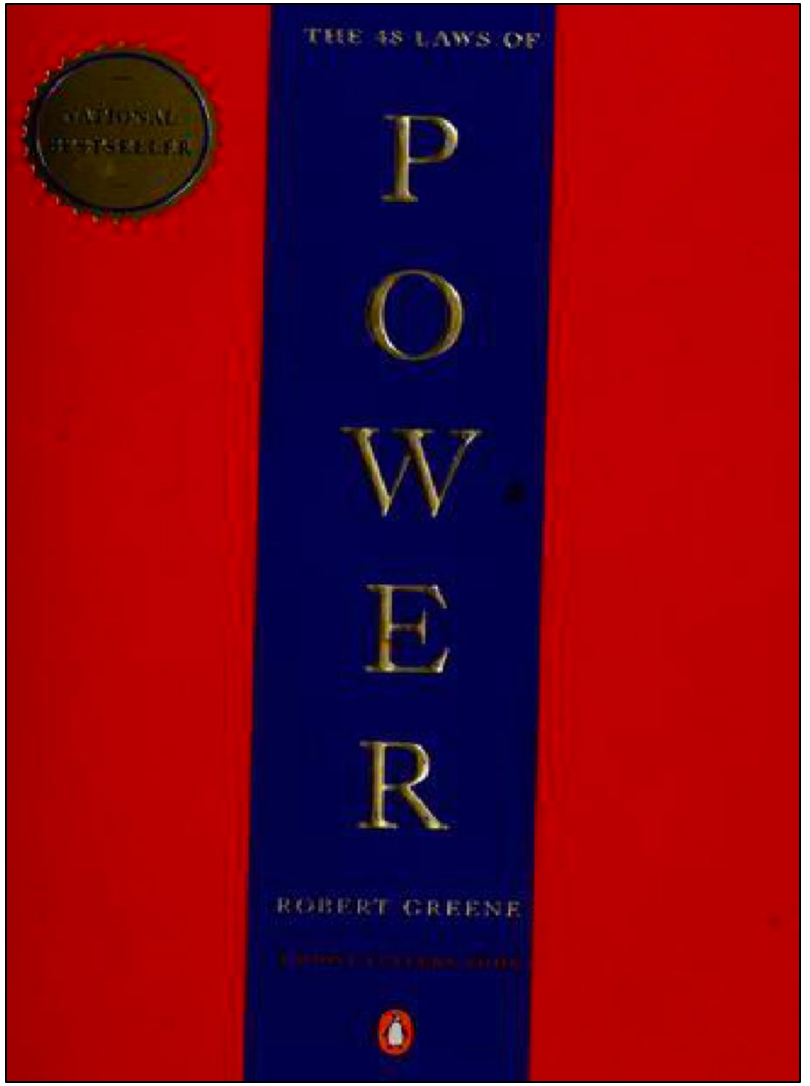
- Our concern will be the arts of persuasion, rhetoric, and social engineering in the contect of knowledge engineering

- You will leave this course better able to:
  - **Present your views**
  - **Convince others to accept your views**
  - **Defend against persuasion by others**







COURSE DIVIDED ROUGHLY ALONG THESE THREE GOALS

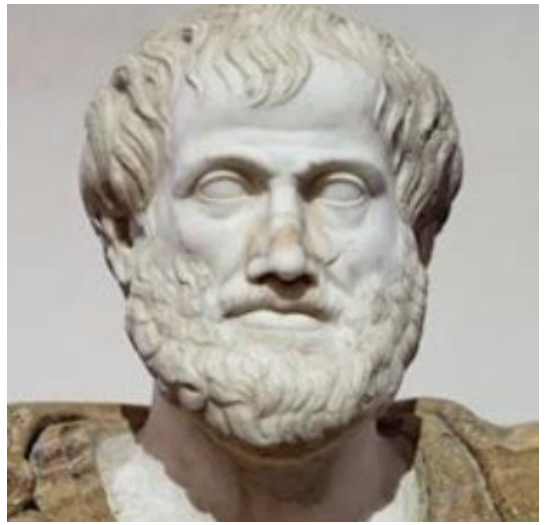
Skill

- Social engineering **is a skill** that can be trained
- It is not as easy to train as other skills, e.g. swinging a tennis racket well
- Training requires delving into your thinking habits, emotional states, triggers, etc.

THIS COURSE IS PSYCHOLOGICALLY CHALLENGING

“EXCELLENCE IS HARD”

-Aristotle



Gnothi Seaton

- We should share a common understanding of the tools at our disposal

- As well as their limitations

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System 1 & System 2

- Generally speaking, humans provide intuitive responses to problems we experience in the real world

- Unfortunately, not all problems are best solved that way

A BASEBALL BAT AND BALL COST $1.10 TOGETHER. THE BAT COSTS $1.00 MORE THAN THE BALL.

HOW MUCH DOES THE BALL COST?

System 1 & System 2

- Generally speaking, humans provide intuitive responses to problems we experience in the real world
- Unfortunately, not all problems are best solved that way
- This is largely true for **novel problems** and for **analytic problems**
- The bat and ball puzzle is an analytic problem, requiring a precise answer with minimal room for error

System 1 & System 2

- Researchers have suggested a plausible way to understand cognition is by way of two distinct systems which operate in parallel during reasoning

- System 1 is intuitive, fast, and coarse-grained

- System 2 is methodical, slow, and fine-grained

System 1 & System 2

- Researchers have suggested a plausible way to understand cognition is by way of two distinct systems which operate in parallel during reasoning

- 2+2 = ?

- System 2 is methodical, slow, and fine-grained

System 1 & System 2

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- System 1 is intuitive, fast, and coarse-grained

- 17 * 45 = ?

System 1 & System 2

- But we need to be intentional about when to use which

- Expert tennis players **should not be thinking** about how exactly to swing a racket, they should just swing

- Similarly, **you** should not spend time thinking about how you put one foot in front of another, you should just walk

System 1 & System 2

- One of the strategies we'll be developing in this course is identifying System 1 heuristics – intuitive judgments – you can trust

- Another is to teach you when it might be a good idea to rely on System 2 thinking

- Most importantly, we will aim to **train your trustworthy System 2 thinking so that is becomes System 1 thinking**

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Attention

- We're surrounded by a booming, buzzing, manifold of stimuli in our perceptual systems

- We're in fact bombarded with too much stimuli to recognize at any given time

- We restrict our attention to some parts of this perceptual manifold, whether it be visual, auditory, olfactory, etc. at any given time

Perceptual Encoding

- When we restrict our attention, we ignore – to some extent – other parts of our perceptual manifold

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- Suppose I'm looking for cufflinks before leaving for a show, but I can't find them in my drawer

- On the way to the show, I realize **that in fact I did** see them in the corner of the drawer, but I didn't **realize** that I saw them…

Perceptual Encoding

- Given the fallibility of our perceptual faculties in certain cases, we've to be on guard about what we attend to in our perception

- This is an issue because we simply can't attend to everything all the time

- We operate largely based on habits of thinking and action, making us susceptible to **perceptual illusions** generating problems downstream

Pattern Recognition

- We're disposed to recognize patterns with our perceptual faculties…

Pattern Recognition

- We're disposed to recognize patterns with our perceptual faculties…
- …and with our cognitive faculties…
- Clearly, sometimes these patterns are useful, sometimes not…
- Seems useful to **over-generate pattern recognition**, rather than **under-generate**

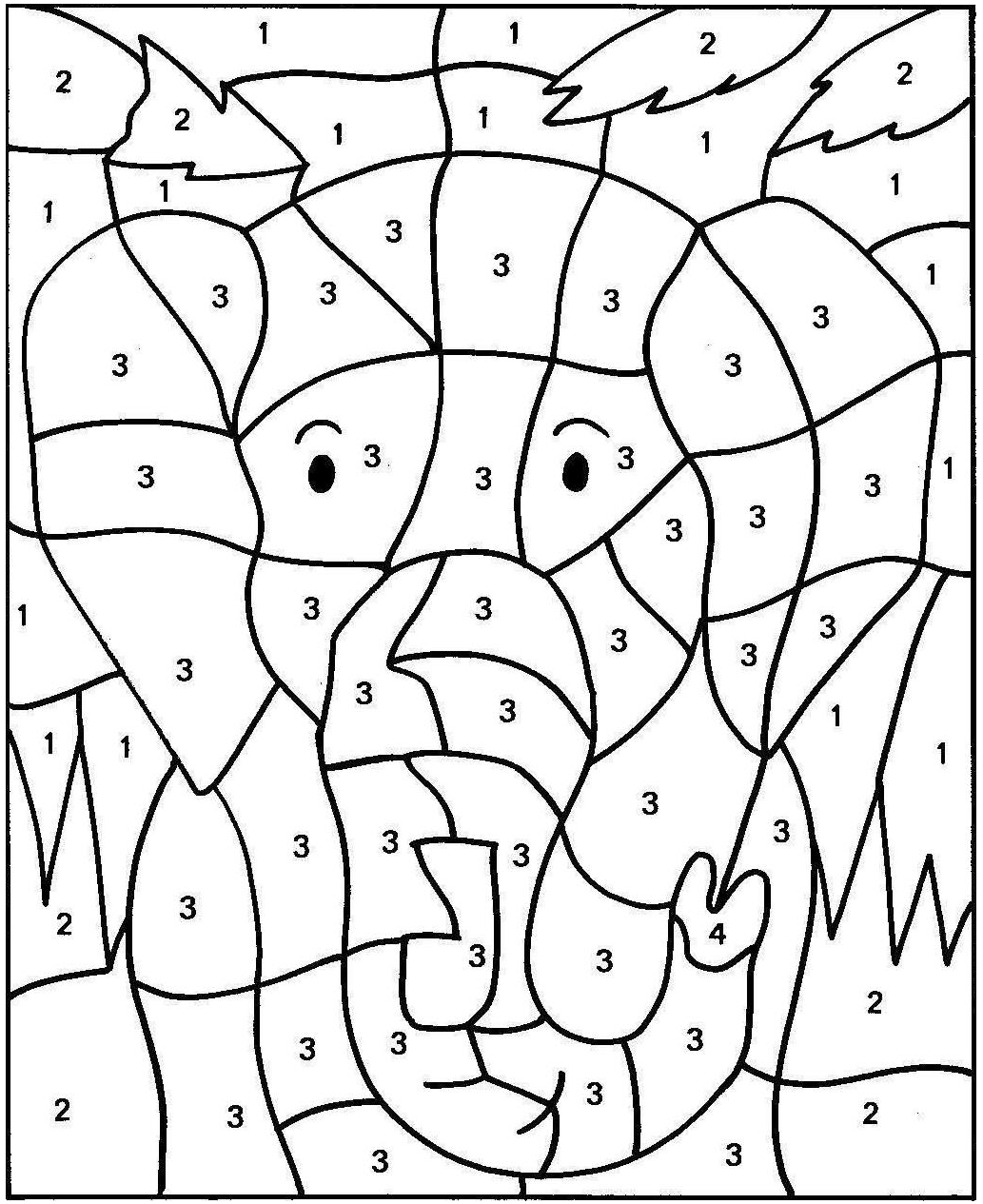
Person at a Time

- Added to this, we also have limited working memory, short, and long-term memory capacity

- Rather than attempt to memorize everything we attend to in our perceptual field, we **name** things and in part so we can **refer** to them later

Divide & Conquer

- Naming is something like a ‘divide-and-conquer’ strategy useful for entities with limited memory
- It allows us to break down complex information into digestible parts
- And this sort of strategy is generalizable in perhaps surprising ways…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WE WILL LEVERAGE PATTERN RECOGNITION TECHNIQUES TO IDENTIFY AND TRAIN PERSUASION TECHNIQUES

Conceptual Hierarchies

- Various terms we use for this or that phenomena carry with them **logical relationships** to other terms

- For example, when I say "dog" you know I also mean "mammal"

- Since anything that's a dog is also a mammal

Conceptual Hierarchies

- Such logical relationships form conceptual **hierarchies**
- Your concept of "dog" is related to your concept of "pet", "mammal", etc.
- There are, moreover, relationships among terms in these hierarchies
- For example, dogs are the sort of things that have tails as parts…

Group Question

Are there more words in the English language that begin with the letter "k" or that have the letter "k" in the third position?

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THERE ARE ABOUT 3 TIMES AS MANY WORDS IN ENGLISH THAT HAVE "K" IN THE THIRD POSITION

Availability Bias

- Most get this wrong, and it's thought this is so because rather than attempt to provide an actual statistical evaluation

- And the gut says something like "I can think of several words that start with "k" but not many that have "k" in the third position."

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- Which is to say you've encoded the relevant information in some hierarchy, and guess based on that hierarchy rather than by reflecting

System 1

Webs of Beliefs and Desires

- Attending to a portion of your perceptual manifold coupled with naming parts of that manifold, results in conceptual hierarchies

- And these inform beliefs and desires you have

- Which themselves form hierarchies, or **interconnected webs**

Webs of Beliefs and Desires

- For example, you likely believe 2+2=4 and that I'm bald
- But I suspect if you were forced to disbelieve one of those, it'd be easier to disbelieve that I'm bald (perhaps I'm using a tricky camera)
- In fact, if you had to disbelieve 2+2=4, then you'd have to disbelieve a **lot of other things too**
- Not so much with disbelieving that I'm bald…

Group Question

Do you think the number of African countries in the U.N. is greater than or less than 10?

How many African countries do you think are members of the U.N.?

Anchoring Bias

THERE ARE 54 AFRICAN NATIONS IN THE U.N.

- Most people provide a lower answer than 54 given this question setup; they've been **primed to think the** actual number is around 10

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- Anchoring is downstream from hierarchies, you're primed to use new, available, information to make a guess

System 1

Behaviors

- Attention to a portion of your perceptual manifold coupled with naming results in hierarchies of concepts, which inform webs of beliefs and desires…

- And these webs inform **behavior**

- You reach for the glass of water because you perceive it as potable water, and your desire to no longer be thirsty

Implicit & Explicit

- Sometimes we've **explicit** beliefs but we've also **implicit** beliefs too
- They often are in alignment
- I bet you explicitly believe that 2+2=4, largely because you've thought this before

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- Sometimes we've **explicit** beliefs but we've also **implicit** beliefs too
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- I bet you explicitly believe that 2+2=4, largely because you've thought this before
- But I bet you've never even thought about whether **I have five fingers on each hand**

Implicit & Explicit

- I bet you **believe I do though**

- Implicit beliefs are – roughly – those you'd agree you have if they're brought to your attention

- This is only rough though because sometimes we have implicit beliefs we'd reject

YOU HAVE IMPLICIT BELIEFS ABOUT PERSUASION THAT IMPACT YOUR BEHAVIOR, WHICH YOU WILL COME TO REJECT OVER THIS COURSE

Summary

- This is a skill-based course; you will be expected to train your social engineering muscles
- We will aim to identify trustworthy System 2 hueristics and train them into habituated System 1 heuristics
- Using our basic model of cognition to identify limitations and thus targets for our training