

Informatics 1 Cognitive Science

Lecture 3: Cognitive Science & The World

Maithilee Kunda

mkunda@ed.ac.uk

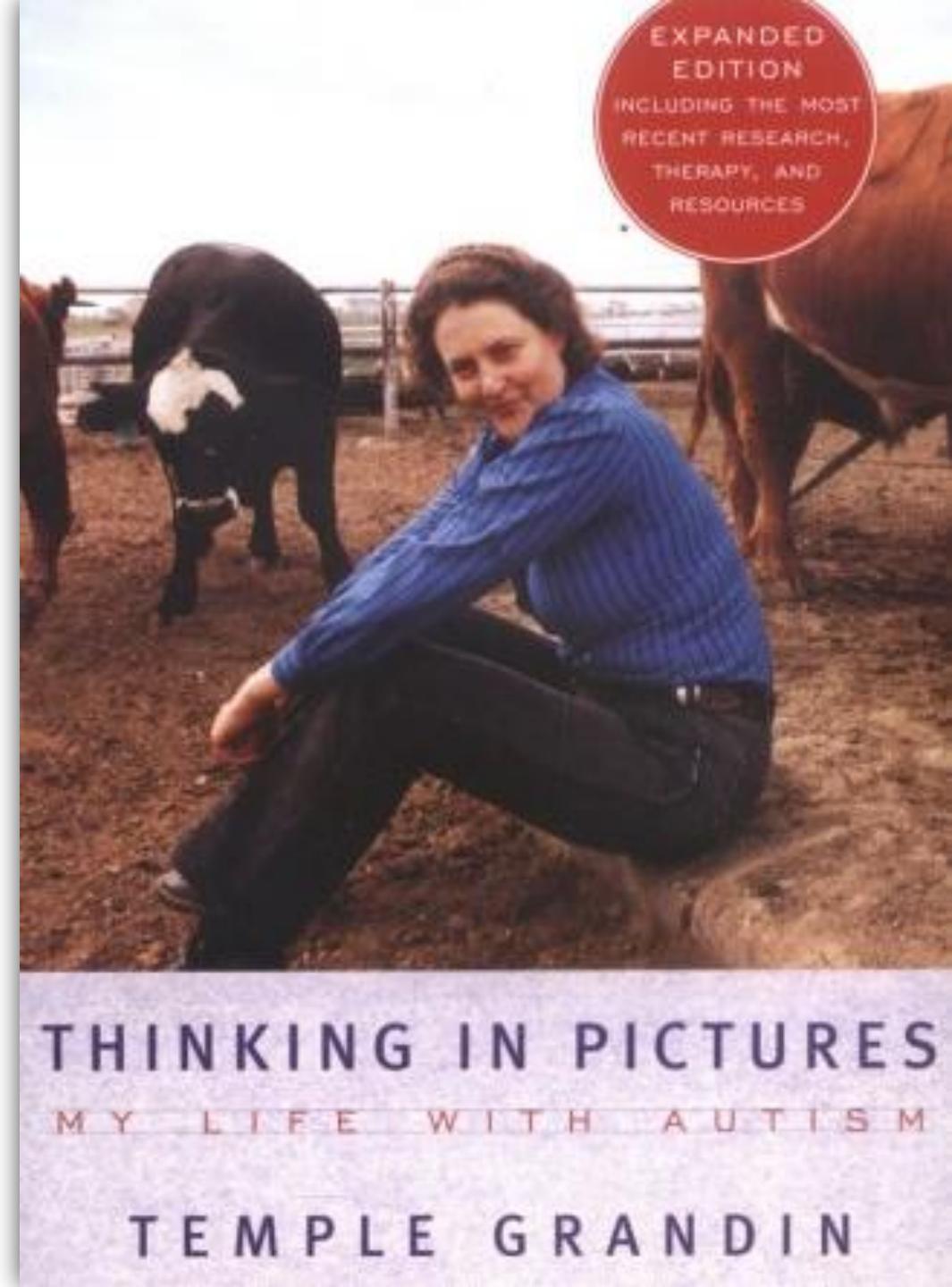
January 16, 2025

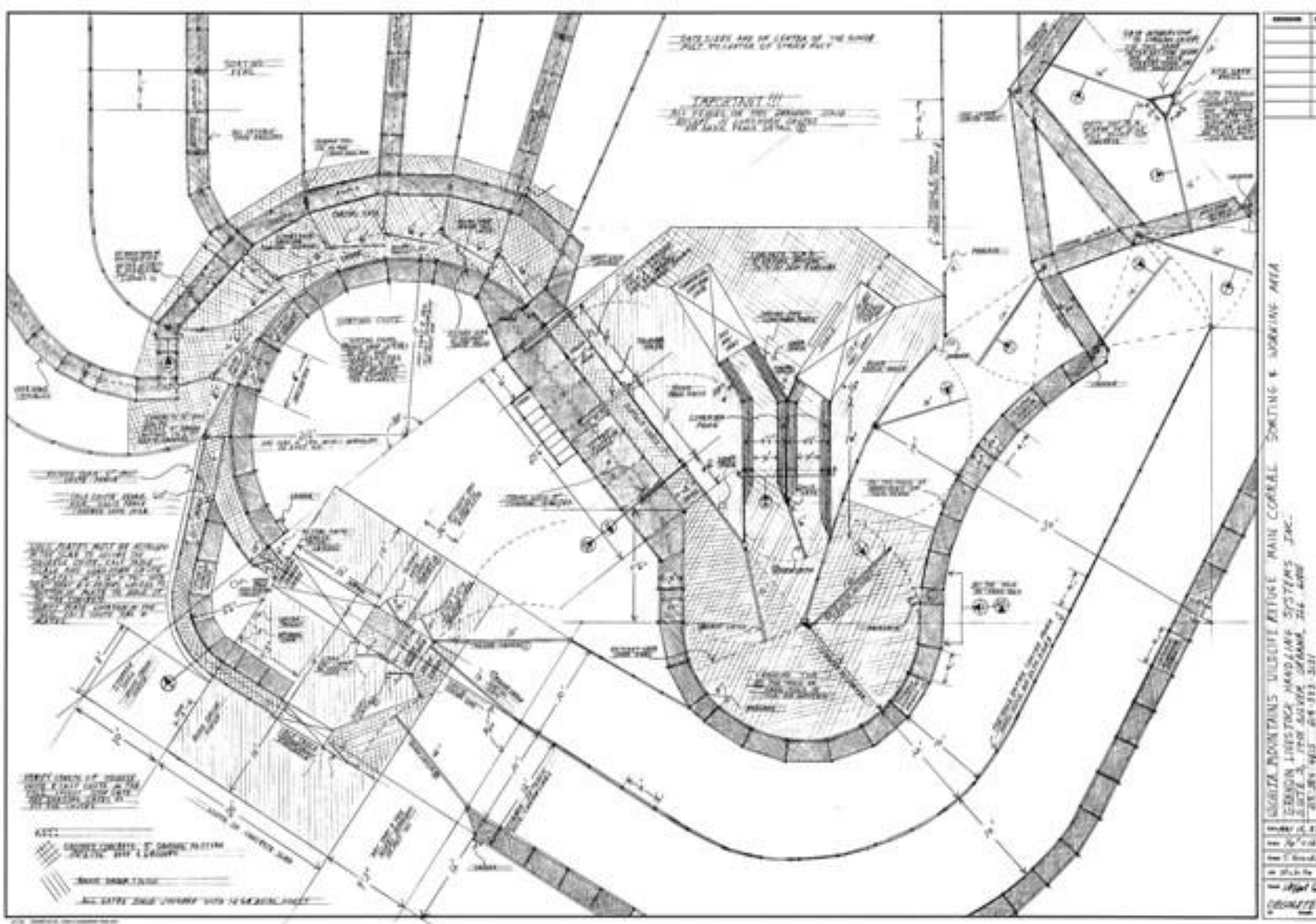
Outline

- Who is cognitive science about?
- Applications of cognitive science
- Ethical considerations

My origin story...

- Early in grad school, I read this book...

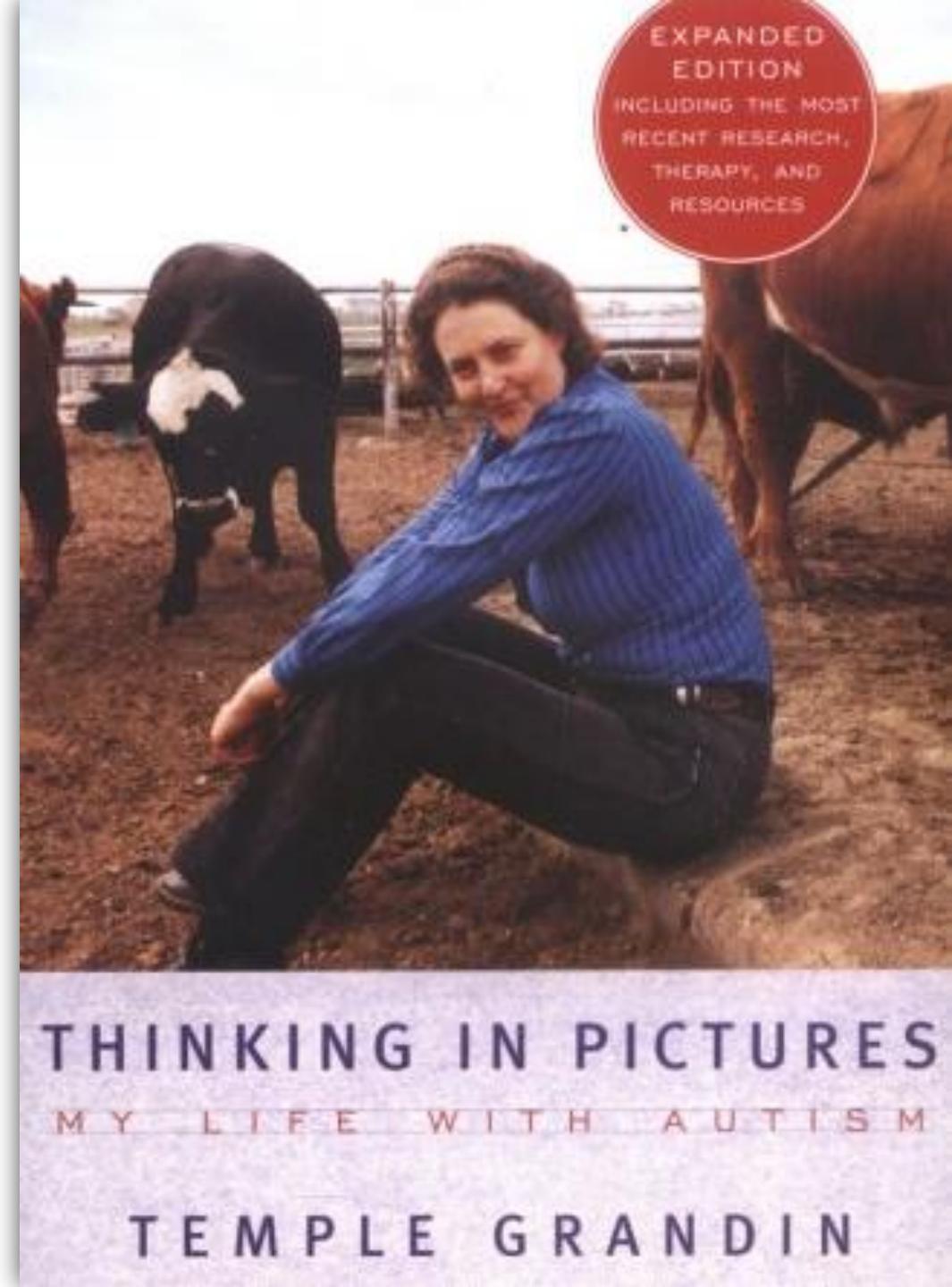




from <http://www.grandin.com>

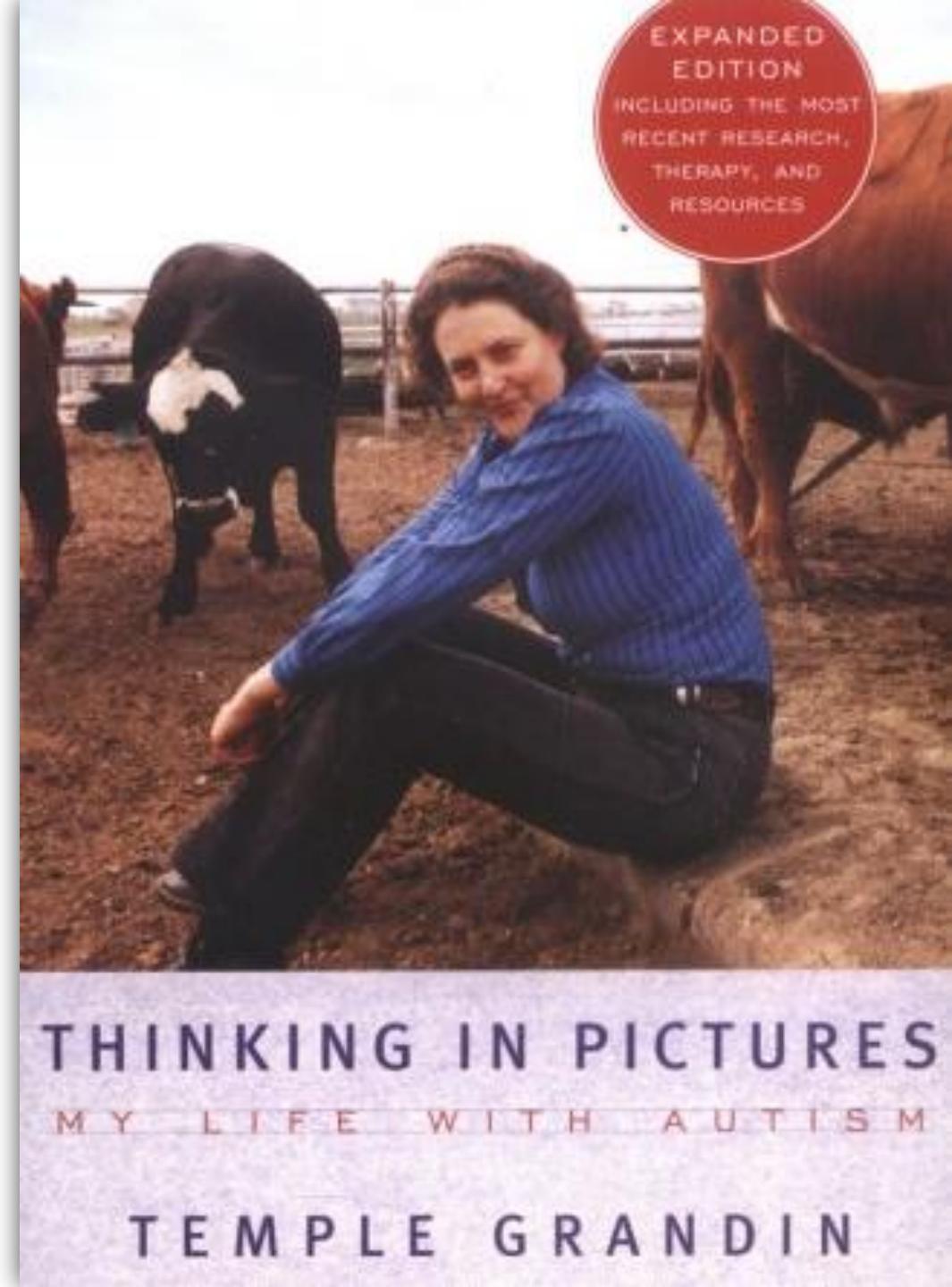
My origin story...

- Early in grad school, I read this book...



My origin story...

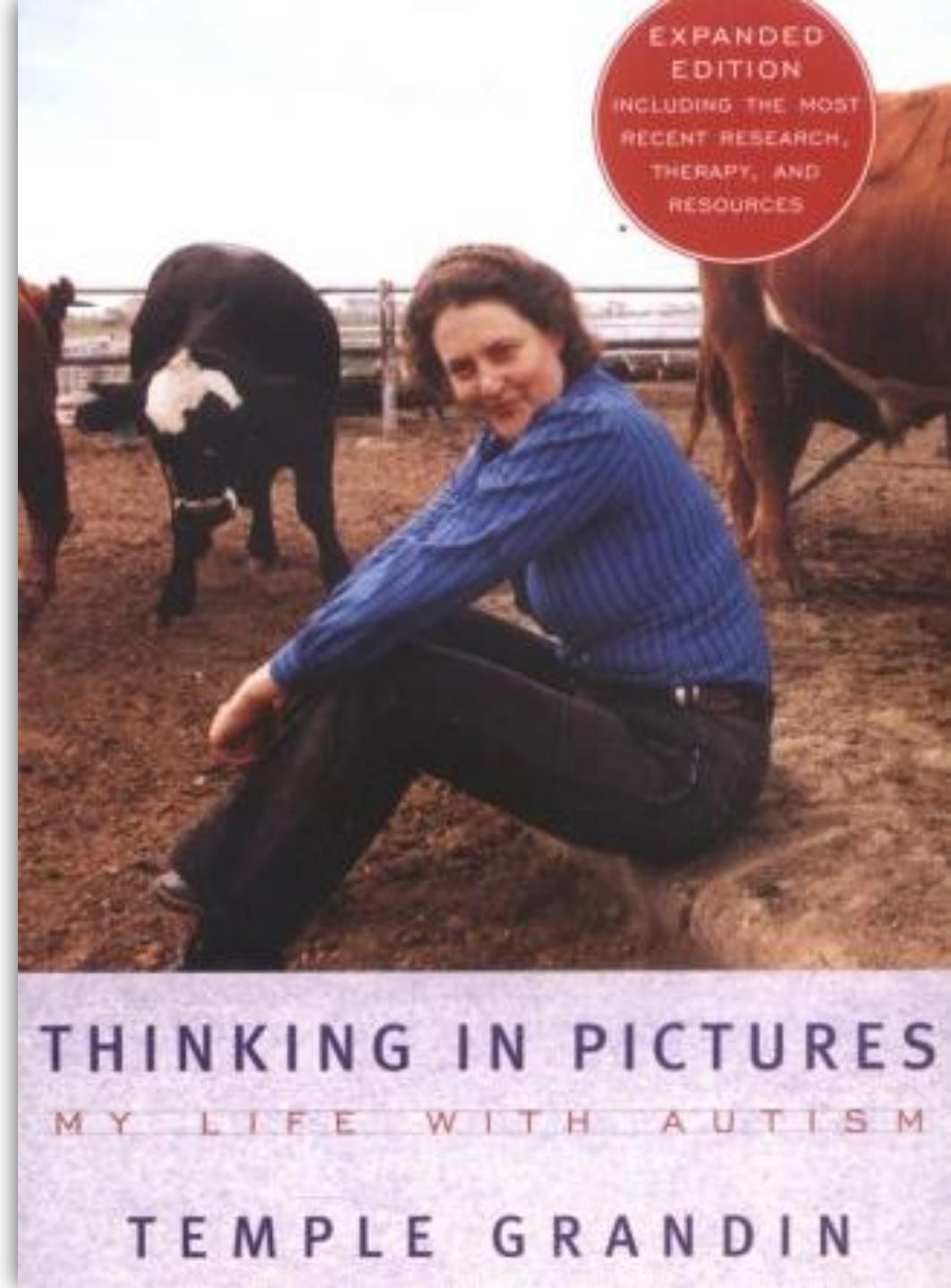
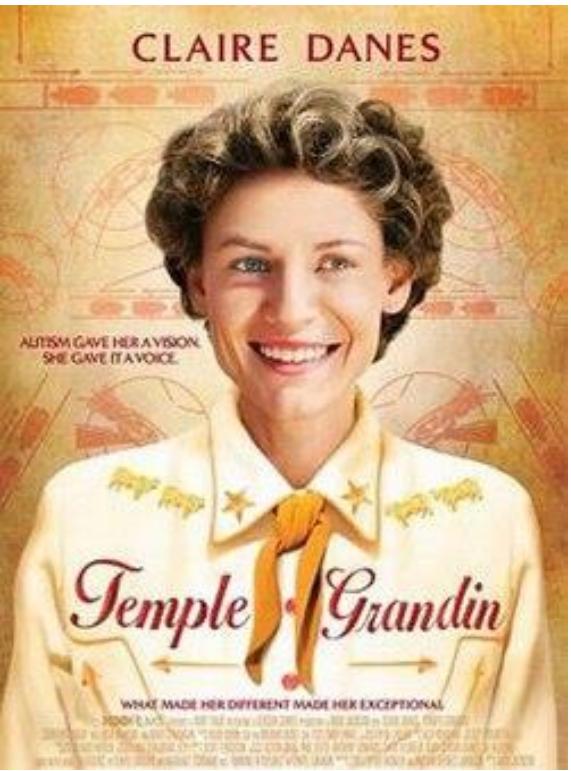
- Early in grad school, I read this book...
- How does this kind of thinking work??



My origin story...

- Early in grad school, I read this book...
- How does this kind of thinking work??

Highly recommend the book, and they also made a great movie with Claire Danes...



Cognitive science is often about how we are all the same...

- How is language learned?

Cognitive science is often about how we are all the same...

- How is language learned?
- How does visual perception work?

Cognitive science is often about how we are all the same...

- How is language learned?
- How does visual perception work?
- How do we form memories?

Cognitive science is often about how we are all the same...

- How is language learned?
- How does visual perception work?
- How do we form memories?
- How do we reason about ethical dilemmas?

HOWEVER: Cognitive science is also often about differences....

HOWEVER: Cognitive science is also often about differences....

- How is language learned?

HOWEVER: Cognitive science is also often about differences....

- How is language learned?

Why do babies learn language
differently from adults? (Remember
the “critical period”!)

HOWEVER: Cognitive science is also often about differences....

- How is language learned?

Why do babies learn language differently from adults? (Remember the “critical period”!)

Does knowing a different language change how a person thinks?

HOWEVER: Cognitive science is also often about differences....

- How is language learned?

Why do babies learn language differently from adults? (Remember the “critical period”!)

How do bilingual people think differently from mono-lingual people?

Does knowing a different language change how a person thinks?

HOWEVER: Cognitive science is also often about differences....

- How is language learned?

Does knowing a different language change how a person thinks?

Why do babies learn language differently from adults? (Remember the “critical period”!)

How do bilingual people think differently from mono-lingual people?

Why do some autistic people have trouble learning language? What strengths might they develop in exchange?

HOWEVER: Cognitive science is also often about differences....

- How is language learned?

Why do babies learn language differently from adults? (Remember the “critical period”!)

How do bilingual people think differently from mono-lingual people?

Does knowing a different language change how a person thinks?

Do people who are blind or deaf learn language differently?

Why do some autistic people have trouble learning language? What strengths might they develop in exchange?

HOWEVER: Cognitive science is also often about differences....

- How is language learned?

Why do babies learn language differently from adults? (Remember the “critical period”!)

How do bilingual people think differently from mono-lingual people?

Why do some autistic people have trouble learning language? What strengths might they develop in exchange?

Does knowing a different language change how a person thinks?

Do people who are blind or deaf learn language differently?

How might brain damage affect language?

HOWEVER: Cognitive science is also often about differences....

- How is language learned?

Why do babies learn language differently from adults? (Remember the “critical period”!)

How do bilingual people think differently from mono-lingual people?

Why do some autistic people have trouble learning language? What strengths might they develop in exchange?

Does knowing a different language change how a person thinks?

Does ChatGPT really “understand” what it is talking about, in the way that people do?

Do people who are blind or deaf learn language differently?

How might brain damage affect language?

HOWEVER: Cognitive science is also often about differences....

- How is language learned?

Why do babies learn language differently from adults? (Remember the “critical period”!)

How do bilingual people think differently from mono-lingual people?

Why do some autistic people have trouble learning language? What strengths might they develop in exchange?

Does knowing a different language change how a person thinks?

Can nonhuman primates (like chimpanzees) learn human sign language?

Does ChatGPT really “understand” what it is talking about, in the way that people do?

Do people who are blind or deaf learn language differently?

How might brain damage affect language?

HOWEVER: Cognitive science is also often about differences....

- How is language learned?

Why do babies learn language differently from adults? (Remember the “critical period”!)

How do bilingual people think differently from mono-lingual people?

Why do some autistic people have trouble learning language? What strengths might they develop in exchange?

Does knowing a different language change how a person thinks?

Can nonhuman primates (like chimpanzees) learn human sign language?

How did human language evolve, and why us?

Does ChatGPT really “understand” what it is talking about, in the way that people do?

Do people who are blind or deaf learn language differently?

How might brain damage affect language?

HOWEVER: Cognitive science is also often about differences....

- How is language learned?

Why do babies learn language differently from adults? (Remember the “critical period”!)

How do bilingual people think differently from mono-lingual people?

Why do some autistic people have trouble learning language? What strengths might they develop in exchange?

Does knowing a different language change how a person thinks?

Can nonhuman primates (like chimpanzees) learn human sign language?

How did human language evolve, and why us?

Does ChatGPT really “understand” what it is talking about, in the way that people do?

Do people who are blind or deaf learn language differently?

How might brain damage affect language?

Can we translate whale language? How would we know if we were right?

Now it's your turn! (Discussion activity in pairs)

Now it's your turn! (Discussion activity in pairs)

How can we study a cognitive phenomenon to understand differences in how it manifests?

Now it's your turn! (Discussion activity in pairs)

How can we study a cognitive phenomenon to understand differences in how it manifests?

- Let's do the phenomenon of: Emotions
- Emotions were not very well studied for a long time, and we still know relatively little about how they work.

Now it's your turn! (Discussion activity in pairs)

How can we study a cognitive phenomenon to understand differences in how it manifests?

- Let's do the phenomenon of: Emotions
- Emotions were not very well studied for a long time, and we still know relatively little about how they work.
- Instead of just saying “How do emotions work?”...

Come up with two different concrete questions that emphasize WHOSE emotions you would study, and why.

Next step... Two pairs together!

- Join your pair with another pair.
- Share your FOUR examples amongst your group.

Next step... Two pairs together!

- Join your pair with another pair.
- Share your FOUR examples amongst your group.
- Can we have a few volunteers to tell us one interesting example from your group?

Who is cognitive science about?

Who is cognitive science about?

- People...

Who is cognitive science about?

- People... but which people????

Who is cognitive science about?

- People... but which people???? This is not a trivial question!

Who is cognitive science about?

- People... **but which people????** This is not a trivial question!
 - Babies, adults, elderly?

Who is cognitive science about?

- People... **but which people????** This is not a trivial question!
 - Babies, adults, elderly?
 - Neurotypical or neurodivergent?

Who is cognitive science about?

- People... **but which people????** This is not a trivial question!
 - Babies, adults, elderly?
 - Neurotypical or neurodivergent?
 - Healthy, with brain damage, with other cognitive conditions?

Who is cognitive science about?

- People... **but which people???? This is not a trivial question!**
 - Babies, adults, elderly?
 - Neurotypical or neurodivergent?
 - Healthy, with brain damage, with other cognitive conditions?
 - People from different cultures?

Who is cognitive science about?

- People... **but which people???? This is not a trivial question!**
 - Babies, adults, elderly?
 - Neurotypical or neurodivergent?
 - Healthy, with brain damage, with other cognitive conditions?
 - People from different cultures?
 - People from different socioeconomic backgrounds?

Who is cognitive science about?

- People... **but which people???? This is not a trivial question!**
 - Babies, adults, elderly?
 - Neurotypical or neurodivergent?
 - Healthy, with brain damage, with other cognitive conditions?
 - People from different cultures?
 - People from different socioeconomic backgrounds?
 - People with different expertise?

Who is cognitive science about?

- People... **but which people???? This is not a trivial question!**
 - Babies, adults, elderly?
 - Neurotypical or neurodivergent?
 - Healthy, with brain damage, with other cognitive conditions?
 - People from different cultures?
 - People from different socioeconomic backgrounds?
 - People with different expertise?
 - People with different life experiences?

Who is cognitive science about?

- People... **but which people???? This is not a trivial question!**
 - Babies, adults, elderly?
 - Neurotypical or neurodivergent?
 - Healthy, with brain damage, with other cognitive conditions?
 - People from different cultures?
 - People from different socioeconomic backgrounds?
 - People with different expertise?
 - People with different life experiences?
 - Each person as a unique individual?

Who is cognitive science about?

- People... **but which people????** This is not a trivial question!
 - Babies, adults, elderly?
 - Neurotypical or neurodivergent?
 - Healthy, with brain damage, with other cognitive conditions?
 - People from different cultures?
 - People from different socioeconomic backgrounds?
 - People with different expertise?
 - People with different life experiences?
 - Each person as a unique individual?



shoutout to
creativity !

Who is cognitive science about?

- People... **but which people????** This is not a trivial question!
 - Babies, adults, elderly?
 - Neurotypical or neurodivergent?
 - Healthy, with brain damage, with other cognitive conditions?
 - People from different cultures?
 - People from different socioeconomic backgrounds?
 - People with different expertise?
 - People with different life experiences?
 - Each person as a unique individual?
- Animals (as species AND as individuals!), machines, aliens.....



shoutout to
creativity !

Cognitive science has been kind of bad at this...

Cognitive science has been kind of bad at this...

BEHAVIORAL AND BRAIN SCIENCES (2010) 33, 61–135
doi:10.1017/S0140525X0999152X

The weirdest people in the world?

Joseph Henrich

Department of Psychology and Department of Economics, University of British Columbia, Vancouver V6T 1Z4, Canada
joseph.henrich@gmail.com
<http://www.psych.ubc.ca/~henrich/home.html>

Steven J. Heine

Department of Psychology, University of British Columbia, Vancouver V6T 1Z4, Canada
heine@psych.ubc.ca

Ara Norenzayan

Department of Psychology, University of British Columbia, Vancouver V6T 1Z4, Canada
ara@psych.ubc.ca

Abstract: Behavioral scientists routinely publish broad claims about human psychology and behavior in the world's top journals based on samples drawn entirely from Western, Educated, Industrialized, Rich, and Democratic (WEIRD) societies. Researchers – often implicitly – assume that either there is little variation across human populations or that these "standard subjects" are as

Cognitive science has been kind of bad at this...

BEHAVIORAL AND BRAIN SCIENCES (2010) 33, 61–135
doi:10.1017/S0140525X0999152X

The weirdest people in the world?

“Behavioral scientists routinely publish broad claims about human psychology and behavior ... based on samples drawn entirely from Western, Educated, Industrialized, Rich, and Democratic (WEIRD) societies.

Researchers – often implicitly – assume that either there is little variation across human populations, or that these “standard subjects” are as representative of the species as any other population.

Are these assumptions justified?”

Joseph Henrich

Department of Psychology and Department of Economics, University of British Columbia, Vancouver V6T 1Z4, Canada
joseph.henrich@gmail.com
<http://www.psych.ubc.ca/~henrich/home.html>

Steven J. Heine

Department of Psychology, University of British Columbia, Vancouver V6T 1Z4, Canada
heine@psych.ubc.ca

Ara Norenzayan

Department of Psychology, University of British Columbia, Vancouver V6T 1Z4, Canada
ara@psych.ubc.ca

about human psychology and behavior in the world’s top journals based on samples drawn entirely from Western, Educated, Industrialized, Rich, and Democratic (WEIRD) societies. Researchers – often implicitly – assume that either there is little variation across human populations, or that these “standard subjects” are as representative of the species as any other population.

Sometimes we don't study a group enough...
sometimes we study them too much!

- Story about when I was a postdoc...

Sometimes we don't study a group enough...
sometimes we study them too much!

- Story about when I was a postdoc...
- Disability community slogan: “Nothing about us, without us.”

Sometimes we don't study a group enough...
sometimes we study them too much!

- Story about when I was a postdoc...
- Disability community slogan: “Nothing about us, without us.”
- Participatory research, as opposed to purely researcher-driven research

Sometimes we don't study a group enough...
sometimes we study them too much!

- Story about when I was a postdoc...
- Disability community slogan: “Nothing about us, without us.”
- Participatory research, as opposed to purely researcher-driven research
- This is also why having diverse cognitive scientists is important!

Outline

- Who is cognitive science about?
- Applications of cognitive science
- Ethical considerations

Applications of cognitive science

Applications of cognitive science

- **Basic science** - How do we form long-term memories?
 - Story about Patient HM, a famous psychology patient

Applications of cognitive science

- **Basic science** - How do we form long-term memories?
 - Story about Patient HM, a famous psychology patient
- **Medical research** – How can we detect Alzheimer's early?

Applications of cognitive science

- **Basic science** - How do we form long-term memories?
 - Story about Patient HM, a famous psychology patient
- **Medical research** – How can we detect Alzheimer's early?
- **Education** – How can we help children learn strong maths skills?

Applications of cognitive science

- **Basic science** - How do we form long-term memories?
 - Story about Patient HM, a famous psychology patient
- **Medical research** – How can we detect Alzheimer's early?
- **Education** – How can we help children learn strong maths skills?
- **Product (and UX) design** – How can we make apps more secure?

Applications of cognitive science

- **Basic science** - How do we form long-term memories?
 - Story about Patient HM, a famous psychology patient
- **Medical research** – How can we detect Alzheimer's early?
- **Education** – How can we help children learn strong maths skills?
- **Product (and UX) design** – How can we make apps more secure?
- **Work** – How can we help air traffic controllers avoid fatigue?

Applications of cognitive science

- **Basic science** - How do we form long-term memories?
 - Story about Patient HM, a famous psychology patient
- **Medical research** – How can we detect Alzheimer's early?
- **Education** – How can we help children learn strong maths skills?
- **Product (and UX) design** – How can we make apps more secure?
- **Work** – How can we help air traffic controllers avoid fatigue?
- **Politics** – Why do people decide to vote a particular way?

Applications of cognitive science

- **Basic science** - How do we form long-term memories?
 - Story about Patient HM, a famous psychology patient
- **Medical research** – How can we detect Alzheimer's early?
- **Education** – How can we help children learn strong maths skills?
- **Product (and UX) design** – How can we make apps more secure?
- **Work** – How can we help air traffic controllers avoid fatigue?
- **Politics** – Why do people decide to vote a particular way?
- **Mental health** – How can we help people form good habits?

Applications of cognitive science

- **Basic science** - How do we form long-term memories?
 - Story about Patient HM, a famous psychology patient
- **Medical research** – How can we detect Alzheimer's early?
- **Education** – How can we help children learn strong maths skills?
- **Product (and UX) design** – How can we make apps more secure?
- **Work** – How can we help air traffic controllers avoid fatigue?
- **Politics** – Why do people decide to vote a particular way?
- **Mental health** – How can we help people form good habits?

==> Cognitive science can help in many careers! (Story about a student)

Now it's your turn! (Discussion activity in pairs – Try to pair up with someone different!)

Come up with two applications of cognitive science that you think would be cool, interesting, or helpful for the world.

Now it's your turn! (Discussion activity in pairs – Try to pair up with someone different!)

Come up with two applications of cognitive science that you think would be cool, interesting, or helpful for the world.

Brainstorming hint: Often it is easier if you imagine someone specific!

Now it's your turn! (Discussion activity in pairs – Try to pair up with someone different!)

Come up with two applications of cognitive science that you think would be cool, interesting, or helpful for the world.

Brainstorming hint: Often it is easier if you imagine someone specific!

- What is something would directly benefit you?

Now it's your turn! (Discussion activity in pairs – Try to pair up with someone different!)

Come up with two applications of cognitive science that you think would be cool, interesting, or helpful for the world.

Brainstorming hint: Often it is easier if you imagine someone specific!

- What is something that would directly benefit you?
- Or, what is something that would benefit one of your family members?

Now it's your turn! (Discussion activity in pairs – Try to pair up with someone different!)

Come up with two applications of cognitive science that you think would be cool, interesting, or helpful for the world.

Brainstorming hint: Often it is easier if you imagine someone specific!

- What is something that would directly benefit you?
- Or, what is something that would benefit one of your family members?
- Or, imagine a specific person who is completely different from you in certain ways. What would help them?

Next step... Two pairs together!

- Join your pair with another pair.
- Share your FOUR examples amongst your group.

Next step... Two pairs together!

- Join your pair with another pair.
- Share your FOUR examples amongst your group.
- Can we have a few volunteers to tell us one interesting example from your group?

Outline

- Who is cognitive science about?
- Applications of cognitive science
- Ethical considerations

So far, we covered “positive” applications... but there can be negative applications too

“The man behind our ability to endlessly scroll through content on social media sites... said he regrets what his invention has done to society.

Aza Raskin is the creator of "infinite scroll".... He said he designed the service to create the most seamless experience possible for users, but did not foresee the consequences.

Mr Raskin... said infinite scroll was one of the first products designed to not simply help a user, but to deliberately keep them online for as long as possible.

"I regret that I didn't think more about how this thing would be used," he told The Times. "I know as a designer that by taking away the stopping cue, I can make you do what I want you to do."..."

Knowles, T. (2019, April 27). I'm so sorry, says inventor of endless online scrolling. The Times. <https://www.thetimes.co.uk/article/i-m-so-sorry-says-inventor-of-endless-online-scrolling-9lrv59mdk>

Types of ethical considerations

Types of ethical considerations

- Applications
 - Is it helping? Is it hurting?

Types of ethical considerations

- Applications
 - Is it helping? Is it hurting?
 - Can it be misused, and if so, whose responsibility is that?

Types of ethical considerations

- Applications
 - Is it helping? Is it hurting?
 - Can it be misused, and if so, whose responsibility is that?
- Research design
 - Who do we study? Is it fair? Do we get their consent?

Types of ethical considerations

- Applications
 - Is it helping? Is it hurting?
 - Can it be misused, and if so, whose responsibility is that?
- Research design
 - Who do we study? Is it fair? Do we get their consent?
 - People who are incarcerated, people from different cultures, people from lower socioeconomic backgrounds, students (!)

Types of ethical considerations

- Applications
 - Is it helping? Is it hurting?
 - Can it be misused, and if so, whose responsibility is that?
- Research design
 - Who do we study? Is it fair? Do we get their consent?
 - People who are incarcerated, people from different cultures, people from lower socioeconomic backgrounds, students (!)
 - Animal experimentation

Types of ethical considerations

- Applications
 - Is it helping? Is it hurting?
 - Can it be misused, and if so, whose responsibility is that?
- Research design
 - Who do we study? Is it fair? Do we get their consent?
 - People who are incarcerated, people from different cultures, people from lower socioeconomic backgrounds, students (!)
 - Animal experimentation
- Addressing biases

Types of ethical considerations

- Applications
 - Is it helping? Is it hurting?
 - Can it be misused, and if so, whose responsibility is that?
- Research design
 - Who do we study? Is it fair? Do we get their consent?
 - People who are incarcerated, people from different cultures, people from lower socioeconomic backgrounds, students (!)
 - Animal experimentation
- Addressing biases
 - Eugenics – a lot of racism cloaked in research on “intelligence”

Types of ethical considerations

- Applications
 - Is it helping? Is it hurting?
 - Can it be misused, and if so, whose responsibility is that?
- Research design
 - Who do we study? Is it fair? Do we get their consent?
 - People who are incarcerated, people from different cultures, people from lower socioeconomic backgrounds, students (!)
 - Animal experimentation
- Addressing biases
 - Eugenics – a lot of racism cloaked in research on “intelligence”
 - Research on gender differences, e.g., in STEM careers

Summary

- Who is cognitive science about?
 - Many different people (and/or animals and/or machines)
 - We can study commonalities as well as differences.
 - Age, gender, socioeconomic status, culture, neurodevelopment, personality, expertise, family background...
- Applications of cognitive science
 - Basic science plus practical applications in virtually every area of life
- Ethical considerations
 - Both positive and negative applications are possible.
 - Research design matters, for people and also for animals.
 - Cognitive science can interact with our biases, for better or for worse.