

## Session 4. Nature of Information

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“The most incomprehensible thing about the universe is that it is comprehensible.” Albert Einstein

### Session overview

- Nature of information seeking to understand whether
  - Matter generates information
  - Information generates matter
- Explore four types of information
  - Nature/Cultivated nature
  - Human language/Human emotive communication
- Brief tour through data analysis
- Two forms of explanation
  - Mechanism
  - Agency
- Measuring information syntactically compared with the semantic meaning of the information
- Examine several biblical illustrations of information primarily from speech

### Key passages

- Essence precedes existence: **Genesis 1:3, 6, 7, 9, 11, 14, 15, 20, 21, 24, 26, John 1:1-3, 10, Psalm 33:6,**
- Creative speech: **Numbers 20:8, Matthew 9:6-7,**
- Existence speaks: **Psalm 19:1-3,**
- Role of information in defending a proposition: **Acts 22:1-2, Acts 25:16, Philippians 1:15-18**

### Examples of Information

- Information is metaphysical in its essence
- Four pictures: nature, cultivated nature, human language, and human emotive communication

#### *Nature*

- Figure 4.1 illustrates a typical jungle scene
- Any human involvement in its design?
- What inferences can be made from this picture?
  - Naturalistic evolution
  - Intelligent causation
  - Need more data to assess the logical arguments

#### *Cultivated Nature*

- Figure 4.2 logically implies a gardener
  - Evidence of cultivation is overwhelmingly clear to anyone
  - Is it possible that this garden just happened? No.
- An intelligent being was involved in the design and maintenance

#### *Clear Communication*

- Figure 4.3 depict human language
  - Language is a wholly different form of information
  - What can you infer from this picture?
  - Did this just randomly appear in the sand?

### *Human emotive communication*

- Figure 4.5 illustrates gratitude
- Even if Geoff Keys (on the left) did not speak the same language as Brad Foat, the helicopter pilot who found him, Geoff is clearly communicating information to Brad

### *Financial information*

- Finance involves vast amounts of information
  - Publicly traded companies must file a 10-K with the SEC yearly
  - Filings are scrutinized for clues regarding the company's future prospects
  - Valuation is based on beliefs about the future, not the past
- Keynes notes that economists "... must study the present in the light of the past for the purposes of the future."<sup>1</sup>
  - Accountants focus on documenting historical transactions
  - Financial analysts focus on making decisions while facing the future
  - A profound difference often missed
- Financial communication goes far beyond sterile data
  - Textual analysis
  - Tone of voice communication
  - Facial expressions

### **Data Analysis**

- "... is a process of inspecting, cleansing, transforming, and modeling data with the goal of discovering useful information, suggesting conclusions, and supporting decision-making."<sup>2</sup>
- Information
  - "describes something we now know which we did not know before."<sup>3</sup>
  - Information is used to answer a question of some form
  - Information helps resolve uncertainty.
  - "The more uncertain an event, the more information is required to resolve uncertainty of that event.
  - Measured in bits (typical unit of information)<sup>4</sup>
- Data analysis seeks to discover previously hidden information for the purpose of explaining something and facilitate making better decisions
- Information is used to provide explanations
- Primary categories of explanations
  - Mechanism
  - Agency

### *Categories of explanations<sup>5</sup>*

#### ***Mechanism***

- Mechanism focuses on what it is and/or how it is, but not why it is
- Figure 4.6 illustrates a Toyota Prius

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<sup>1</sup>John Maynard Keynes, *Essays in Biography*, (NY, Horizon Press, 1951), pp. 140-141. Referenced at <https://www.indstate.edu/cas/econ/introduction-economics/jm-keynes-requirements-economist>.

<sup>2</sup>See <https://en.wikipedia.org/wiki/Dataanalysis> (accessed on July 26, 2020).

<sup>3</sup>John C. Lennox, *God's Undertaker Has Science Buried God?* Lion Hudson plc, Oxford, England, 2009, p. 148.

<sup>4</sup>See <https://en.wikipedia.org/wiki/Information> (accessed on July 26, 2020).

<sup>5</sup>Based on Lennox, Chapter 2 The scope and limits of science.

- (Mechanism) Explained in terms of fundamental parts, how those parts are assembled
- (Agency) Not sure why the engineers at Toyota designed it the way they did unless they choose to reveal it
- Aunt Matilda's cake (Lennox)
  - (Mechanism) If you observed a cake, you can explain that cake mechanically. What are its chemical components, infer initial ingredients, and perhaps document its physical dimension?
  - (Agency) You will never know for sure why Aunt Matilda baked the cake unless Aunt Matilda chose to tell you.

### *Agency*

- Agency focuses on why it is or its purpose
  - Revealed only by design engineers
  - Revealed only by Aunt Matilda, if she chose to do so
- Figure 4.7 illustrates an engineer
- Category mistake
  - Cannot infer agency explanations from mechanistic information
  - Atheistic perspectives suggests that mechanism explains agency
  - Christian perspective suggests that agency explains mechanism
- Data analysis is extremely useful in providing mechanistic explanations but struggles mightily with agency forms of explanations
- Many financial decisions based on agency explanations
  - What is the management team at a particular company (agents) attempting to accomplish?
  - Why are they moving the company in a particular direction?
  - Agency-based explanations will give you advanced knowledge of where the company is attempting to go rather than rely on mechanistic data that show up later

### *Syntactic information*

- A measure of information
- Syntactic information seeks the number of bits needed to store a certain data structure
- Information is measured in bits (e.g., a coin flip contains one bit of information)
- Information resolves uncertainty
- The more uncertain an event, the more information required to resolve its uncertainty

### *Semantic information*

- Greek word for a sign
- The meaning of the data
- No successful way to measure semantic information
- Needs context
- Figure 4.8 illustrates different street signs
  - A world without cars renders signs incomprehensible
  - Traveling in a foreign country many signs do not help
- Data analysis is incredibly useful
- Valuable in human flourishing
  - Aids in a better understanding of our universe's mechanisms
  - Beneficial regardless of our particular fundamental perspective

- Developing a love for the truth will aid in removing false claims

#### *Data analysis and financial prices*

- Finance is often feared due to the heavy use of mathematics and statistics
- Figure 4.9 illustrates the challenge of data analysis applied to finance
  - Stock price chart represents over 20 percent return for almost 20 years
  - An attractive stock based solely on this historical data
  - Easy to forget that the past is not an accurate predictor of the future
- Figure 4.10 illustrates the failure of Bear Stearns March 2008
- Clearly, historical data analysis would not have spared you from this financial carnage
- Investment analysis solely based on historical data is analogous to driving solely by looking in the rearview mirror – crashes are inevitable

#### **Biblical perspective on the nature of information**

- Christian perspective
  - Information precedes matter
  - Essence precedes existence
- Biblical claims related to origins
- Using information to make a defense of the Christian worldview

#### *Role of information in questions of origins*

- Agency related questions are addressed repeatedly
- Mechanism questions, however, are not answered

#### ***Genesis 1:3, 6, 7, 9, 11, 14, 15, 20, 21, 24, 26***

- Organic life is driven by information represented primarily in DNA
- DNA in a human genome contains about 7 billion bits of syntactic information
- Smallest proteins possessing biological function involve 100 amino acids, resulting in  $10^{130}$  sequence alternatives
- Paul Davies, a renowned physicist concludes, "... biologically relevant macromolecules simultaneously possess two vital properties: randomness and extreme specificity. A chaotic process could possibly achieve the former property but would have a negligible probability of achieving the latter."<sup>6</sup>
- The spoken word is widely referenced throughout the bible

#### *Biblical ideas on the nature of financial information*

- Objective truth exists
- Humans have a deeply ingrained capacity to misrepresent the truth
  - Need to be ever vigilant to disentangle truth claims out of the mass of financial information
  - Home mortgage, automobile loans, student loans, credit card debt, and so forth
- Many financial industries rely on people not carefully assessing their choices
  - "Easy payments" just sounds so appealing
  - Avoid delayed gratification

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<sup>6</sup>John C. Lennox, *God's Undertaker*, p. 157. Lennox was quoting Paul Davies.

- Fundamental difference between historical data and the semantic representations of future expectations
- Life's experiences as well as biblical patterns suggest that those things that have never happened in history do
- We tend to think we can predict the future better than we actually can.

### ***James 4:13-14a***

<sup>13</sup>Come now, you who say, "Today or tomorrow we will go into such and such a town and spend a year there and trade and make a profit"—<sup>14</sup>yet you do not know what tomorrow will bring.

- With the humble admission that we do not have the capacity to accurately forecast the future, several finance planning strategies change. One simple example is retirement planning. Rather than focus solely on how much to save and where to invest, this inability to forecast leads naturally to focusing on the relationship between invested assets and the fair estimate of the present value of retirement needs.
- As interest rates have fallen from the mid-1980s to 2020, the present value of retirement needs have significantly risen. By taking into consideration the way retirement needs rise when interest rates fall naturally suggest investing in a way that accounts for this pattern. We may not have known that rates would fall, but the relationship between rates and retirement needs is well known. Some estimate the losses within the pension industry exceed several trillion dollars just on this one issue.

### *Selected quotes and thoughts regarding information<sup>7</sup>*

- One foundational premise of the scientific method is the rational intelligibility of the universe
- "The very concept of the intelligibility of the universe presupposes the existence of a rationality capable of recognizing that intelligibility." (p. 59)
- "Science does not explain the mathematical intelligibility of the physical world for it is part of science's founding faith that this is so." John Polkinghorne (p. 61)
- Are there scientific methods for recognizing design? (A separate question from identification of the designer.)
- "No molecular device is capable of generating any information that does not either belong to its input or its own informational structure."
- "Natural processes involving only chance and necessity cannot generate complex specified information."
- "The meaning of the message just cannot be determined without prior knowledge of the context." (p. 151)

### **Summary**

- We explored the nature of information in this session
- The goal is to begin considering whether matter generates information or information generates matter
- Four pictures were discussed identifying different types of information
- After a brief tour through data analysis, we introduced two forms of explanation
  - Mechanism
  - Agency
- Syntactic measures of information
- Semantic meaning of the information

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<sup>7</sup>See John C. Lennox, *God's Undertaker*.

## Key Bible Passages

**Genesis 1** <sup>3</sup>And God said, “Let there be light,” and there was light. ... <sup>6</sup>And God said, “Let there be an expanse in the midst of the waters, and let it separate the waters from the waters.” <sup>7</sup> ... And it was so. ... <sup>9</sup>And God said, “Let the waters under the heavens be gathered together into one place, and let the dry land appear.” And it was so. ... <sup>11</sup>And God said, “Let the earth sprout vegetation, plants yielding seed, and fruit trees bearing fruit in which is their seed, each according to its kind, on the earth.” And it was so. ... <sup>14</sup>And God said, “Let there be lights in the expanse of the heavens to separate the day from the night. ... <sup>15</sup>And it was so. ... <sup>20</sup>And God said, “Let the waters swarm with swarms of living creatures, and let birds fly above the earth across the expanse of the heavens.” <sup>21</sup>So God created the great sea creatures and every living creature that moves, with which the waters swarm, according to their kinds, and every winged bird according to its kind. And God saw that it was good. ... <sup>24</sup>And God said, “Let the earth bring forth living creatures according to their kinds—livestock and creeping things and beasts of the earth according to their kinds.” And it was so. ... <sup>26</sup>Then God said, “Let us make man in our image, after our likeness. ...

**John 1:1-3, 10** <sup>1</sup>In the beginning was the Word, and the Word was with God, and the Word was God. <sup>2</sup>He was in the beginning with God. <sup>3</sup>All things were made through him, and without him was not any thing made that was made. ... <sup>10</sup>He was in the world, and the world was made through him, yet the world did not know him.

**Psalms 33:6** By the word of the Lord the heavens were made, and by the breath of his mouth all their host.

**Numbers 20:8** “Take the staff, and assemble the congregation, you and Aaron your brother, and tell the rock before their eyes to yield its water. So you shall bring water out of the rock for them and give drink to the congregation and their cattle.”

**Matthew 9:6-7** <sup>6</sup>But that you may know that the Son of Man has authority on earth to forgive sins”—he then said to the paralytic—“Rise, pick up your bed and go home.” <sup>7</sup>And he rose and went home.

**Psalms 19:1-3** <sup>1</sup>The heavens declare the glory of God, and the sky above proclaims his handiwork. <sup>2</sup>Day to day pours out speech, and night to night reveals knowledge. <sup>3</sup>There is no speech, nor are there words, whose voice is not heard.

**Colossians 1:16-17** <sup>16</sup>For by him all things were created, in heaven and on earth, visible and invisible, whether thrones or dominions or rulers or authorities—all things were created through him and for him. <sup>17</sup>And he is before all things, and in him all things hold together.

**Acts 22:1-2** <sup>1</sup>“Brothers and fathers, hear the defense that I now make before you.” <sup>2</sup>And when they heard that he was addressing them in the Hebrew language, they became even more quiet. ...

**Acts 25:16** I answered them that it was not the custom of the Romans to give up anyone before the accused met the accusers face to face and had opportunity to make his defense concerning the charge laid against him.

**Philippians 1:15-18** <sup>15</sup>Some indeed preach Christ from envy and rivalry, but others from good will. <sup>16</sup>The latter do it out of love, knowing that I am put here for the defense of the gospel. <sup>17</sup>The former proclaim Christ out of selfish ambition, not sincerely but thinking to afflict me in my imprisonment. <sup>18</sup>What then? Only that in every way, whether in pretense or in truth, Christ is proclaimed, and in that I rejoice. Yes, and I will rejoice, (ESV)