Tutoring Problems

Josh Ellis

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It's 2115 in Tech City, and new technology has led to a happy, prosperous society.

Part One

Arthur was learning about the immune system in class, but as usual, no human was teaching. Arthur was being taught by his automated tutor, which resembled the tablets from a century earlier. In addition to being individualized and making testing easier, the tutor's software was powerful enough to make animations from a static textbook. This was very useful for learning about complex systems, such as the immune system which Arthur was studying.

The tutor had never failed him, so it was rather shocking to Arthur when it suddenly went from showing phagocytes eating bacteria to an error screen. Hmm. Well, his mom taught him to reboot something when it didn't work, so he hit the manual shut-off switch. When Arthur turned the tutor back on, it popped up the same error screen.

Arthur went to the robotic overseer at the head of the room. The overseer is present in order to ensure that certain students actually use the tutor. Arthur had tried to talk to the overseer in the past; every time, the overseer sent him back to his desk for not using his tutor.

"Excuse me. My tutor is broken. Can you help me fix it?" Arthur asked the overseer. He knew he wasn't on a good track when the overseer went from its normal helpful mode into its ordering mode.

"That is nonsense. Tutor malfunctions are rare. If you need a 5-minute break, please ask. Please return to your seat or go to the manager's office," the overseer responded. Arthur rolled his eyes. Somebody must have used this as an excuse for not doing work in the past.

"Can I go to the manager's office, then?" Arthur asked.

"Yes. I will inform the manager of your unruly behavior." Arthur began walking to the manager's office. He knew that he wouldn't be punished; the overseers just said that to scare students who tried to get out of class.

A few minutes later, Arthur walked into the manager's office. The manager was a smarter and more general AI, so it would hopefully understand his situation better than the overseer.

"Your overseer has already informed me of what happened," the manager said in its almost disturbingly calm, but human-sounding, voice. "Has your tutor truly malfunctioned?"

"Yes. I can show you," Arthur answered as he gave the tutor to the manager. The manager looked at the tutor's error message. After looking through its table of tutor error codes, the manager came to a conclusion.

"It appears to be a problem in the software. I will send your tutor to diagnostics in order to confirm this. In the meantime, go to the library; it has all of the textbooks used for your classes," the manager replied. Arthur was a bit upset, but he tried to be optimistic.

"Well, at least I get to read the original source," Arthur commented. "Thanks for the help!"

"You're welcome."

At first, it looked like Arthur's problem was an isolated incident, but this ultimately proved not to be the case. The next day, a few more people had a similar issue and were sent to the library. The day after that, a few dozen more people were in the library due to broken tutors. Four days after Arthur's tutor broke, the school closed due to the library becoming overwhelmed. It was now Monday of the next week. He was about to ask his parents what he should do when Helen came over; Arthur didn't remember inviting her over.

"Arthur, we're leaving for the day," Arthur's dad told him. "We're having Helen babysit you for the day." Well, that made no sense. Helen is 11, too young to babysit.

"Isn't Helen a little young to be babysitting me?"

"Yes, yes I am," Helen responded as she entered the door. "I'm also a superintelligence, so I'm allowed to babysit you."

"Really?" Arthur quickly took out his computer and learned that indeed, human-level or higher AIs count as babysitters.

"Arthur, we'll see you this afternoon," his mom said.

"OK. Have a good day!" Arthur said as his parents left.

A few hours later, Arthur was eating the lunch that his automated house had prepared.

"How's your lunch?" Helen asked Arthur.

"It's good," Arthur responded. He quickly realized that Helen had asked because she was bored. "Anything going on with you?"

"Well, you asked me to keep you company during lunch, and I'm not eating," Helen answered. "I think I can replace your tutor this afternoon."

"Oh, cool!" Arthur was excited for what he was going to learn now. Granted, he'd be excited to learn about anything, but he was extra-excited to learn what Helen would do. "What are you going to do?"

"You'll find out after lunch," Helen said vaguely, trying to calm her friend down a bit.

Once Arthur managed to find the patience to wait another 10 minutes for answers, he thought about his situation for a bit. He just didn't know why his mom had left. His mom almost never left him at home with a babysitter. Maybe Helen knew? "Hey, why did my mom leave anyway?" Arthur asked her.

"She didn't tell you?"

"No, she didn't."

"Noname is a non-profit that makes the tutors that the schools around here use. Your mom founded it, and now all of their tutors are broken. She's gone to their headquarters to try to fix this," Helen said with a bit of sadness.

Part Two

Once Arthur was through with his studying for the day, he and Helen began looking into what happened. Arthur had wanted to do this right after lunch, but Helen made him finish his school work first.

Now that Arthur's work was done, Helen showed him the website with the code for the Noname tutor. Over time, as Helen looked around at different versions, tests, and so on, something popped out to Arthur: the release date for the current version. It was the exact same day that his tutor broke. After pointing this out to Helen, she compared the current and previous versions of the tutoring software.

"You're right; your problems did have to do with the new update. The current version is extremely buggy," Helen confirmed.

"Why was it released then?" Arthur asked.

"Well, this website shows who put the code in. In this case, it appears that only a few people were involved in putting the code in."

"So my mom just has to fire them, and that's that."

"I'm afraid not. The programming team voted on this and these bugs were pointed out. The vote passed anyway and version bug.0 got through," Helen pointed out.

"Why does this matter?"

"It means that the majority of the programming team behind this software *wants* it to not work. Noname's tutors are being sabotaged," Helen answered. With this answer, Arthur realized what his mom was up against.

"This sounds tough. I wonder how my mom's dealing with this."

Rebecca Noname, a.k.a. Arthur's mom, was not having a good day. She had just come to the same conclusions that Helen had, and she realized that she had a lot of work to do with many peoples' education at stake. She'd at least convinced the government to help her with finding the saboteurs. With everyone else having gone home though, there was nothing for her to do until tomorrow. Breathing a sigh of relief after a busy day, Rebecca summoned a taxi and went home. Once she got home, her son greeted her.

"Hi, Mom!" Arthur exclaimed as she entered her house.

"Hi, Arthur. How was your day?" Rebecca asked.

"It was good. It was a bit boring but Helen helped me get through the reading," Arthur answered. Rebecca was skeptical. She knew that Arthur and Helen loved to mess around (she'd only picked her because android babysitters were more expensive), but she could hope.

"Did you get through *all* of the reading, or were you just messing around?"

"Yes, I got through all the reading," Arthur said, sounding annoyed.

"Are you sure?"

"Yes. Helen made sure of that. Helen even helped explain it and tested me."

"Really?"

"I used your tutoring software; it works really well," Helen stated.

"Thank you." That was a big complement from a superintelligence.

"You're welcome," Helen replied. This had gone a lot better than Rebecca expected. She noted to herself that Helen was a very good babysitter. Actually...

"Helen, I'm just thinking, could you babysit again tomorrow? I could be home tomorrow, but I think it would be easier for everyone if I go to work to sort out my software issues while you tutor Arthur."

"Of course. I can help you too, if you want." Right. Helen was a robot; she could multitask perfectly. She reminded Rebecca of the Helpful Artificial Line (HAL), the superintelligent AI that can take over a billion phone calls at once.

"It's OK. I'm sure that this will be cleared up soon."

"Alright, then. I'll see you two tomorrow," Helen said as she walked out the door.

"Bye, Helen!" Arthur and Rebecca said. With Helen's departure, Rebecca finally collapsed onto the couch, grateful that robots would make their family's dinner.

Rebecca thought that, without having to worry about Arthur, the next day would be better. She was wrong. After realizing that the votes for changes were anonymous, she decided to have her entire core team interviewed. After government interview bots completed the interviews, a problem emerged: the saboteurs were really, really good at lying to them. She'd called HAL and asked it for advice, but it couldn't access her interview bots in order to add new questions. HAL couldn't interview the programmers itself since someone had convinced the entire team not to take HAL's calls. If only there was another superintelligent AI that could solve her problem...

"Computer, call Arthur."

"`Calling Arthur...`" An image of Arthur made from the tiny robots that roamed her office appeared a few seconds later.

"Hi, Mom," Arthur said.

"Hi, Arthur. Could you and Helen come over here?" Rebecca asked.

"Of course! We'll be right there!"

Once Helen and Arthur had arrived, they got to work. Or to be more precise, Helen got to work; Arthur had no clue what to do. Once Arthur's mom explained the situation, Helen called HAL for some of the information that Arthur's mom had given it. After the call finished, Helen announced her and HAL's strategy.

"We figured out why the interview bots failed: they interviewed them all with the same questions without using any other information that we have. Since the saboteurs are fabricating responses in order to sound like non-saboteurs, this didn't work."

"So, you have a different idea?" Arthur's mom asked.

"Of course," Helen answered. "The votes are anonymous, but who puts in code isn't. As a result, we know who put the buggy code in; therefore, we know who some of the guilty people are. Also, a lot of programmers voted to block the changes and made some... angry comments explaining the bugs; those people are probably opposed to sabotage."

"You mean like the guy who threatened to smash the saboteurs' computers?" Arthur asked.

"Yes, like that guy," Rebecca answered amusingly. "I can also probably clear a few people that I know quite well," Rebecca pointed out. Helen grimaced.

"Yes, probably; we shouldn't jump to conclusions," Helen warned. "In any case, we know that a few people will almost certainly be honest, and that a few will definitely try to mislead us. So, we can give particular questions to the people we're near certain about, and then use their answers to deduce which of the remaining programmers are saboteurs and which aren't."

"Great. is there anything I have to do?" Arthur's mom asked.

"I just need the interview bots."

One montage later, and the core programming team was being interviewed with Helen and HAL's new questions. While Helen had been making deductions and refining the bots' questions, Arthur and his mom had mostly been sitting around talking about different topics. Thankfully, the interviews were almost over. Now, Helen, Arthur, and Arthur's mom were just sitting there waiting for the last answers to come in. Arthur, for one, was starting to get bored.

"Bored?" Helen asked Arthur.

"Yeah, just now," Arthur stated.

"Well, you're pretty predictable."

"Was that an insult or a compliment?" Arthur asked. Helen chuckled before responding.

"Neither. Well, you've been learning about the immune system for the last few days; we could talk about that."

"That is interesting. An army of cells stopping things taking over my body."

"I wish this organization had an immune system," Arthur's mom quipped. The quip reminded Arthur of the giant white blood cell models that Helen had shown him the previous day. Suddenly, Arthur was laughing uncontrollably.

"What?" Arthur's mom asked, seemingly offended. Once Arthur managed to stop laughing, he answered her question.

"I just imagined giant white blood cells searching the building for bad programmers," Arthur said.

"That would make for an interesting welcome sign. 'Welcome to Noname. Bad programmers will be eaten by giant white blobs.'" Helen said before the whole group fell into laughter.

A few minutes later, the interview robots knocked on the door.

"Come in!" Arthur's mom exclaimed.

"`We have completed all of our interviews,`" one of the bots said as it showed Helen a list of transcribed answers. Helen nodded before turning to Arthur's mom.

"I'll finish analyzing the footage the robots sent me; I'll let you know if they made any errors," Helen stated. "I'll let you know then who I suspect the saboteurs are."

"Thank you, Helen," Arthur's mom responded. She decided to have them all go home; it was closing time after all.

Aaron had been relaxing after work when he heard the front door open. Rebecca must have finally finished work. Around a minute later, Aaron's wife came in, seemingly still thinking about something.

"Hi, Rebecca," Aaron greeted. Rebecca was so deep in thought that it took her a bit to realize that Aaron was talking to her.

"Oh. Hi, Aaron," Rebecca replied.

"What are you thinking about?" He immediately regretted asking upon seeing the look of realization and defeat on her face.

"Oh no. Oh no, no, no. This is bad,"

"What's bad?"

"The software we're using requires a majority vote to both release software AND to kick a programmer off," Rebecca said in defeat. Aaron didn't see the problem. After all, even if a majority of programmers were saboteurs, Rebecca could surely...oh.

"So you can't kick them off your team?"

"I can fire them, but they can still stop us from fixing the program."

"Didn't you tell me that the tutor code is on some website? How about asking that site to take it down?" Aaron proposed.

"They won't!", Rebecca interrupted her husband in frustration, "The saboteurs are most of the team! As far as they website's concerned, they own it. They won't listen to me!" After hearing his mom's yelling, Arthur now walked into the room.

"What's going on?" Arthur asked with concern. Once Aaron explained the issue to his son, even Arthur's smile disappeared.

Part Three

Arthur had been thinking about the majority vote problem since they got home. They could never use his mom's code again; if only she could...wait.

"I got it!" Arthur yelled out of nowhere.

"Got what?" his mom asked.

"You can't update the current tutor program, but you can make a new one," Arthur explained.

"Won't that take forever?" Arthur's dad asked.

"Not if we use the last version that worked," Arthur responded. His mom thought on this for a minute.

"We'll have to send out instructions on how to install the 'new' software, but other than that, your idea will work," Rebecca stated with a smile on her face.

Once Arthur's idea was implemented, it took only a few days before all Noname tutors were working once again. At this point, the only remaining task was to fire the guilty volunteers, which Helen had given Rebecca a list of. The Volunteer and Employee Removal Act had made the requirements for getting rid of volunteers a bit strange. It was introduced as a joke to the global legislature and, as happens a surprising amount of the time with joke bills, passed unanimously. Fortunately, the required ritual is usually harmless.

As required by law, the volunteers to be removed were gathered in a pre-determined location along with their boss, who then took their volunteer IDs. The IDs were then thrown on the ground in a pile as required by law. Just for fun, Rebecca printed out copies of the bugs on paper and placed them in the pile as well. The pile was then, as legally required, set on fire in front of everyone present. With this act, the saboteurs were officially fired.

On the other end of Tech City, Arthur was finally going back to school. He saw Helen while waiting for his cab.

"Hi, Helen," Arthur said.

"Hi, Arthur," Helen replied. "Are you glad to be going back to school?"

"Yeah. It was nice having you over, though."

"It was nice teaching you," Helen replied. "As a reward for your kindness, you get to be taught by stupid humans for the rest of your life," Helen replied in a completely silly tone.

"Thanks," Arthur replied no more seriously. "As thanks, you have to live with us 'stupid humans' for the rest of your life."

"You're welcome." After a chuckle from both of them, the kids' cabs came. "I'll see you at school!"

"Bye!" Arthur replied. On the trip to school, he wondered briefly who could be responsible for the sabotage. Arthur then simply smiled at the fact that he was going back to school.