The Paradigm Discourses

"The Circle of Truth"

Seek out paradox – that place where established principles collide in contradiction, where logic self-destructs.

– Amanda Gefter

Logic was setting up a demo. He and Understanding had just pushed the regular furniture to the walls, leaving a large open space. Then with most everyone's help, two sets of folding chairs were retrieved from the basement and arranged in a circle. Every chair faced the center. Mathematics doggedly followed Logic around readjusting each freshly placed chair to ensure that each was equidistant from the center. There were six chairs in each set; a set of light blue metal chairs, and a set of red ones with thin cushions. The red chairs looked new; the blue chairs had obviously seen much use.

All the blue chairs were adjacent to each other as were the red chairs. Curiosity surveyed them with a critical and appraising eye; she was not impressed. Understanding noticed, but merely shrugged; style was not his long suit and he knew she knew that.

With the setup at last complete, Logic started off the evening's demo. "I've been looking a bit into Paradigm's imaginary truthvalues, and we are going to use this circle to illuminate some of their properties. I need two volunteers to enter the circle."

Theory and Experiment's hands went up in unison. Logic nodded at them, "You two will do, please step into my circle."

Paradigm had been standing by Understanding content to be an observer. He was interested in what Logic's take on imaginary truthvalues was going to be. Understanding was focused on Logic, who after the invite to Theory and Experiment had said nothing further.

At first Theory and Experiment just stood awkwardly in the circle near the center, but after a minute without further guidance from Logic, Experiment finally went over to one of the blue chairs and stood in front of it. He rather pointedly stared at Theory until he also went and stood by a chair, a red one. By some unseen mutual agreement, they had settled on chairs on opposite sides of the circle.

Logic uttered four words, "So far, so good." Then he went quite again. Understanding smiled, good pedagogy was like fine art for him.

Experiment looked around the circle, then noticing his own action, repeated it deliberately, noticing each and every chair, one by one. He took one step clockwise and stood in front of a different chair, still blue. After the briefest pause, Theory emulated him. Then together each advanced to the next chair, still on opposite sides of the circle. Experiment was still in front of a blue chair and Theory still in front of a red one; but that was about to change for both of them, for each had advanced to the end of the sequence of same-colored chairs they had started on.

Theory, "One of these colors should be true the other false."

Experiment, "But which one?"

Reason, “Ahhh, that’s the very first point isn’t it.” He looked at Logic, “It is completely arbitrary which color gets mapped to which Boolean truthvalue.”

Logic simply nodded.

Theory, stepping forward from the last of the red chairs to the first of the blue chairs, said, “I am NOT Experiment,” to which Experiment responded immediately stepping forward from the last blue chair to the first red chair, “I am NOT Theory.” They enjoyed a shared grin.

Logic, resuming control, “Very good, now hold that thought. I need two more volunteers.” Curiosity and Proof both stepped forward. Logic, “I want you two to stand on the outside of the circle, one of you behind the red chairs, the other behind the blue chairs.” Once they complied, Logic addressed each, “Proof, raise your left hand, Curiosity raise your right hand. Now each time someone passes your position, change which hand you have up.” Then to Theory and Experiment, he gave the final command, “You two start a stately, synchronized march around the inside of the circle.” And off they went, regular as clockwork.

After a few rounds Reason spoke up, “Ok, here is what I’m witnessing. Each of Theory and Experiment are oscillating between true and false, regardless of which way red and blue are mapped to truthvalues. That makes them imaginary truthvalues.

“However, when Theory passes Curiosity her right-hand raises, yet when Experiment passes Curiosity, her left-hand raises. That makes them opposite imaginary truthvalues. However, it is the opposite hands for Proof. Again, it is ambiguous whether right-hand or left-hand is mapped to imaginary true or imaginary false.”

He looked at Logic, “How am I doing?” who smiled and nodded in return but didn’t say anything. “Therefore, we’ve modeled imaginary truthvalues as oscillating Boolean truthvalues, just with opposite phase.”

Logic scratched his ear, “Anything else?” Reason nodded slowly. “Yep, I think there is. Proof is standing behind the blue chairs and he sees alternating Theory and Experiment, while Curiosity standing behind,” he couldn’t help the dig, “the nice new red chairs, sees alternating Experiment and Theory. Thus, we may conclude that he sees one Boolean truthvalue as alternating imaginary truthvalues, while she sees the other Boolean truthvalue as the imaginary truthvalues alternating with the opposite phase.”

Shaking his head side to side in admiration, “I think you’ve done it; in this model imaginaries are alternating Booleans and the Booleans are alternating imaginaries. You’ve shown that they are indeed conjugate bases for truthvalues.”

Understanding initiated the appreciative clapping and Logic took a modest bow, “Let’s break for dinner. I suspect that Logic has one more detail to regale us with. It’s a nice night, so dinner is on the veranda; everyone grab a folding chair.”

For a while dinner was uneventful, but after the normal chit-chat, and polite, ‘please pass the rolls’ exchanges, Dogma voiced his concern, “Is there really no way to uniquely specify T & F and i & j?”

Proof put down his fork, “Perhaps. What we need is simply a tautological form, that’s a logical expression that is true regardless of the inputs. For instance, we could assert that A OR ~A is true, and in symmetry, A AND ~A is false. To quote Dogma, QED.”

Paradigm, “Not so fast, and not so QED. That won’t work, the NOT of imaginary true is still imaginary true. If A is imaginary, A OR ~A is still imaginary, not even Boolean, much less a pure true. Neither or’ing them nor and’ing them yields a Boolean value.”

For a moment there was just silence. That result was unexpected. Curiosity broke the silence, “I was reading recently about digital circuits, the kind that go in Understanding’s computation engines, and they talk about positive logic versus negative logic. Can we use that?”

Logic responded, “I can address that. Unfortunately, no, those terms are used to indicate what kind of Boolean value triggers storage in simple 1-bit memories called flip-flops. A flip-flop has two inputs, one sets it to true, the other sets it to false. They simply come in two forms, in one form you must use true (positive logic) to record a value, in the other you must use false (negative logic) to record a value.”

Mathematics noticed the hole first, “In that case, we can expect that it should be possible to construct imaginary flip-flops; 1-bit memories that can store either imaginary true or imaginary false. Both Logic and Paradigm snapped their focus to Mathematics, and, nearly in unison, “We missed that one.” Then Logic continued, “That should be possible, in fact it must be possible if we are going to treat imaginary truthvalues as a conjugate basis set to the Booleans. Nice catch; perhaps I can have something ready by next week.”

Logic looked around the table, noting the largely empty plates. “Y’all ready for the next demo?” With general acquiescence, they grabbed their chairs and returned to the great room. As before, Logic mandated the placement of the chairs into a circle, but this time he had them alternate colors.

“To keep this simple, we’ll only use Theory and Experiment.” They entered the circle and then marched around just like they had before.

Reason spoke up first, the epiphany hitting him hard, “The frequency with which they are alternating colors, alternating Boolean truthvalues is different; it’s now six times faster. That’s a problem. That can’t be ambiguous too can it?”

