NLP In *Arrival*

Mind Masters
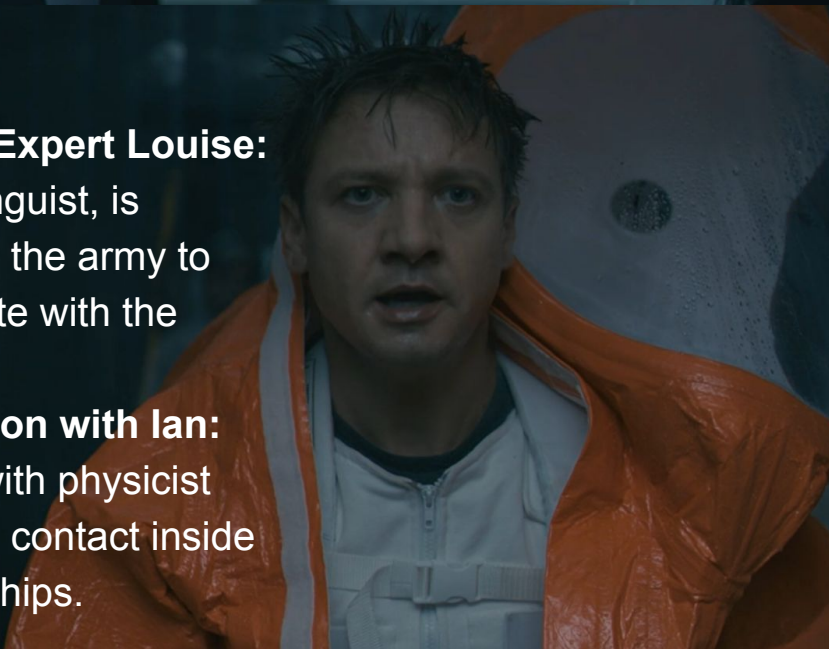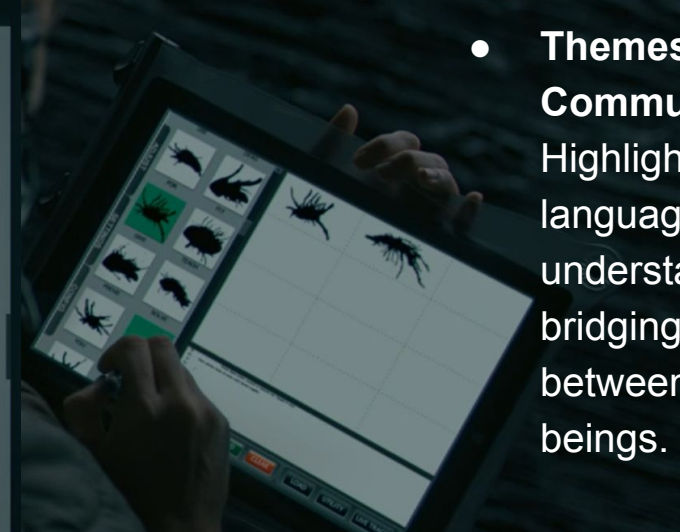
Plot of *Arrival*

- **Mysterious Spaceships:** Spaceships appear globally, causing worldwide curiosity and fear.
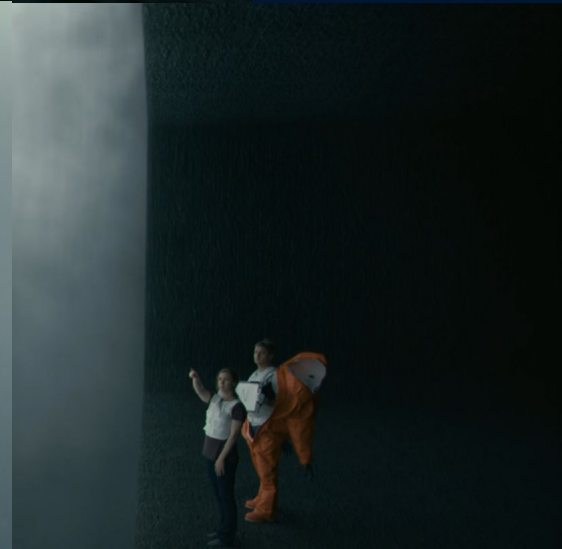
- **Language Expert Louise:**
  Louise, a linguist, is
  recruited by the army to
  communicate with the
  aliens.
- **Collaboration with Ian:**
  Teams up with physicist
  Ian to make contact inside
  one of the ships.

- **Meeting the Heptapods:** Encounters aliens with a unique, circular symbol language.
- **Learning Alien Language:** Works to decode and understand the Heptapods' complex communication.

VISITORS
FRIENDS
HEPTAPODS
OFFER
GIVE
DONATE
AWARD
TECHNOLOGY
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- **Themes of Communication:** Highlights the power of language and understanding in bridging divides between different beings.
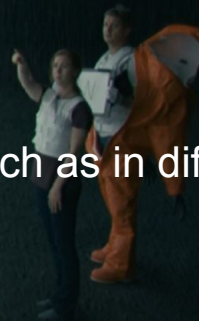
Introduction to NLP

- **What is NLP?** Natural Language Processing helps computers understand human language.
- **Why It Matters:** Makes it easier for us to interact with technology using everyday language.
- **How It's Used:** Behind the scenes in voice assistants, online translators, and smart chatbots.
- **Goal:** To bridge the gap between human communication and computer understanding.
- **Impact:** Improves convenience in our daily tasks, from asking for weather updates to translating languages instantly.

NLP Challenges in *Arrival* & The Real World

- Ambiguity:
  - The alien language in *Arrival* consists of vague, circular splotches and unrelated vocalizations
  - Louise has practically no knowledge of how the aliens use language or think but must translate the symbols
  - NLP faces the challenge of ambiguity in human language
  - Words can have multiple meanings
  - Different words or symbols can have the same meaning such as in different languages
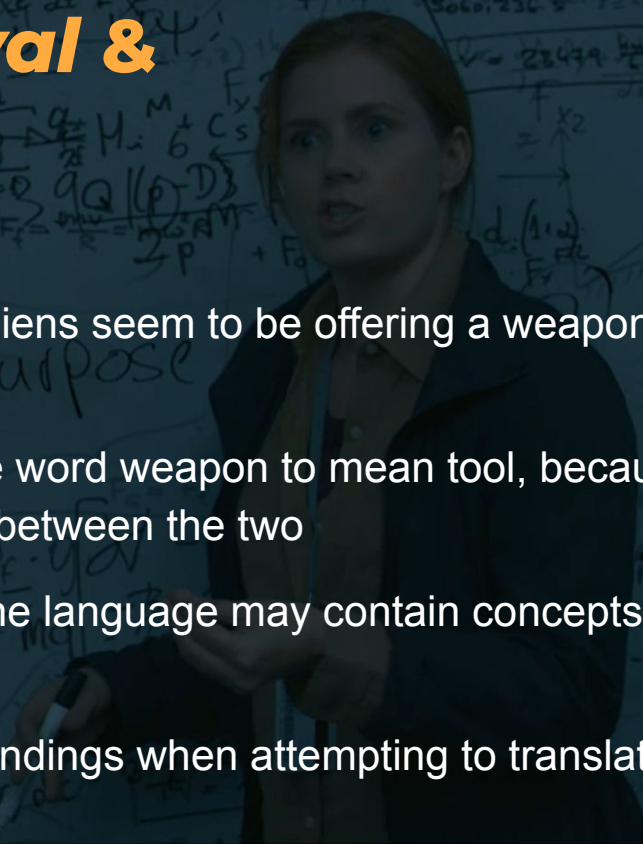 - Full context may not be provided in the available data

NLP Challenges in *Arrival* & The Real World

- Idiomatic Expressions:
  - Idioms and other colloquialisms introduce more ambiguity into language through the possibility of non-literal phrases
  - The aliens could use idiomatic expressions that have a meaning different to what they may be interpreted as literally
  - NLP may encounter idiomatic expressions in human language which require a deeper contextual understanding to correctly interpret the meaning
  - More challenge is presented when considering that certain idiomatic phrases may have different meanings to different groups of people

NLP Challenges in *Arrival* & The Real World

- Regional and Cultural Differences:
    - Major plot point in *Arrival* is when the aliens seem to be offering a weapon to humanity
    - Louise believes they could be using the word weapon to mean tool, because they may have no concept of the difference between the two
    - NLP faces a similar challenge where one language may contain concepts that another language does not
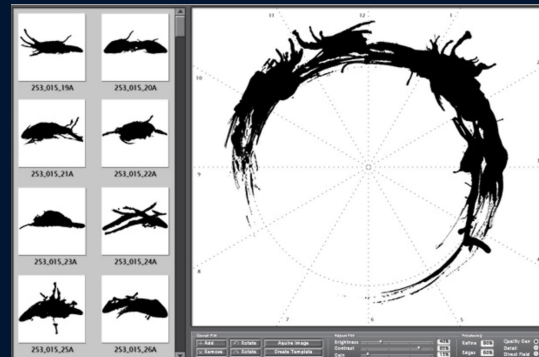   - This challenge can lead to misunderstandings when attempting to translate languages

NLP Challenges in *Arrival* & The Real World

- Bias and Preconceptions:
  - The humans in *Arrival* have the preconception that the aliens perceive time linearly like humans
  - Louise and the rest of the team must overcome a bias for time-ordered language to understand the aliens
  - Other human leaders had to overcome a bias from believing the aliens wanted them to fight amongst themselves
  - Preconceptions when designing NLP systems can hinder their ability to correctly interpret language
  - NLP systems can have biases that result in them struggling to handle certain aspects of language

TIME

Communication Methods in *Arrival* & NLP Methods

- **Heptapod Language** - The aliens communicate through a complex written language that differs fundamentally from human language

- **Semantic Richness** - The Heptapod language conveys meaning in a highly dense and semantically rich way. A single symbol can contain a multitude of meanings and layers, which are understood all at once.

- **Time Perception** - A pivotal revelation in the movie is that the Heptapod language reflects their perception of time as non-linear. Learning their language enables Louise to experience time in the same way, seeing the future and the past as accessible in the present.

جيد أو سيء

UNIVERSAL LANGUAGE CONCEPT

Arrival's Potential Impact on NLP

- **Inspiration for Non-Linear Language Models**

- **Advances in Semiotic Analysis**

- **Exploration of Universal Language Concepts**

- **Enhanced Focus on Multimodal Communication**

Thank You!

References

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