Q1: Let us suppose that Will[m] Shakesper has many semantic networks in his mind. Why might his semantic networks not work in the modern world?

A semantic network consists of a vocabulary (lexicon), structure, and application specific labels (the semantics). Shakespeare's vocabulary is similar (though not exactly the same) as modern day English. Structure would refer to grammar, and though a bit has changed, he would be able to understand the English of today. But beyond the lexicon and structure, there's an extra layer of semantics to consider. The meaning of some of his words have changed in a subtle way, which means Prof. Robertson has a different understanding of Shakespeare's work.

The problem is his representation was created in the context of the 16th and 17th century in London. In fact, even the fact that some of his pronunciation is different changes the meaning of text.

And so from hour to hour we ripe and ripe,

And then from hour to hour we rot and rot;

And thereby hangs a tale.

"As You Like It", Act 2, Scene 7

Above is the canonical example for how we misrepresent Shakespeare's work. Hour is pronounced in modern day English as /ˈaʊə(ɹ)/ but in Shakespeare's time a different pronunciation means that this is actually a bawdy joke. But this writing is a pun to begin with, so it's not too easy to discover how its meaning has changed.

Our semantic networks for how we deal with puns and jokes is going to be completely different because words have multiple layers of meanings. There's the base meaning, the intended meaning, and then the context of why the joke is funny.

Being removed from Shakespeare's day-to-day gives us a different context from which to appreciate his work.

Thus, the semantic network fails because the semantic meanings of the vocabulary and structure are slightly different. William Shakespeare does not have the appropriate network to be able to understand his work in a modern-day light.

Q2: Let us suppose that Will[m] Shakesper knows about and can execute means ends analysis. Why might his means ends analysis method not work in the modern world?

I'll describe means end analysis as:
-You're in a state, and there's a goal state. There's some concept of the difference between your current state and the goal state.

-We use a promising procedure to move towards the goal state. Then we take that path, end up in a new state, and recalculate. Hopefully, we're in a state that is closer than when we started.

Lots of things have changed in the world, so the way we understand books and culture is different than the way it was in 1600. Thus, the way we might want to calculate distance is by the context of years. Let's say he's in 1608. Since he's a playwright, and stories are often how we understand the world, a promising procedure seems to be to have him read plays, poems, and novels that date from about 1620 or so. There's also a matter of telling him some history, because he needs to know the context in which these stories are written.

Assuming an English context, because Shakespeare was an English playwright, the new states would be knowledge of the historical events and reading or watching a particular work of literature. The next famous English playwright would probably be Ben Jonson, then the poets John Milton, John Bunyan, and the novelist Jonathan Swift. There are many more that can be listed, but let's say the final state is reading *Harry Potter* and understanding the context of that story.

Shakespeare can read English, and we believe he's intelligent, which means he'll be able to learn about the contemporary events of each one of these writers. And each book that he reads brings him closer to understanding the modern world. So, what is the problem?

Understanding a culture that is not your own (with the added difficulty of a 400 year difference) requires Herculean effort. There are tons of books, novels, articles, historical events, and zeitgeists, and even an intelligent man like Shakespeare wouldn't be able to understand it all in his lifetime. Some of the social mores in *Harry Potter* would have to replace ones Shakespeare had already developed. In fact, we see this in the world, when someone moves to a different country as an adult--it can be very difficult for them to learn the culture and assimilate if they want to.

Therefore, unlike a child, Shakespeare's computational (mental) ability won't be able to process all this information quickly enough. He could probably get by in today's world, but he'd never be able to understand his works in the context that we see it in. And he's especially not going to be able to assimilate it in one evening extension class! However, this method would solve some of the limitations I'll discuss if he focused on case-based reasoning.

Q3: Let us suppose that Will^{m} Shakesper has many production rules in his mind. Why might his production system not work in the modern world?

SOAR consists of three parts: procedural, semantic, and episodic memory. Thus, he has episodic knowledge (he can recall a specific instance in his play). He even has semantic memory, because he knows the context in which this event occurred. He has

knowledge of the whole play, after all. Then, what he is missing is the appropriate procedural memory. Frames are discussed in Q4 to show a guess of Shakespeare's state of mind.

Shakespeare's goal is to pass Robertson's class. Robertson might ask him to explain a particular section of the play. Shakespeare's behavior is to look through his frames, see what the line is, and his procedure is to describe the literary devices, meaning, context, and character. He achieves his goal if Robertson says, "That's right."

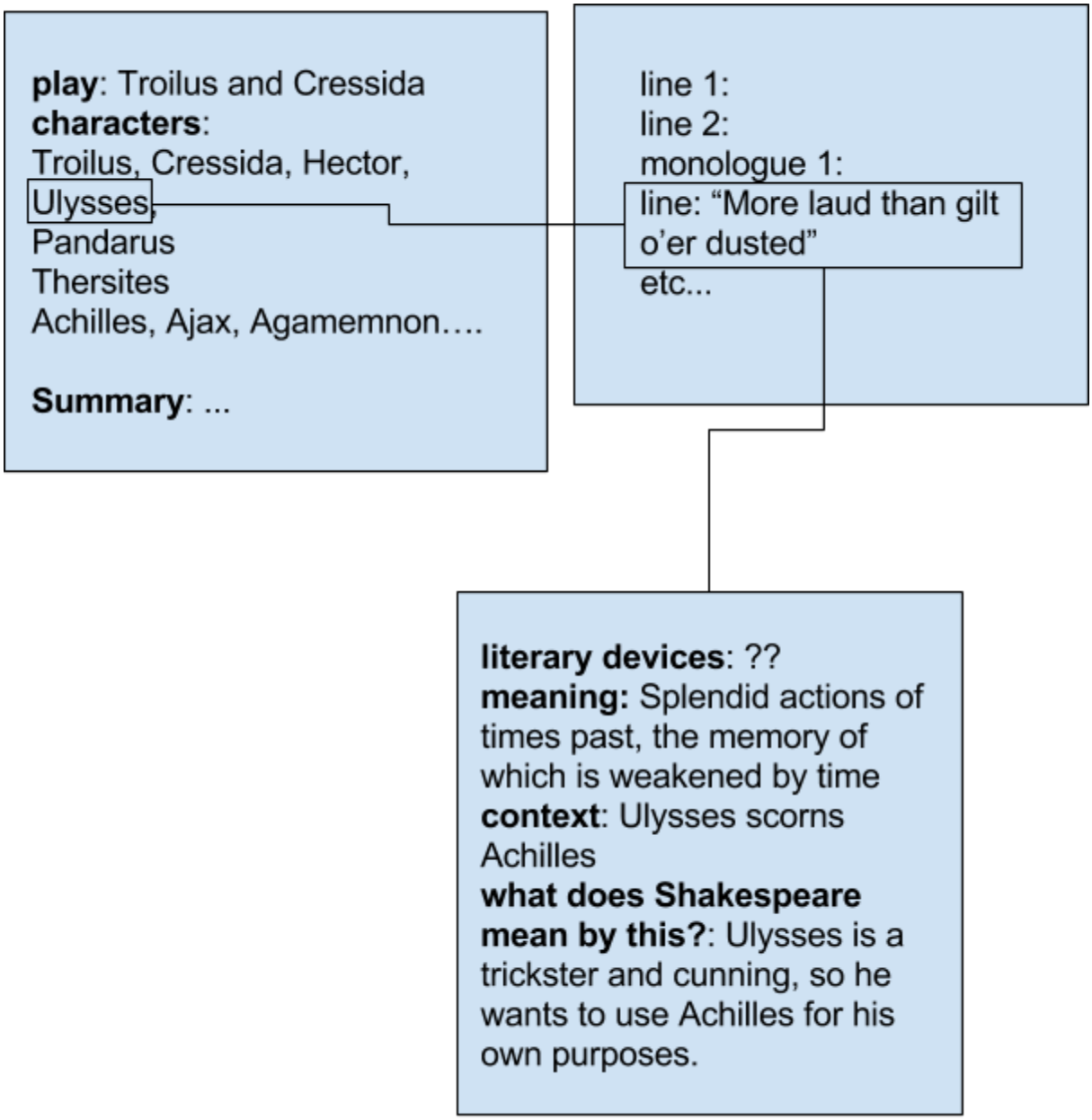
Unfortunately, even with a large and rich frame network, Robertson has (to Shakespeare) very strange analyses of the plays. In this situation, Shakespeare's procedural knowledge has the wrong consequents. Shakespeare would have the best analysis of "why Shakespeare wrote this", but Robertson is the arbiter.

Shakespeare can learn what Robertson thinks. Robertson just has to give feedback. Shakespeare can create new production rules and even go back and edit the frames with new information. After many years of doing this, he might be able to understand what modern analysis of Shakespeare should look like.

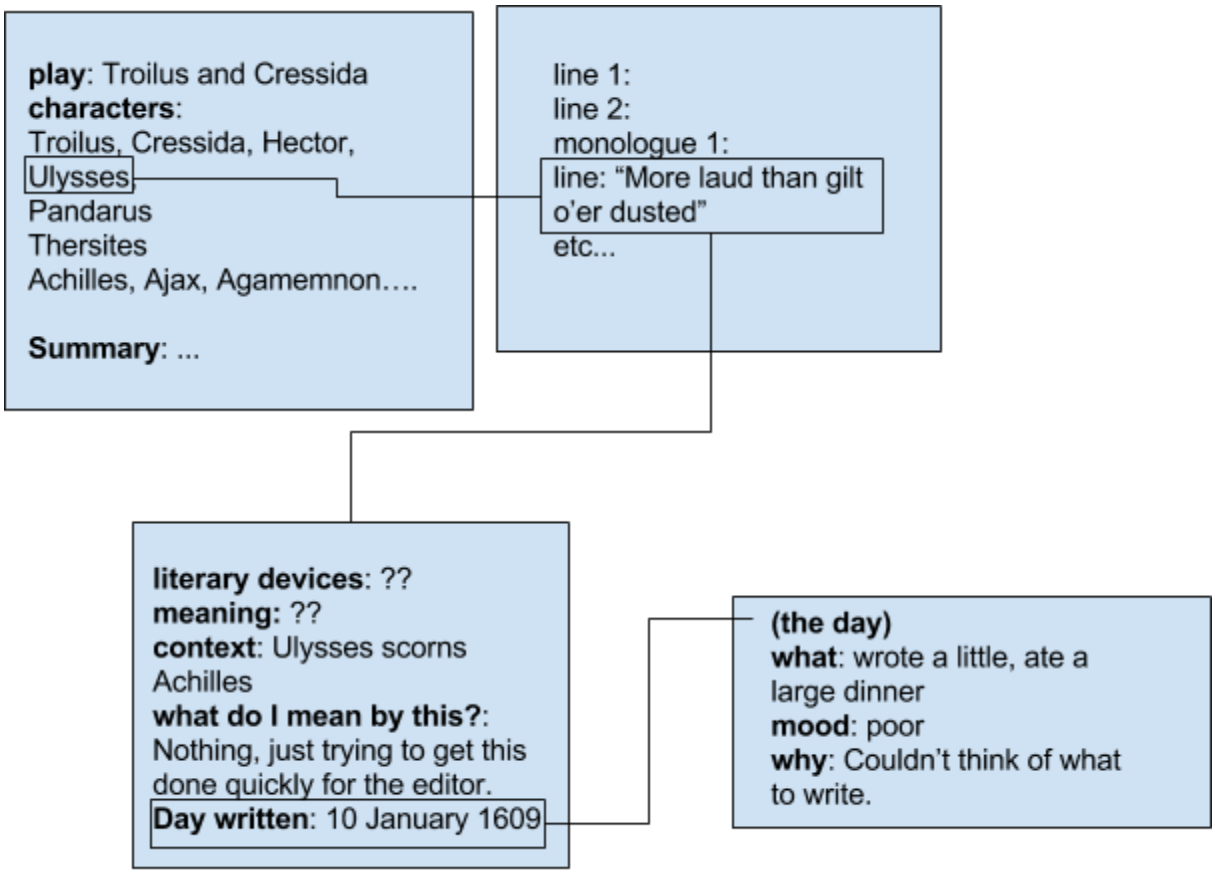
Unfortunately, he can't just come out at the end with near-perfect knowledge. As an agent, he needs to explore the world and achieve some goals along the way. If Shakespeare dies without passing Robertson's class, after taking it many times over, then he will have failed at his goal.

Q4: Let us suppose that Will^{m} Shakesper has many frames in his mind? Why might his frames not work in the modern world?

Robertson (representative of the modern world) has some complicated procedure to understand Shakespeare's plays. An example is below:



That’s because Robertson (and all of us) have some representation of a story when we read it, in the context of the modern world. But Shakespeare knows what he wrote. His frame is more like this:



Shakespeare has some representation of his plays in his mind (as in the frames here). But his frames might fail because they're just filled with incorrect knowledge. Shakespeare believes his 'meaning' is correct (after all, he's Shakespeare!). But this system won't work in the modern world.

The other problem is his hierarchy might work differently. Assuming his memory is good enough, he knows exactly when and why he wrote a verse. So in fact, if he's answering the question, "Why did Shakespeare write this?" he can write, "He needed to get something done quickly because he had writer's block that day." Robertson is not going to accept this as the answer to the question. In Shakespeare's day, infant mortality was higher, everyone was dirty, and the plague was raging through London. Robertson doesn't know what Shakespeare was feeling because of the world around him. Even with historical knowledge, Robertson cannot put himself in Shakespeare's context. Shakespeare, on the other hand, will be overly concerned with specificity (because he knows it!) without understanding the generalizations that have come throughout the centuries. Those generalizations are what Robertson knows, and unfortunately, he is the arbiter of what is correct.

Q5: Let us suppose that Will^{m} Shakesper has many cases in his mind? Why might his case application not work well in the modern world?

Suppose Shakespeare stores the cases of his works in his mind. In his own time, if someone asked him, “Bill, why did you have Romeo die?” he could answer the question by pulling up the memory of what he wrote and why he did it. “In case-based reasoning, a reasoner remembers previous situations similar to the current one and uses them to help solve the new problem,” and let’s suppose he’s had to answer questions like this to his editor back in the day.

William Shakespeare recalls how he answered questions to his neighbors, coworkers, and employers in his own time. Robertson is asking similar questions. However, the answers that would satisfy his friends from 1600 will not satisfy Robertson.

Eventually, Shakespeare will learn that many of the cases he has used to answer questions are quite far from the expected result. He might be able to extrapolate that to realize he does not know the answers to many more possible cases. In this situation, he might decide to throw away everything he knows, become completely inefficient, in order to `reboot` his knowledge. After all, his solutions to different cases are too far away from the correct answers.

Q6: Let us suppose that Will^{m} Shakesper has many cases in his mind? Why might even his case adaptation not work in the modern world?

The other problem Shakespeare has is that he does not have enough experiences that are close to modern day experiences. He is missing the ideas of 400 years of history, which has changed the way people think, act, and talk. He didn’t have access to technology, health care, or ability to travel far.

He cannot adapt cases, because he does not have enough cases that are similar. In fact, it will be hard for him to learn new cases, because people take certain knowledge as just basic or obvious.

“Yes, of course, ‘with bated breath’ is a common English phrase. How do you not know that?”
Shakespeare’s response is, “Well, I’m the first person to use that phrase. It wasn’t common in my day.”

Shakespeare does not even know what to ask to fill in these gaps, and other people do not realize that he does not know the prerequisites to answer the question.

Shakespeare is intelligent, so he is good at adaptation. However, he will not be able to understand the new situation in terms of the old one, because Robertson is not asking the questions for the same motivations. Soon, Shakespeare will be good at evaluating, after seeing how Robertson responds to his answers.

Q7: Let us suppose that Will^{m} Shakesper has many concepts in his mind. Why might his classifications not work in the modern world?

Semantics! That's why Shakespeare would not be able to classify percepts in the modern world. Taking his plays as an example yet again:

In each play, there are characters. Some perceptrons for the characters might be if they live or die, whether they get married, whether they solve their problem, do they learn a lesson, are they the protagonist, deuteragonist, tritagonist, or antagonist. Each of these things will then get mapped to whether the play is funny, a comedy, tragedy, or a history, a tragicomedy, has it been performed often. This list is not exhaustive, but at the end we might want to categorize whether the play was successful or not.

Shakespeare has literary and word concepts of his day, but from his time. Comedy, romance, and tragedy have all changed their meanings over time. Plus, he had different motivations for writing certain phrases. He might have intended for some monologue to be funny or bawdy, yet it's taken to be serious or philosophical. The original intent of his verse is lost.

Given that Shakespeare only has knowledge of the plays during his own lifetime, he might not realize how often they've been performed or how he's reached worldwide notoriety. Therefore, he will not classify the plays in the same way. The descriptors (which are the actions) might not even have the same meaning today.

For things like axiomatic or prototypical concepts, Shakespeare is not going to be too far off. The former is just a definition. The latter, even though there are many examples which "break the rules", are not too far off. Shakespeare will have trouble learning the concepts in the first place--he's never seen a car or a television--but it would only take a few examples for him to be able to generalize.

Here, though, we're discussing the most difficult concept type, exemplar. It is difficult to describe what makes something beautiful or inspirational in the first place, though one might have examples. Shakespeare lived in a world that had different values. Comedy, tragedy, beauty, inspiration--his examples for that will be different from the modern day's.

Q8: Let us suppose Will^{m} Shakesper can learn new concepts via incremental concept learning. Why might even incremental concept learning not work very well in the modern world?

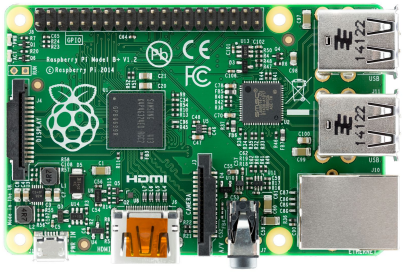
William Shakespeare has never had access to the amount of information that we have today. Everything I want is at my fingertips. I can even look up Shakespeare's works at an instant.

This is a lack of computing or processing power for Shakespeare. He'd have to go through learning what a battery is, a car, light bulbs, the telephone, cell phones, satellites, ball point pens. He doesn't need to know all the ins-and-outs but he needs enough information to understand how to utilize them.

And the biggest problem will be computers.

Computers are going to be hard to use for Shakespeare--he's missed out on learning how to use a phone, how to drag and drop files, how nested folders work, how to use a mouse, and even how to type. He's not even used to the amount of books you can access at the library. This is massive information overload for someone who hasn't become used to the leaps and bounds we've made in technology over the past 20 years.

If you consider the incremental concept learning of understanding what exactly a computer is, it's quite difficult. Because it's ingrained into our daily lives so much, and computers are useful for just about everything, how would Shakespeare be able to learn what they are?




Above are images for things which are and aren't computers. There are a variety of things which are computers, and a variety of things which aren't. Some of these are surprisingly similar to one another, despite being examples or non-examples.

It would be very difficult for Shakespeare to learn what a computer is, even with incremental concept learning. He might eventually be able to recognize one by sight. He'll be able to process the percepts such as it doesn't have a tower, but is an iMac or a laptop. Has a screen. Is a CPU. Has processing power. Is mechanical. Uses electricity.

But, beyond that, in order to understand what a computer is, he needs to understand what a computer does. And, unfortunately, they do so many things--from word processing, calculations, telling time, making phone calls--that it is difficult to pin down what a computer is and why they are useful. Because computers have taken over so much of what we do, he'd have to learn a whole new model of the world.

Chairs are pretty similar, a car is like a carriage, houses still have doors. These will be difficult but tractable. Some of the concepts will be more difficult. However, I think the computer, because the uses are subtle and everywhere, will be an overload for poor Shakespeare.

Sources:

1. Read various Quora answers in the two topics of Time Travel and Shakespeare.
2. Various Shakespeare plays; text is available freely online at Project Gutenberg.
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