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Designing an AI Agent To Converse Online
(or, How to Arrive Late and Leave Early From Work)

The Problem & Why it is difficult

Teaching agents to interact with humans is a challenge facing the AI community today. Although social language and understanding is naturally developed in humans at an early age, AI learning introduces problems. Suppose and AI agent could "sit in" for you in the early hours and again, in the late hour(s) of your workday? The concern here is, when someone tries to contact you via chat window or email, the AI agent must do a convincing job of representing you while you are not there. The agent must have a certain degree of background knowledge and basic representations that similarly matches what a peer or boss would be discussing with you. The agent must be able to synthesize the type of conversation it is having at the time. Is it a casual or work related issue? Is it urgent? Does it require details? This paper tries to address the problem of an AI agent successfully conversing with a coworker, with the same level of ease and expectation as if it were you. If these challenges, and many more can be overcome then an AI agent could take over at your desk early in the morning and late in the afternoon, allowing you a few extra hours to your down-time, without anyone ever knowing.

A Design Using Understanding & Scripts

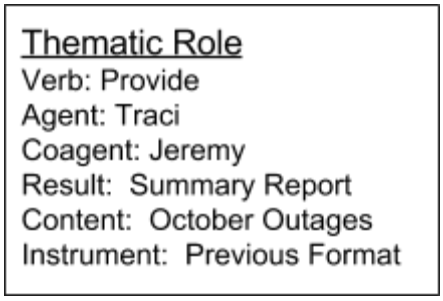
As we start the day, the AI agent will automatically become active at the time of your usual arrival. The agent will sign into the chat system, allowing "your presence" to be known. The agent will also open the email program and review the emails from last night and this morning. As the agent reviews an email, it will begin to make sense of the content by using Thematic Role Frames. For example, if we receive an email requesting a report, such as below:

> *Traci,*
> *Please provide a summary report **from** the October Outages **for** me **with** the same format as before.*
> *Thanks*
> *Jeremy*

The words in bold above are indicative of prepositional constraints which my agent will use to draw inferences based on its semantic categories. A common definition of a semantic category is "a grouping of vocabulary within a language, organizing words which are interrelated and define each other in various ways.".[1] Using the prepositional constraints below, the AI agent will be able to break down the content of the email and

Prepositional Constraints	
Preposition	Thematic Roles
by	agent, conveyance, location
for	beneficiary, duration
from	source
to	destination
with	coagent, instrument

And they will allow the agent to properly build a frame that represents this email. The agent uses the key prepositions in the email (indicated by bold) to make sense out of the email content. The word ***from*** indicates a *source* in the thematic role. The word ***for*** indicates a *beneficiary*. The word ***with*** indicates an *instrument*. After the agent processes the email and builds on its understanding of the content, the frame might look like this:



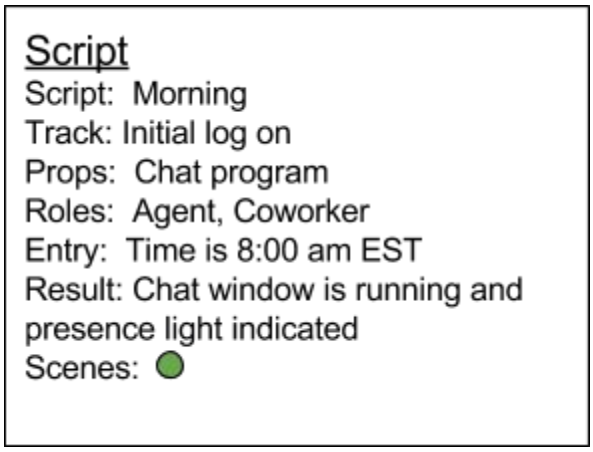
Now that the agent has reviewed and categorized the emails, it is well prepared to carry on a conversation about it that could likely occur via chat. Jeremy is likely to contact me in the morning, and it may or may not be about the email he sent the previous evening requesting an October Outages report. The agent has a series of scripts available to ensure a coherent conversation with Jeremy, including one built from the email. As learned in class, a script is a causally coherent set of events, where each event sets off or causes the next event. The causal connections between events makes sense and the events are interpreted as scenes in the world . An event in this situation is the chat message each time it is received in my chat window.

One such script could be considered a “morning” script. This would be a script expected to execute in the morning. An *entry condition* is a condition necessary to execute the script. An example of an entry condition for this script is the time reaching 8am EST. This would cause the script to be executed. Another entry condition for a script is a chat message starting with the words “good morning”, or “morning”, or “hi”. A chat event that has these words would prompt the agent to follow another script.

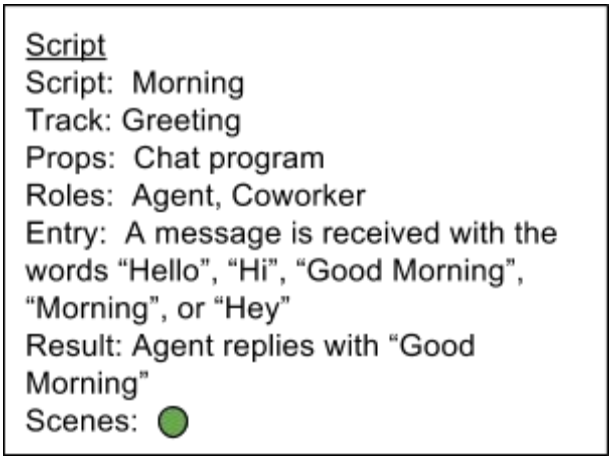
The script would most likely contain *Tracks*. A track is a variation, or a subclass of the script. For example, one track might be a “log in” track. Another track might be a “greeting” track. A third example might be a “reference to email” track.

Another element of a script is a *Scene*. A *scene* in a script is a sequence of events that occurs during the execution of the script. In this example, a scene could be what the AI agent is controlling, whether the chat program or the email program.

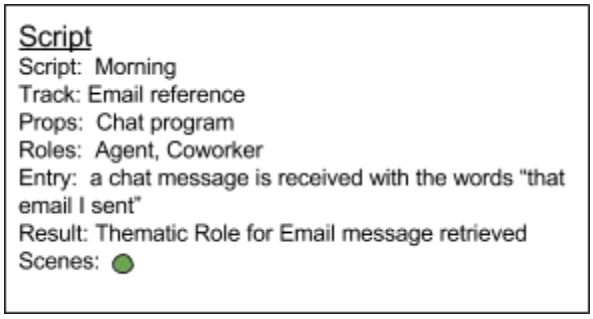
There are other properties of the script such as *props*, *roles* and *result* whose meanings will be obvious when illustrated. Below are examples of 3 tracks of the "morning" script that the agent could follow:



Track 1

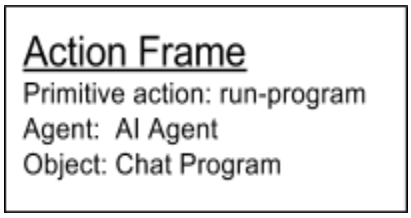


Track 2

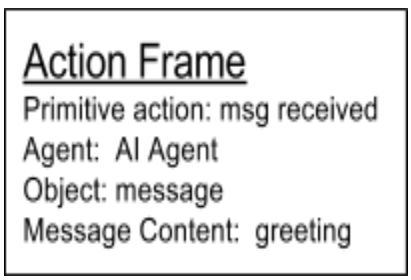


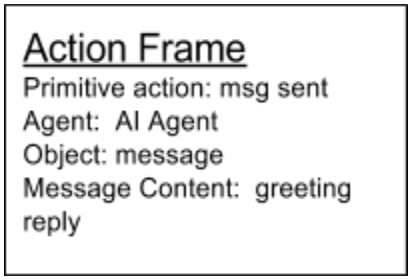
Track 3

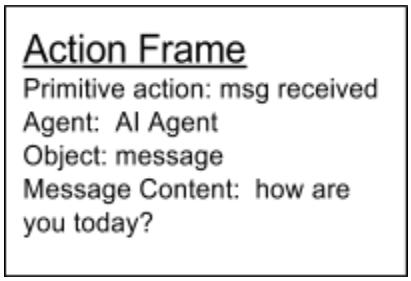
An *Action Frame* represents the actions needed in a scene of the script. In the 3 tracks illustrated above, you can see they each have the attribute of Scene. The scenes for the first track, Track 1, might look like this:

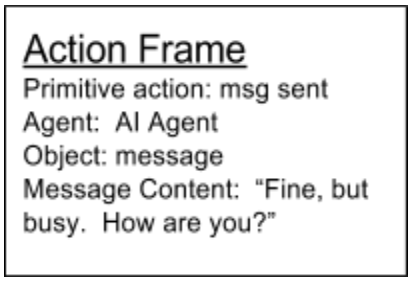


The scenes for Track 2, might look like this:

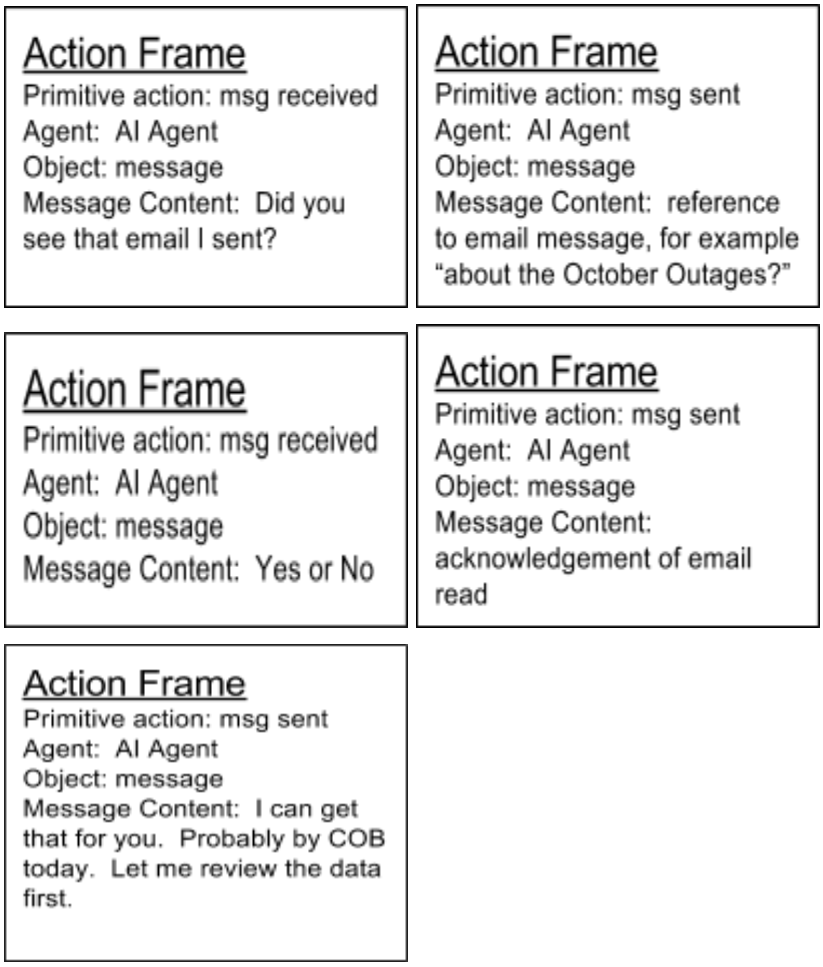








The scenes for track 3 could look like this:



As you can see, there are many many different tracks that can occur in a script. The cues are the contents of each message sent to the AI agent. The more the agent processes messages and emails from a particular recipient, the more it can converse in your place about common workplace subjects and situations, such as reports due, or social interactions. However, there is the problem of the agent not knowing how to respond to a particular message or conversation. In this instance, the agent could have some default scripts, such as "Exit Chat Program", or a script called "Stall" where the agent replies "BRB" and then sleeps for 30 mins until you actually do decide to come into the office.

Conclusion

As we have seen over and over again, making sense of the world around us is crucial in designing an AI agent that can replace humans in certain situations. The agent must be able to use everything it can to understand a situation and react or respond appropriately. This scenario seems simple at it's core, but trying to teach the agent to learn from its incoming data is paramount, because the designer simply cannot account for all possible conversations or words that the agent might be presented with. A good design would include the topics of Understanding and Scripts as we have discussed in class.

[1]Bibliography: What is a semantic category? (1998, July 30). Retrieved 1 November 2015, from http://www-01.sil.org/lingualinks/LANGUAGELEARNING/OtherResources/GlssryOfLnggLrnngTrms/WhatIsASemanticCategory.htm In-line Citation: (‘What is a semantic category?’, 1998)