Beyond Uncertainty

IBICT 2019

11th November 2019

Cuban Missile Crisis

A case of uncertainty?

An Uncertain scenario

- The Cuban Missile Crisis (see WP, US Gov) can be seen as a clear example of Uncertainty epistemology
- The two parties (US/USSR) don't have the full picture of the situation, and have limited resources (time, money, negotiation power) to establish an objective truth (number of missiles in Cuba/readiness of US counter-attack)
- Investing resources (e.g., send a reconnaissance airplane) gets you closer to truth ("I have seen 3 missiles" → there are at least 3 missiles)
- Ultimately, the two superpowers will either get the perfect picture (unlikely), or finish time and be left with some uncertainty

Post-modernism

“The Unreal”

Contemporary perspectives

Social construction of reality

Post-truth

Subjectivism

Contemporary Perspectives

- As computer scientists, we might think that our world is uncertain, but this is not enough!
- This lecture explores some post-Simon perspectives on epistemology, looking at how the interaction between technology and those that make and use them shapes the world
- All the keywords presented before have in common one thing: they critique the supremacy of reason and objectivism, and instead introduce a *social* element in the picture, and attribute stronger “power” and agency to people and their mutual interactions
- You can search all these keywords on WP or on Plato to get more formal definitions of their meaning… But these usually become quite involved and technical


GRIM
FANDANGO
Remastered

Cheating in the casino

- In the last class, we presented an example that works in this way: a Casino where a person, behind the curtains, controls the numbers the roulettes yield
- In other words, this is a scenario with two competing actors, and one can modify the world, while the other is just being affected by it
- If you were a player and didn't know of the cheating, what would your mental model of the world be, and how would you act?
- Notice that if you assume you are in uncertainty or risk, you will adopt suboptimal behaviours, and become a victim of the cheating
- We will however start from a simpler subcase, one where two competing actors are trying to use the world around them to play in their favour, without being able to directly affect it

Roman Generals

Roman Generals

- For this story, consider a rogue Roman general and an envoy of the Emperor chasing him down
- Generals are maneuvering their armies around a battlefield. They know confrontation is inevitable, and each is trying to make use of the elements of the battlefield: hills, forests, rivers, open plains
- Each terrain favours one type of unit (archers want to be uphill; cavalry doesn't traverse forests easily...), and each general wants to use the terrain at their advantage
- Both will have imperfect information; and terrain advantage can be reversed in one's favour (e.g., advantage created by an army by using the hill as high-ground can be reversed by the adversary by surrounding the hill)

Maps and Territories

Maps and Territories

— The imperfect information — and the fact that each general can improvise at the last second — shows us that we are in a situation which is more difficult than the one of Uncertainty
— Actors can invest their resources, but not only there is no guarantee of converging to an optimality. Each actor's improvisation ability means that a smart actor will make the opponent's plan useless
— In other words, while both generals have maps, none of them can fully know the territory, and if they only use their maps to create plans, they will be in bigger trouble than if they had no plan at all

From Uncertainty to Ambiguity

From Uncertainty to Ambiguity

- The scenario of the Roman generals shows the transition from Uncertainty to a first, weak type of what we call Ambiguity: the “world” is set like in uncertainty, but the *meaning* of the world is subjective depending on the actor
- In this case, each general will scramble to try to use the terrain in his favour, but then the wits of the other general might turn their tactics against them
- ...but they will not know (and can not know) until the very last second!
- The situation is *ambiguous* because both generals can spend resources, but the amount of unknowns, unlike in Uncertainty, may not decrease

Leveraging the Environment

Leveraging the Environment

- When we talk about the idea of leveraging the “environment”, we’re talking about making use of different types of non-human elements:
  - Natural elements → Animals, plants, rocks, wind…
  - Objects → Artifacts of human construction
  - Practices → Protocols, language, habits…
  - Organizations → See lecture on Organisations
- All of these can affect human-to-human interactions!
- To see some examples: Alice wants to speak with Bob…
  - Nature → Strong wind might make it impossible to communicate!
  - Objects → If Alice wears earmuffs because it’s cold, she will not hear Bob well
  - Practices → Alice and Bob speak different languages
  - Organizations → If Alice is the CEO of a company and Bob is the cleaner they might not have many chances for interaction…
- You can make different scenarios for different problems…
  - For examples, how does the choice of restaurant affect a date?

Enrolment & Translation

Reading: Some elements of a sociology of translation: domestication of the scallops and the fishermen of St Brieuc Bay, Callon 1984

Enrolment

— As described in the paper by Callon, enrolment is the process through which a human creates a leverage that “moves” a non-human to support his position
  - Take the Alice/Bob scenario from before. If the important part is that Bob always hears Alice, but not vice versa, Alice can simply position upwind to ensure that the wind actually *helps* them
— While we assume that non-humans do not have will, leverage can be constructed so that they become an univocally beneficial (or hindering) element
— Making a non-human take a side that favours a certain agenda is called “enrolling” them
— Non-humans can be enrolled both to dissipate or create ambiguity, to solve problems or create new needs (e.g., selling covers for smartphones)

Translation

— We talk about “translation” as the process through which an enrolled set of (non-human) elements can alter the form and content of a message
— As an example, think of how, through the enrollment of the class infrastructure, any person can step into a podium and start lecturing. In this way, a potentially worthless message can be “translated” into a lecture
— Contexts, therefore, can be leveraged to “translate” the actions of **humans**, and this is another way to innovate...

Some examples...

We now look at some examples where we see strong effects of enrolment and translation and leveraging the environment to serve one’s purpose

Cars and Highways

Culture, Norms and Rules

Cars, Highways, Norms, and Rules

It should be quite clear to see that there is a strong coupling between vehicles and road infrastructures: certain type of roads only allow for certain type of cars, and cars have “evolved” in parallel with road construction technologies. More interestingly, we can also observe how car manufacturers might enrol infrastructure, regulations, culture and social norms to promote a certain type of business. What possible connections of this nature can you find in German highways, compared to Italian highways? How does the physical landscape affect infrastructure, and how are regulations created as a consequence of infrastructure and culture? As a simple example: Germany’s mostly flat landscape allows to build broad streets, which promote generally “good” driving. Because of this, we can set higher speed limits, and therefore develop faster/bigger cars.

Mixing Cause and Effect

Mixing Cause and Effect

It’s not easy to univocally establish what is the cause and what the effect in processes that involve complex chains of human and non-human elements. Is it because Germans are precise and ordered that they have safety in very fast highways or is it because of a relatively simple environment that German culture became precise and ordered? This can easily become a “chicken and egg” problem, so it makes sense to take a step back, and instead of establishing cause/effect links, look at “connections” more in general. We will shortly present one tool that has been used to map these connections.

From Enrolment to ANT

Toward ANT

— If enrolment and translation are so powerful, it makes sense to have a tool to “map” which are the humans and non-humans involved in any given context, so that we can study their interactions
— One such mapping tool is the so-called “Actor-Network Theory”, which we will present later in the lecture

Is all ambiguity created equal?

Roman Generals vs Calavera

Two types of Ambiguity

As a sidenote, we want to make a distinction between types of Ambiguity:

On the first type, that we call “ambiguity weak”, we put all the situations like the one of the Roman Generals. The environment is subjective, because no actor can ever fully grasp it since it’s too complex, and every movement enables a counter-movement that could reverse the advantage.

On the second type, “ambiguity strong”, we put situations like the one in the Cheating Casino. Here, actors can modify the outcomes that the environment yields, and they spend resources to *affect* the environment (e.g., betting chips).

When we’re working with complex systems that, like those that we map with ANT, we’re often in the second case.

Actor-Network Theory

Reading: Where are the missing masses? Latour 1992

Actor-Network Theory (ANT)

- ANT is an approach of social studies of science that is able to “map” where the various actors stand and what are their interactions
- Its main proponents are Latour, Bijker and Law, and we propose one reading by Latour as an introduction to this field (see slide before)
- ANT, per Latour’s words, does not explain *how* the interactions happen, but it merely maps *what* interactions exist, and then leave it to other tools to explain the how
- The main benefit of ANT for our purposes is that it allows us to state that each non-human embeds into it the intents of his human designer
- We introduce ANT to say that, when analyzing an innovation and human-to-human interactions, you should also pay attention to all the non-humans involved in the process, and what the intents of their designers are

Summarizing

- In many contemporary human-to-human interactions, there are a number of layered non-human actors that mediate these interactions
- Through this mediation, messages are altered and reshaped
- The context translates the actors and their messages
- These actors, however, can be enrolled to make them favourable to one particular message, making it stronger
- We can innovate by orchestrating these processes, and indeed this is the case for many recent innovations
- See the notekeepers' notes for some examples

Non-Human Agency

Designer’s Intent

Non-Human Agency — Designer's Intent

In "Where Are The Missing Masses?" you can find one of Latour's interpretations of what it means to attribute "agency" to non-human actors: actions that an object allows or prescribes reduce the space of actions that humans can perform.

In other words, if an object only allows you to use it in a certain way, or stops you from doing something, the object is effectively *performing an action* on the human using it. This action is, of course, the one that the object's designer intentionally embedded in the object.

This idea is powerful because it tells us that objects are never fully "neutral", because they embody the values, thoughts, culture, etc of their designers.

Fake News

Finding needles in haystacks

Cost of Falsification

Fake News and Falsification Costs

The phenomenon of “fake news” shows an example of clashing designer’s intents. We assume that “news” are made to inform and to be truthful, with the idea that we can then use this information to inform our behaviours. These, however, are “news” items intentionally designed to be false, and their goal is to leverage the ability of “news” to inform behaviours in order to manipulate people’s behaviour.

We could avoid being misguided if we had ways to show the falsity of fake news, but the cost of falsification is often times too hard to be paid, since the news reporting system is too complex for individuals to untangle, and each person needs to fight against the intents of multiple designers and their own cognitive biases.

Opening the Black Box

Reading: Science in Action (Introduction), Latour 1989

Opening the Black Box

Going back to one of the readings suggested in the second lecture, this discussion of untangling designers' intents refers to the idea of "opening the black box". In that class, we discussed that using debates can be a way to open some black boxes.

Here we want to highlight the fact that, when technologies and innovations become a system of deeply-nested black boxes, debating might not be enough. We need to equip ourselves with a different way of thinking if we want to be able to make innovations and businesses which can be profitable and make a positive impact in the world. At the very least, we need to "know the enemy" if we want to survive in today's world.

Post-Truth

Reading: STS, symmetry and post-truth, Lynch 2017

Reading: QAnon and the Emergence of the Unreal, Zuckerman 2019

Conspiracy Theories

Creation of new Meanings

Post-Truth and Conspiracy Theories

Some perspectives on the phenomenon of the so-called “post-truth” can give you another angle to what we have described so far. This is a very recent keyword in the field, and one that gathered a lot of attention. If you start from the two readings, you should be able to get at least a cursory grasp of the phenomenon.

The key point is this: since technologies are so complex, it becomes harder and harder to discern the truth. For the first time in our history, astute manipulation of information can create contradictory meanings that can coexist and cannot be falsified.

The clearest example of this are conspiracy theories: if you assume a malicious actor is trying to manipulate the truth, any falsifying proof is rejected, because it is assumed to be misleading.

Other examples?

What can you do about this?

From great power...

What can you do about this?

Why did we include such an abstract lecture in this course? You are part of a very small minority which has the knowledge to understand *how* technology works, and therefore how it shapes our environment.

We hope to spark in you the thought that you can also get an understanding of the *why*, so that you can use your skills not only to improve technology, but also to contextualise it, and understand whether the technical improvement can become progress for humanity.

What we have covered is (obviously) not exhaustive, but it should represent a good starting point for you to dig deeper, starting from encyclopedias and their references.

What next?

- On Wed 13 Nov 2019 no IBICT class
- Battle 5 preparation: Mon 18 Nov 2019 in A205 at 13:30
- Next class is Mon 18 Nov 2019 in A205 at 14:30
  - Topic: venture financing

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