LISTENING TO THE FUTURE

by Greg Stolze

Jaycee smoothed the front of her skirt. Took a deep breath. This would be fine. Never mind that she was a scientist and he was a senator, never mind the age difference, the race divide… it would work because what she had, he would want. He had to. Right?

"Ms. Colvin? The senator will see you now."

"It's Dr. Colvin," she said, then cleared her throat and repeated it, a little louder.

"Of course, I'm sorry." The receptionist gestured her to the open door, and the man inside came around from his desk to shake her hand—a firm grip, two handed, with eye contact.

"Dr. Colvin," he said gravely.

"Thank you for meeting me, sir," she replied, sitting at his gesture.

"So. You have something for me?"

"Yes. Uh." She took a deep breath. This would be fine. She closed her eyes and opened them and said, "What if you could prevent 9/11?"

He blinked at her slowly.

"What if you could stop the next 9/11? Would you do it?" she repeated.

"Of course. Who…? I mean, anyone would."

"Exactly, exactly." Another deep breath. "If you could go back to 1930 and kill Adolph Hitler…?" The question was somewhat diminished by her voice going squeaky.

"Miss… are you talking about time travel?"

Deep breath. "I am."

For a long moment, they just stared at each other.

"You won that physics prize, didn't you?" he said.

"Yes. The positron impression timing experiment. It bears out what we're calling quantum informatics."

"Quantum informatics," he repeated, levely.

"It's… one of the coauthors married a marketing person, it was…" She cleared her throat again, reminding herself to focus. "It is possible to receive messages from the future."

"In theory."

"The positron impression appears to support it. I mean, it supports it. It does support it."

He looked away, fingers on his lips.

"Tell me how it works," he said at last, and she exhaled.

"It's not *exactly* time travel," she admitted. "It's not… you know, *Bill and Ted*."

"Sure. If that was possible, we'd know about it."

"Would we? For someone with time movement abilities, what would be easier than concealing oneself from people without those abilities?"

"Now you're making me paranoid," the senator said drily. Jaycee raised her hands.

"Matter can't travel backwards through time, except possibly tachyons, which are so far only theoretical and, anyhow, would never be able to interact with anything moving *slower* than light. But if you… set things up just right, you can have duration-independent informational effects."

"Break that down for me, then. Explain it like I'm ten."

Jaycee smiled. "All right, imagine you could build a radio receiver, turn it on, and as soon as it's activated, it receives a message. That message would not need to be sent for… a decade? A century? Any span of time, really. Any span of time could pass before the transmitter was built and the message was sent. No matter how long it took, the message would arrive just as soon as the receiver was on."

"And you can do this?"

She nodded.

"Good grief," he said, quietly.

"Now, there are limits. Each receiver and transmitter pairing would only work once, and the energy requirements on both ends are large and specific."

"What does that mean?"

"Our… estimates… are that building the receiver and running it for thirty-one seconds would cost…" She swallowed. "One point three billion dollars." Her voice was barely above a whisper.

"One point three billion."

"Well, if you gave us the Tevatron."

He blinked.

"The Tevatron?" she repeated. "You know, the particle accelerator at Fermi? J-just outside Chicago? It hasn't been active since 2011, if we could build onto its infrastructure and collider loops…"

"OK, sure. Give me a second. A billion dollars to get a message from the future."

"One point three."

"Give me a second."

He looked away. His expression was so intent that Jaycee involuntarily glanced along, following the line of his attention, but it was just a wall of books with matching spines.

"Why did you bring this to me and not DARPA?" he said, but his tone suggested he already knew the answer.

"Well… if it was a military project then, presumably, the military would be the ones sending the transmission and… we would… we just think that a lot of the… potential challenges… aren't exactly army stuff."

"Play this out for me. I build the receiver. I get a message from the future saying…?"

"Um, it could be 'there's a rogue asteroid heading towards Earth, a real dino-killer, build something to deflect it now, here's a blueprint and an interception trajectory.' It could be 'when you hear about a viral outbreak in North Dakota in January of 2035, lock down the entire state immediately for a full year' or it could be a… a full report on a century of weather disasters giving times and dates and intensities. It could be anything!" She leaned forward. "This is what humankind has wanted forever, a peek at the future! Old civilizations had *gods* of prophecy, but we can actually *do* it, like… like King David warning Pharaoh about seven lean years!"

"That would fit in thirty seconds?"

"Thirty-one seconds," she said automatically, then grimaced. "But it's not… it wouldn't have to be a spoken message. *Conservatively*, the data transmission rate would be something like 22 megabytes per second."

"Is that a lot?"

"We did the math," she said, corralling a stray hair as she spoke. "You can put a novel's worth of words in a file that's about 500 kilobytes. With thirty-one seconds of transmission, at twenty-two megabytes per, that's about thirteen hundred books worth of text." She gestured at his bookshelf. "Way more than, say, that. High resolution graphic files would probably take up more space than they'd be worth, but we've got a communication protocol we like…"

"Lots of information, got it, got it." He frowned. Then he thumbed a button on his intercom. "Bradford? Push my next meeting, would you? This is going long."

Jaycee tried to suppress the little thrill she felt at his words.

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"I'm still trying to wrap my brain around… this," he said.

"Quantum informatics," she said, her tone helpful.

"…sure. Now, I… read some science fiction as a kid, I saw that *Endgame* movie with my niece and… I guess my question is, what happens to the dead future?"

"Excuse me?"

"Let's use your example. We get a list of weather disasters, earthquakes… hell, with a whole bookshelf, we could get every major crime's time and location for decades. So we get that, and we evacuate people ahead of the hurricanes, and we intercept the criminals, and we change all the bad outcomes they warned us about."

"Exactly!"

"What happens to the people who sent the message?"

"Excuse me?"

"What happens to them? The disasters change. Especially the crime stuff. If the crime is prevented, why would they send a message back to prevent it?"

"Because in the future they've already done it," Jaycee said earnestly. "Their past becomes our future and is fixed. It happens because of cause and effect. It's just that in this case, the effect precedes the cause, but only in *linear* time. The loop is smooth."

"The loop?"

"I understand that this is really hard," Jaycee said. "I have the advantage of having thought about the tough parts for decades, so please believe me when I say you're catching on fast, but I… *we*, the team, we've all been over this."

"All right. Let's try a different example. Killing Hitler. People in the future warn people in the past to kill Hitler because otherwise he engineers the Holocaust. Everyone wants to avoid that. So the people in the past, having been warned, kill him or throw him in jail or do *something* to neutralize the problem." He steepled his fingers. "Then the people in the future send the message because… why? If the Holocaust is prevented, why send back a message to prevent the Holocaust? They wouldn't know about it."

"But they would, because the message persists. They'd know about the Holocaust the same way we do—not because we directly experienced it, but because we were told about it by people who were there," Jaycee said.

"These future people, then, we'd be counting on them to send back a message—a one time, very expensive message—based on hearsay?"

Jaycee blinked hard. "It's not hearsay. It's what they *do*. It… it's a smooth loop, you see? They do it because they do it. The causality reinforces itself. Any other action is automatically hypothetical, it's deselected."

"So they have no free will?"

"No, they have as much as anyone, but their decision, their free decision, appears immutable after the fact. I know your aide called me 'Ms. Colvin' because that happened. It's immutable now, but it was a choice before it happened, it could have been different."

"In this case though, they have to do it because it's known that they did it before they build the transmitter and do it."

"Exactly! That's the smooth loop!"

"What if they don't build the transmitter?"

"But they do."

The senator scratched an ear. "I feel like I'm stuck in a 'who's on first' routine," he said.

"That's… understandable," Jaycee admitted.

For a moment, the pair were still, thinking.

"Try it like this," Jaycee finally said. "There's a timeline, moving along like a train on a track. At some point, we build the receiver. After we do that, bad things happen, and at some point there are enough bad things that the people farther down the line build the transmitter and loop back a warning. We receive it and correct the timeline, which becomes the new, better history of the world, it proceeds until the transmission point, when the message is sent and the loop closes."

"So the bad future gets annihilated."

"Well… that's one way of looking at it…"

"And some warnings can only emerge from bad futures?"

"Um…" Jaycee shifted in her seat as the senator leaned forward.

"If Hitler gets stopped, there's only the say-so of the bad future that Hitler needed to be stopped, and if Hitler's stopped, the bad future doesn't happen."

"I guess, yes, but with…"

He held up his hand and, unhappily, she stopped.

"So this scheme only works if people in the bad future submit to their own destruction."

"No! It's, there's not people *dying*, people w-would *not* die. Very specifically!"

"They would have to send a message, at tremendous expense, to change things drastically and unpredictably. Right?"

"Yes, which is why this would *only* be used for big, obvious disasters."

"Hm. Until the message was received, the bad future would have no idea that it worked, right?"

"The episode would be forestalled before the alternate conclusion was experienced," Jaycee admitted.

"So not only do they have to accept the destruction of the time line they live in, they have to do it without any proof that it even works. How much would it cost to build the transmitter?"

"Sorry?"

"A billion and change, plus a Tevatron, to build the receiver. How much for the transmitter? Same amount?"

"Well, probably less, maybe a *lot* less depending on what we learn from building the first stage, and much of the equipment could be repurposed after receiving the message…"

"Ballpark it for me. Give me a low end. A million dollars?"

She laughed. "You can't possibly expect to build something that big, energy-intensive and complicated for less than eight hundred million—or, you know, the future equivalent of that value, it's, this isn't something an individual can do. That's a feature, not a bug. You're not going to get a lone individual building a transmitter to hijack the one time receiver."

"No, sure, but imagine there was this big, expensive government project in the past that did nothing, and you're trying to sell it to deficit hawks with the argument 'well, it *will* work once we pour even *more* money into this thing you don't understand and which has not worked yet'."

"So just factor the costs of both receiver and transmitter into the pitch it's, it's a, it's… you're the budget negotiator, I'm sure you know far more than me about, about how to… get things, done, funded, how to, er, cultivate agreement…"

"Which is why I'm telling you this is a hard sell," he said gently. He paused, then asked, "What if we don't act on the warning?"

"Why…?"

"Just humor me."

"All right, if… if there's a bad event, and the future warns us about it, and we ignore the warning, the event happens. The timeline continues unimpeded in its bad version, but why wouldn't we act on a warning?"

"Maybe it's suspect. Maybe it's from a future of winners and losers where the winners are making sure they stay winners. Imagine some future dictator sending back the

message 'make sure I succeed and survive, no matter what'. Instead of killing Hitler, time travel saves Hitler."

"I think we have to trust our descendants."

The senator winced. "I have seen politics, I have seen the sausage get made, I have seen the compromises and the factions, and it seem possible some future power group would see this as the perfect way to cement their power. I'm hesitant to trust."

Dr. Colvin blinked hard, twice, and took a deep breath. "Every technology can be, be abused, but that's no reason to leave them untried! Car crashes kill people but we still drive cars. Drugs can, people, they overdose, but we still use them b-because…" She paused, collected herself and said, "The benefits outweigh the costs. We do these things despite their downsides, because of the upsides."

"Doctrine of double effects," the senator said.

"Excuse me?"

"It's a philosophy thing. An ethics precept. When an action has two outcomes, one good and one bad, you weigh them against each other. If it's overall bad, it's a bad action despite the good outcome, and vice versa."

Jaycee's eyes brightened. "Exactly! The possible good outweighs the potential bad. We could, could just do it for weather! Just put the whole thing under the National Weather Service. In 2017, the cost of hurricane cleanup was…" She glanced upward briefly and bit her lip. "$306 billion, I think. The cost of building both the receiver and transmitter are spare change to the cost of that *one year* of weather disasters."

"Those are compelling numbers, but it's hard to give them that much weight when we're sure there are hurricanes, and we aren't sure there's time travel. Or, excuse me, quantum informatics."

"The science is sound," she said plaintively.

"And the terrible thing about science is that what one can do, another can repeat. As soon as we had the atom bomb, the USSR and China didn't rest until they had them too. I don't want to be responsible for starting a time war."

The physicist gave a bark of unbelieving laughter. "That's quite a pivot, sir! From 'what if it won't work' to 'what if it works too well' without a single pause in the middle to consider the promise of it working *just right*."

He sighed.

"I know it's… scary," she said. "And this is the problem with a technology that is… is an epochal, fundamental change. There is no incremental way to work up to this. Sending 'Mr. Watson, come here' back a week is not substantially less expensive than sending our 31 second burst back a hundred years—all the difficulty and trouble lies in creating, tuning, and purifying a unique signature. I wish we could just dip our toes in, but the

closest to that we've come was the positron timing. That's taken us as far as it can and it worked exactly as predicted."

"As if *you'd* gotten a message from the future," he said, with a little smile.

Her return smile was rather weak.

"I'm probably going to have to sleep on this. Talk it over with some people. Get some alternate perspectives. You know," he said, standing.

"Sure, sure," she said, taking his hand and shaking it, trying to match his firmness with her own. "I'm confident that you'll see this, this is the right thing to do."

His wince was so slight, she might have imagined it.

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"So is he in?" the other physicist asked Jaycee, as the team convened in a non-Starbucks Washington cafe.

"He says he needs to think about it."

"That means no," intoned their mathematician.

"If he meant no, that's what he would have said," Jaycee replied.

"You haven't dealt with many politicians, have you?"

"Have *you*?" she snapped. "He could do it. He saw the potential, I really think he did!"

"But he still has to convince people who are dumber, to put money into something unproven, where all the work gets done in a blue state," the mathematician said, shaking his head. "I'm telling you, take it to some tech billionaire."

"And live in a future determined by Elon Musk or Mark Zuckerberg?" The other physicist's lip curled in revulsion at the thought. "I would, in all true sincerity, rather go on with unguided history than put Jeff Bezos behind the wheel."

"Yes yes, we all hate billionaires, pity that's so inconvenient when one needs a billion dollars," the mathematician replied.

"We could just publish the theory," Jaycee said. "That would at least build some pressure, if people understood the potential!"

"Sure, the way they understood the potential of vaccines."

"Well *someone* has to get it!" Jaycee slammed her hand on the tabletop. "Someone has to care about the future enough to listen to it!"

The mathematician gave one slow blink, then said, "Dr. Colvin, what are you basing that on?"