Verisimilitude

The Structure and Interpretation of Narratives

1 Axioms and Dogma

The special theory of verisimilitude is built using the calculus of constructions as defined by the three core axioms and their natural dogma:

- Propositional extensionality: "equivalent languages are indistinguishable."
- Quotient construction: "all languages are contingent on their construction."
- Choice: "the existence of language is proven by the medium."

By choice, we study the nature of language using *strategic languages*: languages that are interpreted as translations of other languages. The definition of *strategic choices* then derives elegantly.

However, since strategic languages are contingent on their construction, their translation—or, more generally, their *interpretation*—may not be unique or be known to exist at all. Languages that are without interpretation are called *alien languages*. Languages that have a unique interpretation are called *formal languages*.

With axioms now either accepted or rejected, and with dogma that is sufficiently persuasive, the special theory of verisimilitude can now be defined as a general theory of physical constructions.

2 Physical Geometry

Classically, the invocation of a frame of reference, and thus with it the conception of space-time, is derived through the epiphany of Descartes: *I think, therefore I am.* It's clear now that Descartes' beautiful rhetoric can be constructed formally by reflecting on the axiom of choice: *the existence of language is proven by the medium.* But if we are going to be abandoning the principle of reference frames, how then could it be possible to construct definitions of space and time that are consistent with physical geometry?

The human struggle with this question lies in our failure to generalize our interpretation of translations—or, stated more plainly, the general problem of interpretation: our obsessive strive toward the perfection of our language that is often blocked by the mistaken belief that the language spoken by the mind to itself is indistinguishable from the language spoken by the voice to its peers. But by propositional extensionality, if the languages were to be indistinguishable, then they must be equivalent; however, since these languages are constructed from different mediums, this is a contradiction. This argument is called the *misère condition*, and here it is argued without shame that this is the only contradiction permitted by God.

Therefore, left with the burden of knowledge, we must invoke choice to define potential quotient constructions.

Suppose we are contemplating an experiment to calibrate our lab equipment and endeavor to construct the simplest possible measurement to ensure the independence of contingent language. We envision then the existence of two indivisible particles and we define *measurement* to be the construction of a proof that there exists a language that is exchanged between them.

By choice, we must therefore study the medium using strategic language.

Since our particles are indivisible, we cannot yet use language that is contingent on the internal structure of the particles themselves. So instead, we must resort to *nonempty numbers*: natural numbers that are not zero. If there exists a language between the two particles, then we can identify this language by observing the medium and associating unique transformations with unique numbers.

The nonempty numbers form a strategic language equipped with the property of *universal translation*: the unique ability to translate all alien languages into formal languages. However, all universal translations are indistinguishable, thus, by the misère condition, any translation of an alien language that is complete is also alien.

We must now define what constitutes the transformation of a medium, and to this end, we endeavor to construct a formal interpretation of Einstein's special relativity. Our objective thus turns to the question of defining what is understood classically as "simultaneous events," or contemporaneously as simply *data*.

By having chosen nonempty numbers for our strategic language, the definition is now immediate. The catch, however, is that we must now engage the problem of teleological deduction, or *time*. The rhetoric of verisimilitude compels us to avoid using time as a given since we have yet to reach our destination of a general theory of verisimulation.

As of now, we can only proceed by establishing a *formal analogy*, wherein a speculative proposal is presented and authenticity is informed by the difficulty of proving it wrong. Here, it is proposed that all indivisible particles communicate by transforming a shared medium into a game of coinage. Clarification will be written in vernacular:

First, one of the two particles bids a nonempty number by translating its interpretation of the number into the medium. We do not assume anything about the complexity of the interpretation, nor even the existence of the medium, thus the numbers being used can only be compared using propositional extensionality within the context of calculus.

Second, the particle receiving the bid replies with a bid that, by the misère condition, might be distinct from the original.

Third, and so on, the receiving particle must reply with a nonempty number that is linearly independent from all numbers bid previously. In other words, the number that a particle chooses must not be derived from any of the numbers already declared before it. If one of the particles produces a linearly dependent bid, we assume that the particles are alien to each other and choice must be invoked in order to continue analysis. Assuming this is not the case, the game is otherwise concluded when one of the particles no longer has any remaining bids. This particle is then "the winner who receives the pot," wherein the final message, constructed as a unit terminated list of linearly independent nonempty numbers, is given an orientation that allows the scientist to distinguish the two particles from one another: one is the winner, the other is the loser—positive, negative; charming, strange; black, white; us, them; reader, writer; beautiful and elegant.

In classical language, we have just argued that photons do not travel, they simply arrive at their destination instantaneously.

And if we were to articulate this further, our reason would eventually rest on the interpretation that photons are somehow “equivalent” to some “aether.” And it is here that the analogy of coinage ends.

3 Consensus

In the study of communication, the Byzantine generals problem, as formulated by Leslie Lamport, is foundational. The impossibility theorem that it inspires brings madness to all who understand its scope. However, to the optimist, impossibility is the greatest of news since knowledge of what is impossible improves the efficiency of our reason.

Before discourse on the general problem of the Byzantine generals can begin, it is first necessary to discuss the simpler problem of only two generals. This simpler excersice will be used to inspire a formal definition of *consensus* which will be used in later discussion. The formal analogy of the two generals is stated as such:

> Two generals and their armies find themselves on opposite sides of enemy territory. The enemy is assumed to be strong enough to repel an attack from one army, but not a simultaneous attack from both. Any allied travel through enemy territory is assumed to be treacherous. The two generals are assumed to recognize the enemy and distinguish them from their allies. Both generals are aware of the other's initial position, but knows nothing of the other's movements or behavior. Lastly, it is assumed that the only form of communication between the allied leaders is done through messengers sent through enemy territory, and thus, the problem of the two generals asks whether it is possible for these generals to coordinate a specific time to attack the enemy in unison.

The key to understanding the problem is to sympathize with one of the generals. This general, eager to initiate an attack, may choose a time then send a messenger to inform their peer. But since travel through enemy territory is treacherous, this initial general cannot be certain that their message successfully reaches its destination. Without this confidence that their message has been received, the general may not wish to attack if they fear that they will do so alone. Likewise, if the message is received by the other general, they may wish to send a confirmation to resolve this issue of confidence. But just as the first, the second general cannot be sure that their confirmation will reach its destination either. And even if this confirmation does go through, the receiving general might feel the need to confirm the confirmation to assuage this uncertainty in the other—revealing the dilemma.

In the language of verisimilitude, the problem of the two generals is reasoned about using *teleological deduction*: a form of deduction that is not *deterministic*—or, stated more concretely, a strategic language that uses symbols prior to their definition.

Suppose we reason about the problem backwards by assuming that a successful attack has already occurred. We are thus required to deduce how such an event could be possible. We know from deterministic deduction that there is no choice of protocol that can guarantee a simultaneous attack, therefore, we can surmise that either the generals accepted some amount of uncertainty in their protocol, or the attack itself was not simultaneous. Thus, it is revealed that there are two dimensions to the question posed by the analogy: one that seeks to minimize uncertainty and one that seeks to maximize simultaneity.

It may seem counter-intuitive to discuss the possibility of the attack not being simultaneous since it was the mutual fear of idleness between the two generals that gave rise to the paradox in the first place. Yet, a scientist might recognize this technique as simply the rejection of a hypothesis, prompting us to wonder how much we really understand about the problem to begin with.

The purpose of the analogy of the two generals is to discuss the difficulty of creating deterministic networking protocols over an unreliable medium, or *channel*. However, the goal of verisimilitude is to contemplate the more general communication between particles. In a lab environment, the problem of the two generals cannot be seen, only the "results of an attack" can be seen: either the attack is led to failure by one general, or the attack is led to success by two. The integrity of the enemy represents the measurement—or, in the language of verisimilitude: the destruction of the medium, called *termination*, serves as the proof that a language exists between the two generals.

From this lens, we see how it might be reasonable to contemplate events that are not authentically "simultaneous" in the classical sense. Extending the analogy, suppose our generals are clever and have sent scouts to study their enemy. The scouts might then discover that the enemy is equipped with a large horn to rally troops to defense. If such a discovery is made, a general informed of this alarm could reason that they no longer need to send messengers to their peer in order to coordinate an attack. Instead, if the general simply initiates the attack immediately, the sound of the enemy's horn will signal their ally to join the offensive.

However, this line of reasoning should be insulting to the educated reader. Extending an analogy is not a rigorous exercise. But the subsequent interpretation, however, can be made rigorous if it is eventually written in a formal language. The practice of teleological deduction, then, seems to demand of us a certain humility. An admission to the incompleteness of any language invented by the mind that is destined for the interpretation of others.

If it is our intention to formalize consensus between the two generals, it is necessary that we construct a protocol that allows the two generals to use a finite number of messengers to maximize the simultaneity of their attack. Since this is a new interpretation of the original two generals problem, we must first reframe our desired outcome using a new formal analogy:

Two generals find themselves on opposite sides of enemy territory while they wait for reinforcements. Each general knows the position of the other, but not their movements, behavior, or how many reinforcements they have received; each knows that their only means of communication is via messengers that must travel through treacherous territory; and each knows how to distinguish enemy from ally. In addition, the generals are also both aware that the enemy is equipped with a horn that will blow whenever an attack begins. The question to be answered is whether it is possible for the generals to coordinate an attack only when both allied armies have gathered sufficient reinforcements.

The key to the construction is to define how to utilize a game of coinage to communicate the rate of reinforcement of one general's army. This rate of change is not a measurement in the classical sense, but rather, it is an indicator of confidence based on the size of the sending general's army relative to the enemy. The next step will then concretely define the interpretation of a message and show how this can be used to improve the rigor of what is understood as confidence.