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2. Record Nr.	UNINA9910506381303321
Autore	McConnell Brian S.
Titolo	The Alien Communication Handbook : so we received a signal -- now what? // Brian S. McConnell
Pubbl/distr/stampa	Cham, Switzerland : , : Springer, , [2021] ©2021
ISBN	3-030-74845-6
Descrizione fisica	1 online resource (298 pages)
Collana	Astronomers' universe
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Soggetti	Interstellar communication
Lingua di pubblicazione	Inglese
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Livello bibliografico	Monografia
Nota di contenuto	Intro -- Preface -- Contents -- 1: C-Day -- What Happens if SETI Succeeds? -- How Many Alien Civilizations Are out There? -- The Drake Equation -- L (And Other Unknown Unknowns) -- What Are the Odds of Detecting a Signal from another Civilization? -- There Is Nobody out there (there Never Was or they Are all Dead) -- They Are Not Transmitting Signals or Emitting Technosignatures -- They Are Selectively Targeting their Transmissions -- Their Transmissions Are

Intermittent -- They Are Not Aware of our Presence Yet -- They Are Using Other Methods of Communication -- How Will Society Respond to Contact? -- The Rio Scale -- Planetary Biosignatures -- Microbial Fossils -- Active Microbial Life -- Macroscopic Fossils -- Macroscopic Life -- Planetary Technosignatures -- Animal Communication Breakthroughs -- Beamed Propulsion Signals -- Engineered Signals -- Engineered Artifacts -- Robotic Probes -- Crewed Vehicles -- A Primer for Policymakers -- Understanding the Type of Contact -- Technosignatures without Communication -- Passive Technosignatures -- Active Technosignatures -- Technosignatures with Communication -- The Risks of Contact -- Social Disruption/Culture Shock -- Misinformation and Bad Actors -- State Competition and Information Warfare -- Unintentional Consequences of Technological Knowledge Transfer -- Intellectual Property Rights and Law -- Regulating the Transmission of Outbound Signals (METI) -- Competition to Intercept Inscribed Matter Probes -- Artificially Intelligent Programs or Agents -- References -- 2: The Limits of Communication -- Prerequisites for Interstellar Communication -- Incentives for Interstellar Communication -- Intelligence -- Observables -- Symbolic Communication -- Interaction -- Multiple Paths to Comprehension -- 3: Animal Communication -- What's in a Language? -- Information Theory and the Structure of Language. Symbol Frequency -- Zipf's Law -- The Distribution of Meaning -- The Law of Abbreviation -- Recursion -- Comparing Animal Communication Systems -- Selected Examples of Animal Communication -- Ants -- Bees -- Prairie Dogs -- How Might a Communication Engineer Approach Animal Communication? -- Step 1: Identifying which Animal Is Vocalizing -- Step 2: Identifying the Basic Elements of an Animal's Calls -- Step 3: Building a List of Possible Utterances or Phonemes -- Step 4: Measuring Frequency of Use -- Step 5: Assigning Meaning to Words and Phrases -- Step 6: Building a Recognizer or Crude Translator -- Step 7: Interactive Experiments -- Step 8: Two-Way Communication Experiments -- Applying these Techniques to SETI -- The Limitations of Animal Communication as a SETI Analog -- Interactivity -- Intent -- Constructed Languages (Conlangs) -- References -- 4: A Timeline of Events -- Signal or Technosignature Detection -- Signal Analysis and Demodulation -- One-Way Communication -- Deciding whether to Respond -- Transmitting a Response -- Two-Way Communication Begins -- References -- 5: Information Delivery (Carriers) -- Electromagnetic Radiation -- Inscribed Matter -- Gravitational Radiation -- Other Carriers -- Reference -- 6: Modulation -- Radio Signals -- Amplitude Modulation -- Pulse Width Modulation -- Pulse Interval Modulation -- Frequency Modulation -- Phase Modulation -- Optical Signals -- Pulse Length Modulation -- Pulse Interval Modulation -- Wavelength (Color) Multiplexing -- Polarization Modulation -- How Much Information Can ET Transmit? -- Radio/Microwave Communication -- Optical and Infrared Communication (Pulsed Beacons) -- Annual Transmission Capacity -- Inscribed Matter and Artifacts -- Bracewell Probes -- Conclusions -- References -- 7: Lessons from Computing and Communications -- Segmenting Data -- Forward Error Correction. How Much Error Correction Is Enough? -- Building a Tree -- Hinting at Message Structure -- Checklist of Patterns to Look for -- 8: Entropy: Measuring Order and Randomness -- 9: Algorithmic Communication Systems -- ET Basic -- Boolean Arithmetic -- NAND (NOT + AND) -- AND -- NOR (NOT OR) -- OR -- NOT -- Math Operations -- Memory (Variables) -- Inter-Program Communication and Input/Output Interfaces -- Inter-Program Communication -- Input/Output Interfaces

-- Comparison Operations and Branching -- Modularity and Reuse -- Applying These Concepts to an ET Programming Language -- Lossless Compression Algorithms -- Lossy Decompression Algorithms -- Logic Gate Networks -- The Limits of Computation, AI, and Sentient Messages -- Level 0: Static (Non-interactive) Information -- Level 1: Intelligently Designed Algorithmic Messages -- Level 2: Machine Learning/Specialist AIs -- Level 3: General AI (Sentient Messages) -- Finding and Analyzing Algorithmic Systems -- Checklist of Patterns to Watch for -- References -- 10: Images -- Bitmaps -- Encoding Video on the Voyager Golden Records -- Assisting the Receiver in the Decoding Process -- Color Images -- Image Compression -- Color -- Compression Algorithms -- How Many Images Can ET Send? -- Checklist of Patterns to Watch for -- Planetary Images -- Saturn as Seen by Cassini -- A Jupiter Vista from Juno -- Landscapes -- Green Bank Telescope -- The Great Pyramid of Giza -- Life Forms -- Praying Mantis -- Purple Striped Jellyfish -- Visual Art -- Edward Hopper "Groundswell" (1939) -- Visual Art -- The Tower of Babel (1563) -- 11: Three-Dimensional Images and Models -- Stereoscopic Imagery -- Point Clouds -- Polygon Meshes -- Programmatically Generated Objects -- Checklist of Patterns to Watch for -- 12: Four Dimensions (Video and Simulations) -- Motion Pictures -- Video Compression -- Implicit Compression. Algorithmic Compression -- Simulations -- 13: Sound -- How Much Information Is Needed for Audio? -- Recognizing Audio -- Defining the Time Base -- The Hydrogen Spin-Flip Transition -- Pulsars - A "Standard Bell"? -- Environmental Sounds -- Audio Compression -- 14: Communicating Fundamental Units and Scientific Information -- Time -- Distance -- Mass -- Energy -- Electric Charge -- 15: Semantic Networks and Constructed Languages -- Learning to Parse the Network -- Querying the Network -- What Nodes Is Node X Connected to? -- How Is Node X Related to Node Y? -- Which Nodes Are Most Connected? -- Linking a Semantic Network to Other Media Types -- Turbulence -- Nonlinear Sensitivity (The Butterfly Effect) -- The Limits of Communication -- Building an Interlingua -- Translating an Interlingua into Human Languages -- 16: Genomic Information -- Why Include Genomic Information? -- What Might a Primer Look Like? -- What Could We Learn from Genomic Information? -- Abiogenesis (How Life Started) -- Panspermia -- Convergent Chemical Evolution -- Diverse Genomic Systems -- The Tree of Life and the Formation of Species -- Patterns of Reproduction -- The History of Life on Other Worlds -- Preservation -- 17: The Galactic Internet -- Checklist of Patterns to Watch For -- 18: The Message Analysis and Comprehension Effort -- The Interstellar Communication Relay -- Tier 0: Raw Data Access -- Tier 1: Derived Signal Data -- Tier 2: Demodulated Data Streams -- Tier 3: Structured Data Extraction -- Separation of Concerns -- Initial Analysis and Visualization -- Low-Level Decoding and Collection Extraction -- Media Extraction and Conversion -- N-Dimensional Models -- Algorithmic Communication Systems -- Semantic Networks -- Genomic Information -- Other Data Types and Sensory Modalities (Unknown Unknowns) -- 19: What Could We Learn from Another Civilization?. Virtual Exploration and Experiential Communication -- Art and Culture -- The History of Life on Other Worlds -- Astronomical Surveys -- Deep Time Views of Earth and Human Civilization -- Reference -- Recommended Reading -- Exercises and Sample Problems -- Selected Books, Essays, and Other Materials -- Research Tools -- Index.
