

The Appearance of Reality

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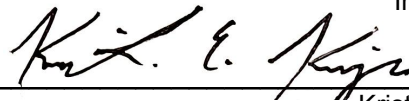
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INTRODUCTION

What is “true” and/or “real” is an ongoing debate.

“Capital T” Truth—axiomatic and unchanging—posits that certain facts remain fixed. But human experiences frequently suggest reality to be more fluid and flexible. Perhaps you’ve experienced this firsthand if your recollections of an event don’t match your friends’ memories, past decisions no longer seem as sound as they once did, or you’ve simply tried taking a selfie.

Depictions of truth and reality come in an increasing variety of sources and forms and we encounter matrix problems on a daily basis where hundreds of colors of pills are available to us based on our respective media, cultural, political, scientific, and spiritual subscriptions. How, then, do we reconcile our personal beliefs in a rampant thought playground? What and/or how can we trust or ‘know’ anything at all? My creative works make no claims as to what is ‘true’, known, or knowable, but rather the entirety of my practice reinforces the plasticity of reality through the ways that ‘truth’ appears to us. I employ the photographic medium and its limitations to test, illustrate, and embrace the fallibility of human beings as perceivers.

As information moves through a person’s body, mind, and spirit it is subject to translation issues like compression, scope, recontextualization, resolution, and distortion similarly found in photography. These conditions are inherent in my creative process as my own ‘corrupt’ hand passes images through series of digital, physical, and

conceptual iteration wherein subject matter and their representations misbehave while shifting between dimensional spaces.

Common encounters in my daily life like food, sex, weapons, babies, plants, animals, and death are presented in experimental combinations and conditions that pose optical obstacles to interrupt immediate comprehension. By straining our instruments and methods of understanding, the personal beliefs that support them are also called into question. My photographic works are sites for active exchange; their visualizations serve as seeds to stimulate discussion and new conceptions towards the social, scientific, personal, and potential functions of familiar content.

The flexibility of reality across differing perspectives presents existential uncertainties and encouraging possibilities for how we may physically, psychologically, and spiritually engage in our own existence. My own body, environment, and fallible personal perspective are photographically depicted to promote suspicion, compassion, and playfulness towards our own individual abilities and limitations to 'see'.

VISUAL STRATEGY INDEX

Our ability to visually receive and render the world is mediated by our eyeballs, nerves, electrical signals, and brain. If any of these components or processes are compromised then one's optical vision may be additionally affected. Beyond operational ocular fallibility, our access to 'reality' is influenced by a myriad of other physical and conceptual factors. Photography's complicated relationship with sight and 'truth' or 'reality' makes the medium a useful platform from which to compare and examine the operations and boundaries of our own perception.

A camera's ability to visually receive and render the world is mediated by lenses, light control, sensors, electrical charges, and image processors. If any of these components or processes are compromised then the recorded image may be additionally affected. Beyond operational visual fallibility, photography's access to 'reality' is influenced by a myriad of other physical and conceptual factors. Despite the limitations of cameras and our own sight, imagery and the visual world have a particularly powerful influence on how we perceive, relate to, interact with, and understand 'reality'.

Visual stimulus has long been recognized as among the most influential sources of information. Between 75-43 BCE, Roman philosopher Cicero practiced and promoted the use of imagery to enhance one's memory and ability to communicate (Coleman, 2014). Many experiments have since been conducted in a variety of fields, from neuroscience and psychology to linguistics and machine learning, in effort to

understand how images impact the mind. In 1971 Allan Paivio coined the term “Picture Superiority Effect”, which outlines how visual data is better stored and retrieved in our brains than other sensory stimuli (Schnotz & Horz, 2010).

It is estimated that, of all data being actively processed by our bodies in a waking moment, an average of 1% is taste information, 1.5% touch information, 3.5% smell information, 11% hearing information, and 83% is sight information (Rosenblum, 2011). While audio is our most quickly received stimulus -taking only 3 milliseconds to receive- vision is the second fastest, taking just 13 milliseconds to, not only receive, but also detect meaning from (Villazon, 2023).

Human sensitivity and susceptibility to imagery, paired with our limited ability to ‘see’, is foundational to the creative process, production, and presentation of my photographic works. This is true of the photographs featured in my thesis show, “what, where, when, why, how”, whose conceptual and practical concerns are directed at the reception, translation, organization, and overall function of visual information as it moves through and within us. These images each employ a distinct optical feature, or *visual strategy*, meant to slow down, describe, and/or test our perceptual practices.

The distinct artistic treatments involve a variety of in-camera, and post production tools, techniques, and materials and are employed based on their ability to: (a) act as both physical and conceptual speedbumps, (b) strain our instruments, sources, and methods of comprehension, and (c) test the personal beliefs that structure, direct, and constitute our understandings of ‘reality’.

These exhibited images will be visual examples as we proceed in this text.

Thesis Exhibition Information

“what, where, when, why, how”

On display in the Carroll Gallery at the Newcomb Art Department of Tulane University from February 25, to March 12, 2025.

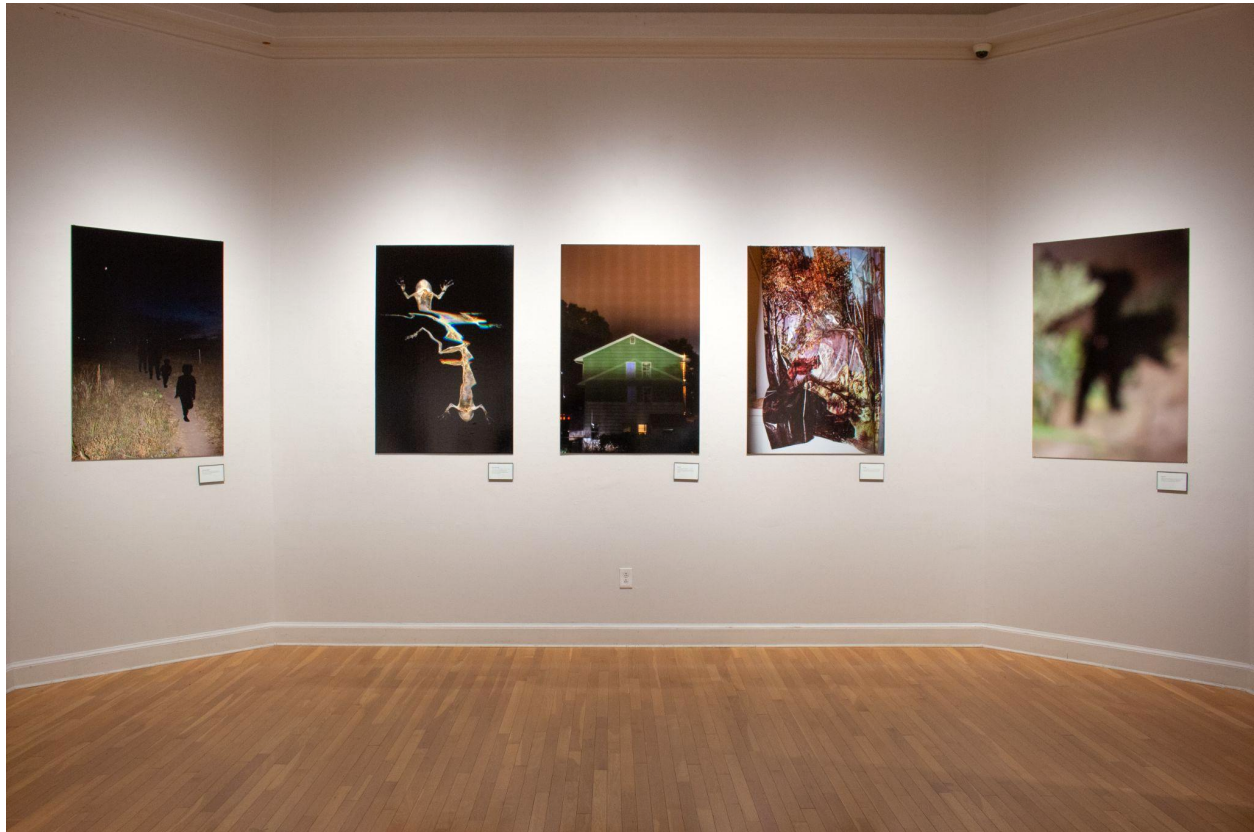


fig. A.1.

My work promotes multiple ways of ‘seeing’ and engaging with the world. Historically, I have displayed large collections of images (30+) at a time; providing variety to reinforce the cumulative, multifaceted, and flexible qualities of reality. While this expansive approach offers many entry points, it also inadvertently provides escape routes from itself. Visual options can become opportunities for avoidance—allowing viewers to bypass imagery that challenges or unsettles them in favor of what feels familiar or comfortable. Limiting the stimulus in this exhibition to just 18 images

increases the likelihood that visitors consider new information and/or turn to themselves to find tools and materials to navigate, contextualize, and reconcile troubling image contents.



fig. A.2.

Each photographic print is sized at 34" x 51", vertically oriented (portrait mode), spaced 12 inches apart, and hung at a height where the bottom edge is 48 inches from the floor, with the top reaching 99 inches. The scale and positioning are designed to encompass the dimensions of a human form, emphasizing the viewer's immediate physical and conceptual presence. As larger-than-life depictions, the images are overconfident and actively confrontational, asking viewers to contend with their visual suggestions.

An image's visual offerings shift depending on the proximity of the viewer. From several feet away, a single composition's entire collection of ingredients can be evaluated for their material and spatial relationships. Up close however, ingredients must be tended to individually within the context of smaller pictorial swatches. The images themselves host photographic treasures and clues that may not be visible from a distance in order to invite and reward close looking.



fig. A.3.

Human field of vision requires a viewer to ocularly crawl across the image to collect and assemble information piece by piece. This process of gradual discovery and incremental understanding paired with a more distant first impression may foster deeper engagement from viewers spatially interacting with the work as they would elements of the real world.

The photographs are Epson inkjet prints on archival high gloss paper. This paper type often reflects the glare of surrounding light/light sources, reinforcing themes in the collection about factors and forces that influence how things appear to be. Occasionally,



fig. A.4.

viewers must move or adjust their own bodies in order to reposition the imposed glare and reveal the information that it blocked/blanketed. Fundamental premises of the work involve a person's physical and conceptual context, position, and approach and how they impact the content around us.

The paper prints are mounted on a foam core substrate (using an archival spray adhesive), trimmed to full-bleed margins, and displayed with unframed raw/exposed edges. The artworks' technical finishings are as ordinary as its subject matter: non-celebratory occurrences and materials usually considered to be 'regular' or

‘un-special’. The images are not physically precious or protected, they do not sit behind frames or glass, because the creative contents are not separate or far away from us and our immediate reality.

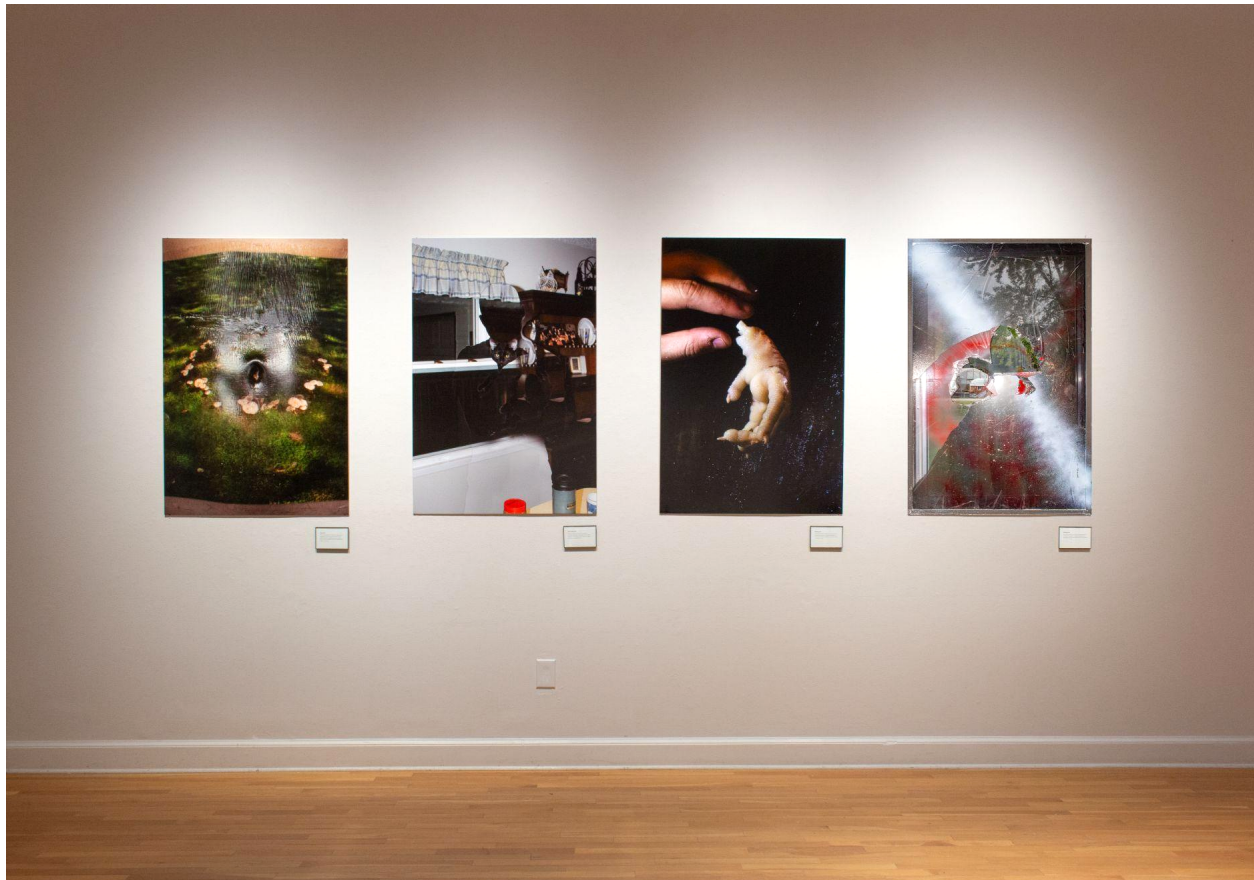


fig. A.5.

Self Informed Fill

fig. 1.



How does our concept of ‘self’ affect the appearance of reality?

To examine our personal roles in ‘reality’, we must first address the ‘person’ to which we refer. Many definitions of ‘self’ have been offered throughout history and up to this day, each theorizing unique sets of principles, qualities, abilities, and activities that equate to an individual. *‘Identity, ego, psyche, soul, consciousness, self’* etc.; there likely exists as many different ‘self-concepts’ as there are living beings. Let’s consider just twelve suggestions about our personal entities and how they may influence what appears to be ‘real’ or ‘true’:

Concepts of Self

■ The Cartesian Self (Descartes, 1641)

- The self is rooted in Descartes' famous statement, "I think, therefore I am," which suggests that the 'thinking mind' or consciousness (cogito) is the essence of selfhood. Self-awareness defines the existence of individuals and distinguishes them from the material world.
- Separation between the mind and external elements (dualism) implies that our reality is something that must be questioned and verified through personal reason. As thinking entities, we operate through introspection; doubting external reality but certain of our own self-awareness.

■ Bundle Theory (Hume, 1739)

- The self is not a singular, unified entity, but rather a bundle of perceptions, such as thoughts, emotions, and sensations. There is no permanent or enduring core to a person so individual entities consist of a fluid, ever-changing collage of instances and activity.
- The rejection of a unified self suggests that our reality is a collection of fleeting impressions rather than a stable, continuous experience. This perspective is skeptical towards objective reality and supports the idea that meaning, the self, and reality are constructed moment to moment.

■ Being and Time (Heidegger, 1927) & Existential Self (Sartre, 1943)

- The self is not a fixed, isolated entity but rather the dynamic activity of Dasein or 'being-in-the-world'. A person continually creates themselves through choices and actions and are responsible for making meaning in an otherwise meaningless world.
- We perceive reality not as an abstract object but rather the result of our participation in the world and involvement in shaping the passage of time.

■ Atman and Brahman (Shankara, 8th century)

- The perception of a separate self is an illusion. Realize that Atman (the individual self) and Brahman (the ultimate, unchanging reality) are fundamentally one.
 - If we identify with a separate self, our perception of reality is shaped by ego-driven distinctions—such as self vs. other, pleasure vs. pain, and life vs. death.
 - If we identify that Atman and Brahman are the same thing, we would perceive ourselves and reality as an interconnected, unified, and divine whole beyond singular identities.
- No-Self, '*Anatta*'
(Rahula, 1959)
- In Buddhist philosophy, the concept of *anatta* suggests that there is no permanent, unchanging self or soul within a person. The typical concept of an individual self is but a temporary aggregation of five changing components—form, sensation, perception, mental formations, and consciousness—known as the Five Aggregates (Skandhas).
 - If we cling to the illusion of a fixed self, we will perceive reality as suffering (Dukkha).
 - If we perceive reality simply as phenomena devoid of inherent essence, we are liberated by spiritual freedom (Nirvana).
- "I" and "Me"
(James, 1890)
- Self consists of the "I" and the "Me". The "I" is the conscious subject of experience. The "Me" is an object of reflection composed of the material, social, and spiritual aspects of a person.
 - The "I" experiences reality directly, while the "Me" interprets it based on memory, society, and self-concept. Our perception of reality consists of the personal narratives developed by exchange between our "I" and "Me".
- The Social Self
(Mead, 1934)
- A social self relies on the "I" and "Me" structure; "I" being spontaneous and "Me" representing the socialized aspect of a person. Mead's model suggests

that the self is a social construct that emerges through interactions with others.

- As products of social construction, we perceive reality as a shared, context-dependent, and negotiated experience based on societal norms and expectations.

■ Archetypal Self (Jung, 1953)

- The Self consists of three distinct layers of consciousness within an individual: (a) the conscious mind, which houses our everyday awareness and ego, (b) the personal unconscious, which contains forgotten memories, repressed experiences, and individually unique complexes, and (c) the collective unconscious, a universal layer shared by all humans, which holds inherited archetypes such as the shadow, and the anima/animus.
- Our three layers would filter and distort our perception of reality, infusing it with subjective meaning and psychological symbols.

■ The Simulacra of Self (Baudrillard, 1983)

- The self is a coagulation of simulations shaped by media and culture. Individuals curate, construct, and perform their 'selves' through copies of copies of signs and symbols.
- We do not perceive reality as a direct experience but as a system of mediated representations, making it difficult for us to distinguish what, if anything, is "real".

■ The Digital Self (Ruan et al., 2020)

- The digital self is an element, extension, and embodiment of a person's identity. This self exists via digital artifacts, visibility, online engagement, technological infrastructures, algorithms, and self curation, presentation, and perception.
- Our perception of reality is highly personalized; partially curated by our online subscriptions and partially controlled by targeted content. The customizability of our digital experiences often yields echo chambers that distort information and social consensuses.

■ The Neurobiological Self
(Damasio, 1999)

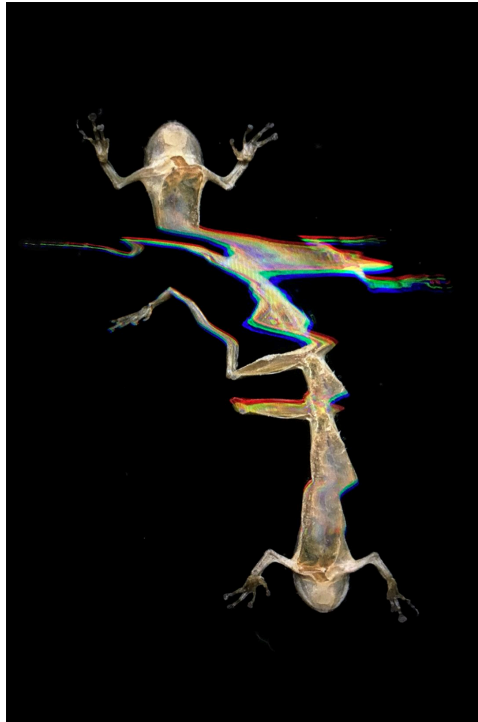
- The self emerges from the brain's ongoing mapping and regulation of the body's internal states in three stages: the proto-self (basic bodily awareness), the core self (momentary consciousness), and the autobiographical self (long-term identity formed through memory and experience).
- Based on the signals and exchanges between our body and brain, aka our physiological status, our perception of reality is shaped by our past experiences and skew to affirm our most heightened senses/sensations at the moment.

■ The Ego Tunnel
(Metzinger, 2009)

- The self is an illusion created by the brain's representation of its own states and is not an entity that actually exists.
- Our brains construct a model of reality rather than directly accessing it so our perception of reality is a neurological simulation rather than an independent external truth.

Unforeseeable Fill

fig. 2.



How does 'change' affect the appearance of reality?

Discerning what is 'real' or 'true' may be complicated by the anti-static nature of the world. To weigh the impact of shifting data sources, let's examine the sanctity of information and consider the ways in which it can change. Information exists in many forms that can be loosely categorized by its source, format, and function, among other characteristics. Given the extensive practical and conceptual connotations of 'information', we will, for now, examine its general types, sources, and the rates at which change can occur within them:

Information Types

■ **Data**

(Kitchin, 2014)

- Raw, unprocessed facts or figures without context.
- Exposure to reliable data provides an objective baseline that can ground our understanding of the world, helping us to calibrate what we perceive as real.

■ **Information**

(Floridi, 2014)

- Organized or structured data that has been contextualized or imbued with meaning.
- By transforming data into information, we create frameworks that highlight what is significant, thus shaping our interpretation of reality.

■ **Knowledge**

(Nonaka, and Takeuchi 2020)

- Information that has been integrated into a broader framework of understanding. Integrated and contextualized information that is understood and retained.
- Knowledge allows individuals to synthesize new facts with past experience, thereby influencing how they perceive cause and effect in their world.

■ **Wisdom**

(Glück, 2019)

- The judicious application of knowledge, enriched by experience, insight, and ethical considerations.
- Wisdom filters and refines our accumulated understanding, guiding us to see a more nuanced and ethically informed reality.

■ **Belief**

(Kahan, 2017)

- Convictions or accepted truths that may not be fully supported or proven by empirical evidence but form part of one's worldview.
- Beliefs act as lenses that filter incoming information, deeply influencing what individuals consider to be real, even in the absence of complete evidence.

■ Idea

(El-Den and Sriratanaviriyakul, 2019)

- A creative thought or innovation that sparks new inquiry.
- Fresh ideas challenge established paradigms and can transform one's perception of reality by opening up novel possibilities and alternative interpretations.

■ Feeling (Emotion)

(Barrett, 2017)

- Subjective, internal experiences that are often tied to values and personal meaning.
- Emotions can intensify or dampen our perception of events, thus altering our immediate sense of what is real and significant.

■ Scientific Information

(Munafò et al. 2017)

- Knowledge derived from systematic observation, experimentation, and the scientific method, and so, is reproducible and considered to be empirical.
- Scientific findings establish a shared, evidence-based view of reality that can override personal biases and subjective interpretations.

■ Mathematical Information

(Gowers, 2002)

- Abstract, logical structures and relationships derived from axioms and proofs—ideal for modeling and reasoning about the world in precise terms.
- Mathematical models provide precise frameworks that shape our understanding of physical and theoretical realities, often revealing patterns and structures that are not immediately apparent.

■ Philosophical/Conceptual Thought

(Audi, 2015)

- Systematic reasoning and reflection about existence, ethics, and the nature of reality that goes beyond what is strictly observable.
- Philosophical inquiry challenges basic assumptions and encourages critical reflection, thereby influencing how individuals define and perceive what is truly real.

■ **Intuition**

(Gigerenzer, 2018)

- A non-analytical insight or understanding that can guide judgments without explicit reasoning.
- Intuition can rapidly shape one's sense of reality by offering gut-level assessments, though these may sometimes bypass more deliberate reasoning.

■ **Narrative/Story**

(Haven 2017; Bruner 1991)

- Information conveyed through stories that weave facts, experiences, and values into meaningful accounts.
- Narratives help individuals construct their own reality by embedding abstract information in a context that resonates with personal and cultural experiences.

Sources of Information & Rates of Change

■ **Astronomy**

(Planck, 2021)

- Tools on earth and in space are used to study the universe by observing and analyzing stars, planets, galaxies, and phenomena such as black holes, supernovae, and cosmic microwave radiation for example.
- *Rate of Change*: Although many astronomical systems have seemed to follow predictable paths and patterns over millennia, new technology and subsequent discoveries rapidly emerge. In addition to human advancements, the cosmos constantly changes on its own through galactic collisions, star formation and death, and the expansion of the universe for example. Celestial alterations occur on scales ranging from minuscule (subatomic particles) to massive (clusters of galaxies).

■ **Chemistry & Material Sciences**

(Aal E Ali, et al. 2024)

- Both chemistry and materials sciences are major information sources as they both study the nature of matter, but with distinct focuses. Chemistry is concerned with the composition, properties, and reactions of matter, often at

- the molecular and atomic level. Materials science employs chemistry, physics, chemistry, engineering, and other disciplines to understand and manipulate materials for specific applications.
- *Rate of Change*: While atomic structures seem to remain constant, interdisciplinary collaboration and technological advancements are accelerating the discovery of new chemical compounds, synthetic materials, and breakthroughs like nanotechnology and superconductors. Outside human directed developments, chemistry and materials change on their own; when bonds between atoms are broken new ones are formed, thus substances transform into new substances with different properties (e.g. photosynthesis, metal rusting, and milk souring).

■ The Natural World

(Urban, 2016)

- 'The natural world' is a massive source of information as it encompasses all living and nonliving things of our universe that exist without being made or caused by humans. Examples of nature can be seen on large and small scales; from earth's atmosphere, geological matter, and ecosystems, to plants and animals, sizing all the way down to microorganisms and single cells.
- *Rate of Change*: All levels of the natural world are constantly changing. Geological developments and changes in animal behavior can occur in days and/or across millions of years given environmental conditions like sudden natural disasters or atmospheric shifts. Noticeable differences in a landscape may take years to develop, while fluctuating ocean waves can be seen by the naked eye, and chemical transformations like photosynthesis occur almost instantaneously.

■ Animal Behavior & Biology

(Dodd, 2024 and Román-Palacios, 2022)

- Animals are (with rare exceptions) multicellular organisms that move, breathe, sexually reproduce, grow from an embryo, have specialized sensory organs, and require food consumption to live. They have developed vast arrays of physical features and strategies to efficiently live within their specific environments and have provided humans with essential education and information about our own history, survival, and development since the beginning of our existence.
- *Rate of Change*: Animals come from a clade (i.e., they evolved from a single shared ancestor), which speaks to the enormity of change they have experienced throughout time. Biologists estimate that even though approximately 99% of earth dwelling species no longer exist, that a potential 10 million more species are currently alive in addition to the 1.7 million species already classified with around 15,000-18,000 new species being discovered every year. While some evolutionary developments take

thousands or millions of years to occur, animal biology has been observed to change over a single generation, and behavior can adapt within a creature's single lifespan.

■ Human Brain

(Cunnington, 2021)

- As the central organ of our nervous systems, our brains coordinate, and, to many degrees, control most of our bodily activities like sensing stimulus, feeling emotions, having thoughts, and managing memories. The brain sends, receives, processes, interprets, and produces mass amounts of information.
- *Rate of Change*: Changes within the brain occur at varying rates depending on our age, experiences, lifestyle, genetics, and the type of neural processes involved. Rapid neural connections are constantly being formed, strengthened, or pruned out throughout our lifetimes. Our brains maintain plasticity as they physically grow and shrink, adapt and process stimuli in milliseconds, and even be rewired.

■ Human Behavior

(Molteni, 2015)

- How we interact with our environment, make decisions, and respond to stimuli all reveal the deep intertwining of internal states and external actions. Overt visible behaviors, invisible covert behaviors like thinking and feeling, and social behaviors are heavily studied as information sources on our own nature and the nature of the world as a whole.
- *Rate of Change*: The behavior of individuals may change on a daily basis while societal level shifts usually take months to years to yield noticeable differences. Technological advancements, political movements, education, and exchange accelerate the rates at which behaviors are reshaped.

■ Culture

(Hopkins and Schildkrout, 2025)

- Social symbols, attitudes, trends, and traditions serve as rich sources of information and as contexts for the meaning behind said information. Shared values, beliefs, and practices influence how information is shared, formatted, and stored/preserved.
- *Rate of Change*: Many cultural elements remain stable for centuries, while more stylistic components like art, fashion, and language can dramatically evolve over months or even days. Generational shifts, globalization, technology, and digital communication are accelerating cultural transformations and rapidly hybridizing historical practices with new cultural identities.

■ **Spirituality & Religion**

(Bingaman, 2023)

- The idea of something(s) or someone(s) greater than oneself is a source of information both about people and *for* people. Spiritual or religious organizations reveal the concerns, priorities, and beliefs of practitioners. Said practitioners seek guidance and knowledge through their spiritual alignments, exercises, religious texts, and mystical experiences. (Vatican Library, 2024).
- *Rate of Change*: Religious doctrines can remain unchanged for millennia, but interpretations, rituals, and spiritual movements may evolve on a daily basis due to philosophical debates, societal progress, and personal practices, applications, and/or expressions. Recent studies indicate that such systems are evolving rapidly in response to global, cultural, and technological developments, with a trend toward individualized and hybrid forms of belief that redefine traditional religious boundaries.

■ **Government & Politics**

(Solito and Sorrentino, 2018)

- This societal facet yields an array of data ranging from laws and court decisions to census and research findings, which serve as evidence and, to some degrees, explanations of history, policies, and societal values. Political systems structure human civilization on local and global scales, and so offer formal information about conditions and contexts throughout time.
- *Rate of Change*: Many political structures and ideologies have remained unchanged for decades, but generally, they evolve in tandem with cultural developments. Laws and policies may shift in response to current events in mere months; revolutions or major crises can lead to rapid systemic change. Developments in technology, communication, and global relations are rapidly reshaping governmental operations and exchange, intensifying political polarization, challenging traditional institutions, and prompting adaptive models.

■ **Media**

(Klinger, 2021)

- The media based channels and tools used to communicate and collect information include traditional forms like newspapers, television, and radio, as well as digital platforms like social media, websites, and podcasts, which constitute a primary portion of the information available today. Media heavily influences and also represents public opinion, news, entertainment, and cultural phenomena.

- *Rate of Change:* Media and communication exist in an increasing variety of form and function, transforming the rules and roles of knowledge. Information spreads instantly in the digital age, but its credibility and content can shift depending on political, economic, geographical, and cultural mediation. Media constantly changes through technological advancements, alterations in audience preferences, and the emergence of new platforms that transform how information is created, distributed, and consumed.

■ **Technology & Artificial Intelligence** (Wolff, 2021)

- Machines and algorithms can process, organize, reassemble, analyze, and produce data with increasing speed. By identifying patterns, and even generating new insights it frequently expands our understanding of, and access to the world. Contemporary AI is designed to simulate human thinking, learning, and decision-making to enhance and extend the ways in which we find and handle information.
- *Rate of Change:* Technology and artificial intelligence are among the fastest-changing fields. Major technological breakthroughs occur every year, but the machines themselves are constantly learning and subsequently transforming entire industries and fields like medicine, finance, governance, and education. Moore's Law approximates that computing power will double every two years but recent developments indicate that estimation is being surpassed.

■ **History & Archaeology** (Crema, 2011)

- Fragments of the past in the form of written records, documents, stories, artifacts, fossils, tools, buildings, and biological remains, reveal information about how people lived, worked, and interacted throughout time. In studying such materials we can see elements and patterns of human development and evolution on biological, cultural, and technological levels.
- *Rate of Change:* While historical events remain fixed, discoveries, technologies, and perspectives constantly reshape how we understand and interpret the past. New artifacts and sites arise, DNA analysis and satellite imaging offers more descriptive details, and modern viewpoints lead to re-evaluating past events through new cultural or ethical lenses.

Flux Fill

fig. 3.



How does motion affect the appearance of reality?

The inherent movement of the cosmos suggests a constant state of flux in our physical and conceptual worlds. From the sky to our bones, atomic activity perpetuates a constant state of 'happening' or 'being'. How much of our immediate present do we receive or access? Many tools and phenomena can extend the range/scope/field of vision beyond the ability of 'personal' perceptual instruments, but how do we render 'truth' or 'reality' within a state of perpetual motion? To examine potential implications, let's consider some instance of this underlying movement:

Active Motion

■ **Cellular Motility**

(Friedl and Wolf, 2003)

- The movement of cells, known as cell motility or locomotion, refers to activity in which cells change their position within an environment. Motility is crucial for many biological processes involved in human development and health like embryonic development, cytoskeletal reorganization, wound healing, and immune responses.

■ **Bodily Movement**

(Winter, 2009)

- The motion of human bodies occurs on micro and macro scales from cellular movement to muscular contraction and relaxation. Precise neural signal exchanges and collaborative physical reactions direct and control all manner of bodily movements from coordination and balance to fine motor skills and facial microexpressions.

■ **Cosmic Movement**

(Binney and Tremaine, 2008)

- Beyond the movement of meteoroids, galaxies, and the orbital motion of moons, stars, asteroids, and planets, the universe is intrinsically expanding. Distance is constantly increasing between time and gravitationally unbound parts of the cosmos.

■ **Geological Movement**

(Turcotte and Schubert, 2014)

- In addition to its continual galactic orbit, the earth is in a state of constant motion both superficially and interiorally. Deep earth dynamics (mantle convection) affect tectonic plate shifts, volcanic activity, a continental drifts, while up on our planet's surface things like the freeze-thaw processes (cryoturbation), land rise (isostatic rebound), glacial movement, erosion, sediment transport, and mass wasting (e.g., landslides, rockfalls, hill slumps etc.) all shift the visible landscape.

■ **Social & Cultural Movement**

(Tarrow 2011, and Appadurai 1996)

- The practices, priorities, and beliefs of people as individuals and collectives are constantly growing, updating, and developing. As technology, resources, and thinking evolve, the social/cultural landscapes adapt through artistic, spiritual, judicial, lifestyle, and economic movements, just to name a few.

■ **Psychological/Cognitive Processes** (Cherry, 2024)

- In sleeping and waking hours, internal mental activities transpire. Our brains coordinate basic bodily functions like breathing and blood flow to keep us alive in addition to neural exchanges and synaptic movements that mediate our attention, memory, perception, and thoughts.

■ **Digital Movement** (Castells, 2010)

- Information and exchanges rapidly evolve across digital and internet based spaces. Constant physical processes support electronics and the online world with which many people interact and contribute to on a daily basis. The World Wide Web, social media, email, online games, file sharing, streaming media, and much more are maintained and updated at every moment.

■ **Temporal Movement** (Dowden, 2021)

- The concept of “time” is a complicated and debated one, but generally refers to the progression of states of being from the past, to the present, and ahead to the future. Time, often referred to as the fourth dimension of reality, is an apparently constant, linear, and irreversible type of movement that we use as a unit of measurement.

Flat Fill

fig. 4.



How do ‘representations’ affect the appearance of reality?

Our understandings of reality are mediated by ‘representations’. Each of us use sensory and cognitive systems to interpret and translate our perception and experiences into dynamic, model-like constructs that ‘represent’ reality (Clark, 2013). Internal mental images and other representations in the world like language, images, signs, and symbols stand in for elements of reality that are not readily available, -sometimes in addition to, or on top of, the perceived ‘real thing’. While representations *can* include more information about reality than is immediately obvious, their formats often cause them to under-describe the qualities of what they refer to. To examine how representations may affect the appearance of reality, let's consider some common types of representation in use today:

Types of Representations

■ **Mental Imagery**

(Pearson et al., 2015)

- Mental imagery, also referred to as 'visualizations', are internal representations that mimic perceptual experiences. Mental imagery can involve a variety of sensory modalities such as visual, auditory, tactile, or kinesthetic experiences.
- Examples:
 - Visualizing a childhood home.
 - Imagining the sound of a friend's voice.
 - Mentally simulating the texture of grass.

■ **Propositional Representations**

(Pylyshyn 2003)

- Information that is encoded in abstract, language-like structures that capture the meaning of ideas or events even in the absence of direct sensory access or input. These representations are considered to be fundamental to our cognitive processes like reasoning and understanding concepts.
- Examples:
 - "I love pizza."
 - "Water freezes at 0°C."
 - "Humans need food to survive."

■ **Schemas and Scripts**

(Whitney, 2001)

- Internal sets of concepts, organized structures of knowledge, sequences of action, or mental frameworks that help us process, sort, store, and retrieve information. Schemas play a major role in how we approach new information because they provide a reference of past experiences and understandings to use in interpreting and responding to the world.

- Examples:
 - Event schema: e.g. at a restaurant - knowing to wait to be seated, behave at the table, order food, pay the bill, etc..
 - Object schema: e.g. a mug - knowing to hold the cup handle, how it contains or pours liquid, the angles and movements needed to sip from it, etc..
 - Person schema: (these schemas often involve stereotypes and generalizations) e.g. women - knowing that they have particular anatomical features, often hold particular jobs, wear certain clothes, etc..

■ Conceptual Maps

(Epstein, 2019)

- Internal and/or external networks of interconnected concepts that represent knowledge by showing the relationships between different pieces of information.
- Examples:
 - Imagining your day and seeing the scheduled activities as sequenced or stacked along a timeline of hours, days, weeks, and/or months.
 - A diagram of the human digestive system that depicts the physical connections between concepts like the mouth, esophagus, stomach, and GI tract etc..
 - The flow of energy through an ecosystem like a food chain; wherein the sun supports the growth of vegetation, which is then eaten by herbivores, who may then be eaten by a secondary consumer or apex predator etc..

■ Symbolic Representations

(Uttal et al., 2009)

- Symbolic representations use symbols (e.g., words, signs, or images) to stand in for objects, actions, or ideas etc.. These forms of representation are central to language processing and communication and are becoming increasingly prominent in contemporary dialogue.
- Examples:
 - The word "dog" represents a type of four-legged canine.

- A red light signals "stop" in traffic.
- A national flag symbolizes a country or group of people.

■ **Analogical Representations**

(Payne, 2003)

- Internal or external visualizations that closely resemble the characteristics of the thing they represent. Unlike symbolic representations that use abstract signs, these representations directly connect to and/or model the object or concept it depicts by preserving its characteristics like shape, size ratios, and spatial relationships.
- Examples:
 - Road maps: mimic a real-world layout in a 2D form by visually depicting the spatial relationships of geographical features like roads, rivers, mountains, cities etc..
 - Food recipes: depict a real-life edible dish by listing the specific ratios of ingredients along with a series of steps to prepare, assemble, and process them in order to transform them into a finished product.
 - Lego instructions: show a miniaturized version of a kit's lego pieces with illustrations and/or written text that depict, direct, or describe the actions required to accurately build a whole construction.

■ **Metaphors & Similes**

(Kao, 2021)

- Similes and metaphors are 'figures of speech' that, in different ways, use comparisons to describe and/or represent the qualities of separate objects, materials, people, etc.. Similes use "like" or "as" to state a similarity, while metaphors make a direct comparison without using "like" or "as" -implying a sameness between the separate things.
- Examples:
 - Simile: They ran the house like a circus
 - Metaphor: They were a circus

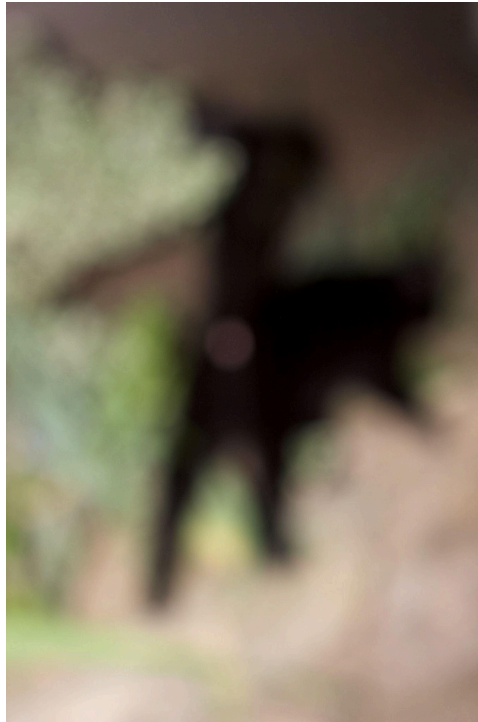
■ **Distributed Representations**

(Christophel et al. 2017)

- Information that is represented not by a single unit but through patterns of activation across a network of units or neurons. In this cognitive connectionist model, sets of internal and external representations together represent the abstract structure of a whole subject. In technological or computer contexts,.
- Examples:
 - In a human brain, understanding language employs distributed representations because words, their meaning, and relationship to each other, activate different neural regions depending on the context and/or intended meaning.
 - The World Wide Web, cloud computing platforms, file sharing systems, and online services like social media networks have components that are physically located on different machines but communicate and coordinate to function as a single entity.

Focal Fill

fig. 5.



How does our calibration affect the appearance of reality?

The 'accuracy' of our perception of reality depends on the condition and calibration of our cognitive, conceptual, and sensory tools and practices. In addition to our unique perceptual instruments, each of us are predisposed and/or trained to approach and understand reality in different ways. How we perceive and even *what* we perceive can vary greatly between people. Our individualized methods for thinking of, feeling, and seeing what is 'real' or 'true' are informed by a myriad of factors. To examine how our respective calibrations may affect the appearance of reality let's consider some elements that constitute and influence our personal orientations:

Calibration Contributors

■ **Biology and Physical Form**

(Stefánsson, 2007)

- The ingredients, qualities, composition, and health of our material human forms heavily influences who and how we are, as well as how we move through the world and relate to reality. Unique physical and neural capacities, sense instruments, and genetic predispositions all contribute to our individual perspectives and perception.

■ **Family and Upbringing**

(Thomas et al., 2017)

- Familial interactions and parenting styles significantly shape our brain development and subsequent emotional and cognitive frameworks. These foundations influence our self image, emotional intelligence, problem solving skills, social skills, communication skills, relationship dynamics, and mental health.

■ **Culture and Tradition**

(Kastanakis & Voyer, 2013)

- Cultural heritage and traditional practices provide a shared set of norms, symbols, and narratives that frame how we interpret or understand our human experiences. They can establish our personal identity, beliefs, ethics, priorities, conceptual frameworks, and even basic visual perception.

■ **Religion and Spirituality**

(Pargament & Exline, 2020)

- Religious beliefs and spiritual practices offer moral guidance and existential direction that can heavily inform our worldview, values, social connections, sense of belonging, emotional regulation, physical health habits, lifestyle choices, political subscriptions, and response to struggles and challenges. Many religious organizations offer explicit instructions on how to be, perceive, and navigate the world.

■ **Personal Experiences**

(Snyder et al, 2015)

- Life events and lived sensations are the building blocks of our relationships with 'reality'. Personal experiences like successes, failures, traumas, and joys all contribute to our attachments to and interpretations of the past, present, and future.

■ **Socioeconomic Status**

(Manstead, 2018)

- Socioeconomic situations provide differing access to material resources, opportunities, information, education, communities, and experiences that impact our thoughts, feelings, behaviors, and subsequent perspectives. Our individual statuses may affect our level of sensitivity to various stimuli, train our brains, and emphasize different methods of perception.

■ **Education**

(Cunnington, 2021)

- Formal and informal educations impart knowledge and skills that can transform how we participate in, move through, and perceive 'reality'. Ideas, tools, practices, and people equip us as agents of our own perception.

■ **Peer and Social Networks**

(Laursen & Veenstra, 2021)

- In various ways and degrees we are impacted by interactions, social atmospheres, community support, cultural movements, trends, and collective attitudes and opinions. The people that surround us affect transmissions of information, social expectations, behavioral standards, and how we form our own individual identities and perspectives.

■ **Media Consumption**

(Korte, 2020)

- Media channels offer immense varieties of content, framing, and narratives through which to perceive and understand our existence. Such technology can improve access to information, increase communication, offer education, provide resources, alter our neurological and emotional health, enforce some perspectives over others, expose us to new sensations, and much more.

■ **Geography**

(Jimoh & Ajagbe, 2015)

- The landscapes in which we reside shape us in conscious and unconscious ways. Beyond the cultural or social aspects of a geographic location, environments can determine a lot about the nature and qualities of its inhabitants. Our roles, behavior, activity, relationships, and outlooks are informed by our local ecosystem's weather, seasons, topography, plants, animals, and natural resources.

Effected Fill

fig. 6.



How does time affect the appearance of reality?

Throughout time materials change, technology develops, discoveries are made, and people grow. Such evolutions shape matter and concepts; altering, adapting and transforming them in accordance with the newest contexts and understandings. Many of the ways in which we navigate and comprehend the world are based on previous experiences and, while we cannot change the past, the way that we perceive the past may change. In this way, even our personal memories are vulnerable to the influences of passing time. To examine the influences of time upon 'reality', let's consider some temporal updates and evolutions that can impact our understandings:

Time Related Alterations

■ **Circadian Rhythms**

(National Institute of General Medical Sciences, 2025)

- The 24 hour cycle of an internal biological clock that shifts our bodily processes like alertness, cognition, hormone release, mood, digestion, temperature regulation, and even pain thresholds.

■ **Aging**

(Columbia University Mailman School of Public Health, 2021)

- The natural aging process impacts our minds, bodies, lifestyles, and perspectives. We grow and shrink physically, learn and forget, and overall accumulate experiences and knowledge that build and update our understandings and perception.

■ **Rest**

(Wamsley & Stickgold, 2011)

- Sleep is critical for our cognitive and physical health and even influences the quality of our memories. A lack of restful and restorative time often yields physical and mental alteration and/or impairment.

■ **Screen Time**

(Ruder, 2019)

- Excessive or extended use of digital screens can interfere with our natural biological processes, negatively affecting language skills, reducing our critical thinking, and increasing our risk of depression and anxiety.

■ **Remembering**

(Inda et. al., 2011)

- Every time we recall a memory it is cognitively reconsolidated and susceptible to modification during this retrieval process, potentially altering the original information.

■ **Habituation**

(Ruggeri, 2024)

- Prolonged or repeated exposure to the same stimulus, whether external or internal, can diminish its novelty; our neural receptors may “tune out” or completely miss that input which is overly familiar.

- **Normalization**
(Ruggeri, 2024)

- As our experiences diversify over years or decades, things we once found surprising or unusual may lose their emotional charge and become increasingly ordinary to us.

- **Temporal Landmarks**
(Taylor, 2024)

- As we get older and each year becomes a smaller fraction of our life, ‘new’ experiences may decrease in frequency and leave our brains with less information to process on a daily basis. These effects, among others, often make time itself seem to speed up and pass by more quickly.

- **Contrast Effects**
(Shatz, 2025)

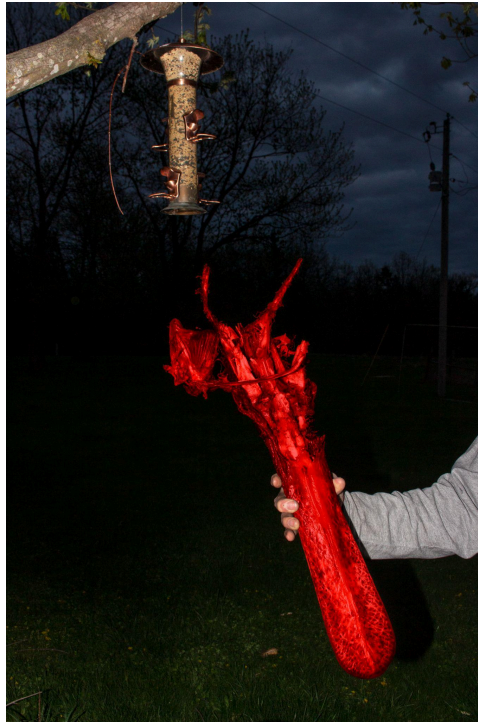
- What was most recently seen or heard may “set the bar” for the next thing we encounter, perceptually magnifying or diminishing its qualities in comparison to the preceding stimuli.

- **Contextual Priming**
(Notaro et. al. 2024)

- Past experiences “prime” us to notice certain patterns and relationships, so our present experiences may reflect what we expected them to be.

Philosophical Fill

fig. 7.



How does ‘the unknown’ affect the appearance of reality?

Understanding or even comprehending reality is complicated by mountains of unknowns about it. Many fields of research have illuminated qualities of internal and external concepts, materials, and occurrences, and even offered explanations about the relationships between them, but many basic questions like *how?* or *why?* remain unanswered. We rely on the things that we know to understand and perceive reality, but what we *don't* know equally informs our decisions, actions, and feelings on a daily basis. To examine how ‘unknowns’ may affect what appears to be ‘real’ and/or ‘true’, let's consider some common approaches to them:

Common Approaches and Reactions to 'The Unknown'

- **Information Seeking and Exploration**
 - We may pursue new information and experiences to reduce uncertainty and build knowledge about unfamiliar situations.
- **Social Support**
 - We may rely on advice and reassurance from friends, family, or community networks to interpret and manage unknown circumstances.
- **Cognitive Reframing**
 - We may alter our outlooks or reinterpret the unknown as familiar in order to more easily integrate it into our existing belief systems and alleviate the anxieties of uncertainty.
- **Emotional Regulation**
 - We may employ techniques like meditation, exercise, or breathwork to self-soothe and help manage any stress associated with the unknown.
- **Rituals and Traditions**
 - We may engage in rituals or traditions that offer structure and resolution to make the unfamiliar more predictable and less threatening.
- **Ideological or Belief System Adoption**
 - We may embrace spiritual or religious ideologies for their interpretations and explanations of the unknown to mitigate uncertainty.
- **Avoidance and Denial**
 - We may avoid exposure to the unknown or deny its presence to eliminate it as a concern or potential influence all together.
- **Humor and Playfulness**
 - We may use humor to reframe and defuse difficult or confusing situations to lower the stakes of their implications and take the edge off their potential.

■ Experimentation

- We may try new things or take risks to directly confront the unknown and learn through trial and error.

■ Professional Help

- We may consult experts or professionals through formal therapy or specialized advice to gain tools and strategies for dealing with difficulties of uncertainty and the unknown.

■ Acceptance

- We may practice present-moment awareness to accept and integrate uncertainty into our lives in order to let go of its surrounding stress and improve our internal flexibility.

■ Narrative Construction

- We may create stories or fictional explanations about ambiguous or novel experiences to place them in our broader personal narratives and contexts, and make them more clear and meaningful.

Faux Fill

fig. 8.



How do inexplicable connections affect the appearance of reality?

By drawing on seemingly disparate ingredients, experiences, emotions, and ideas, we often find unexpected connections, develop insights, and infer meanings that transcend an obvious or initial reception. Our brains can produce mashups and recombinations of content when we dream, use our imaginations, or plan for the future, just to name a few. This ability to remix different elements into novel wholes allows us to create new ideas, solutions, and understandings. To examine the influence of personal connections or rogue associations upon our perception of what is 'real' and/or 'true', let's consider some common recombination processes and how they are frequently integrated into understandings of reality.

Remix Methods

- **Questions & Problems**
 - Challenges and obstacles invite and catalyze adaptation and invention.
- **Experimentation**
 - Pursuing problems through methodologies like scientific, creative, or personal exploration.
- **Interdisciplinary Practices**
 - Blending knowledge from different fields.
- **Complexity Theory**
 - Seeing how small changes can catalyze large-scale reactions.
- **Juxtaposition**
 - Placing unexpected elements together to create new meanings.
- **Sampling**
 - Using parts of existing content as building materials for new constructions.
- **Modular & Adaptive Design**
 - Developing systems that can host or integrate multiple components.
- **Reduction**
 - Lowering the amount of components at play to make room for emergence and revelation
- **Living Materials**
 - Using biological organisms as an ingredient or source of unpredictable content.
- **Dreams**
 - Stringing things together while unconscious or asleep.

- **Improvisation**
 - Generating spontaneous connections through immediate human behavior.
- **Comedy**
 - Presenting unrelated ideas or pieces of content to form new relationships and jokes.
- **Synesthesia**
 - Ascribing sense information to subjects they do not ordinarily belong to.
- **Hallucinatory & Psychedelic Experiences**
 - Altering one's state of consciousness to host new experiences.
- **Chance**
 - Receiving fresh information without creating or pursuing it.
- **Observation**
 - Noticing things with careful and open-minded attentiveness.
- **Visualization**
 - Rendering invisible or non-physical data as visual information.
- **Augmented & Virtual Reality**
 - Blending digital and physical experiences.
- **Digital Integration**
 - Translating and/or reformatting content through technology or electronic platforms.
- **Machine Learning**
 - Detecting hidden patterns and producing rogue associations with artificial intelligence.
- **Conceptual Mapping**
 - Tracing the relationships between things.

- **Emotional Attachment**
 - Linking content based on personal feelings.
- **Cultural Blending**
 - Integrating traditions, cuisines, social norms, spiritual practices, attitudes etc. from different cultures.
- **Code-Switching**
 - Shifting between languages, dialects, or cultural references.
- **Versioning**
 - Making copies and iterations of preexisting content but with slight variation.
- **Biomimicry**
 - Translating elements of nature into other mediums.
- **Incubation**
 - Giving things time to marinate, ferment, and/or develop.

Fluid Fill

fig. 9.



How does delineation affect the appearance of reality?

Many things are understood based on the ways they differ from other things. Distinction honors the unique qualities of ingredients, entities, and ideas however, it can also enforce unnecessary edges and boundaries. Given the seeming separation between ourselves and the rest of the world, it is unsurprising that we perceive other things to be separate from ourselves and each other. Throughout history it has behaved us to differentiate for the sake of survival and thrival; between predator and prey, ripe and rotten, normal and abnormal etc.. To examine how delineation may affect the appearance of reality, let's consider some common organizational practices along with grey areas that resist categorization:

Organizational Approaches

- Appearance
- Action & Operation
- Use & Application
- Location
- Lineage
- Conceptual Connection
- Popularity / Ratings & Reviews
- Power & Influence
- Significance & Relevance

Categorically Complicated Content

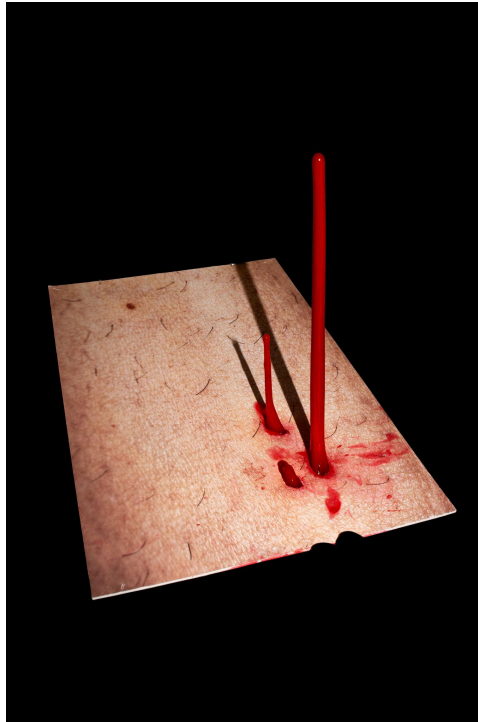
- Truth
- Meaning
- Purpose

- Life
- Consciousness & The Mind
- Intelligence
- Perception
- Emotions and Subjective Experiences
- Individual Identity
- Personal Preferences & Tastes
- Dreams
- Belief Systems
- Philosophy
- Ethics & Morals
- Religion & Spirituality
- Culture & Community
- Interpersonal Relationships
- Language
- History

- **Evolution**
- **Mutation**
- **Metamorphosis**
- **Translation**
- **Originality**
- **Creative Works**
- **The World Wide Web**
- **The cosmos**
- **Dark Matter**
- **etc.**

Metaphysical Fill

fig. 10.



How do metaphysical dimensions affect the appearance of reality?

When otherwise ordinary subjects appear to disobey the laws of its universe, the nature of reality and interdimensional activity is called into question. Often it is made the prerogative of individuals to sort out the validity and implications of occurrences that defy 'reality'. This task asks each of us to determine the boundaries of reality and/or the qualifiers required for something to be 'real'. To examine how things like magic, spirituality, and paranormal activity may affect what appears to be 'real' and/or 'true', let's consider some common ideas about 'the metaphysical' as a concept and how it is often integrated into our understanding of reality:

Multi-Dimensional Experiences

■ **Inner Worlds (self, spirit, mind, energy within):**

- **Chakras** (energy centers within the body linked to health and consciousness)
- **Aura Reading** (perceiving the subtle energy field around living beings)
- **Astral Projection** (the soul or consciousness traveling outside the body while remaining aware)
- **Dreamwork** (interpreting dreams as spiritual messages or psychological maps)
- **Kundalini Awakening** (rising of powerful spiritual energy along the spine)
- **Meditation** (focusing attention inward to achieve spiritual awareness or healing)
- **Past Life Regression** (retrieving memories of previous incarnations through trance or hypnosis)
- **Energy Healing** (channeling universal or personal energy for healing and balance)
- **Shadow Work** (acknowledging and integrating unconscious or suppressed parts of the self)
- **Third Eye Activation** (awakening intuitive and psychic perception)
- **Lucid Dreaming** (becoming conscious within a dream and controlling it)
- **Mantra Practice** (chanting sacred sounds to align energy and consciousness)
- **Soul Retrieval** (reclaiming lost parts of the soul often due to trauma)
- **Inner Alchemy** (transforming emotions, thoughts, and energies into spiritual gold)
- **Breathwork** (conscious breathing to activate altered states or spiritual clarity)
- **Visionary Art Creation** (creating artwork while in trance or altered states)
- **Mystic Pathworking** (visualization journeys into symbolic or archetypal realms)

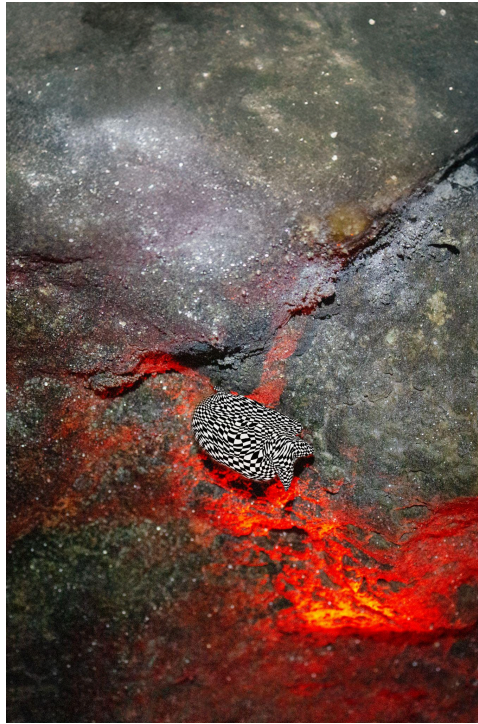
- **Outer Worlds (forces, spirits, cosmic systems, external mysteries):**
 - **Magic** (working with unseen forces to create changes in reality)
 - **Witchcraft** (using rituals, spells, and natural energies to influence reality)
 - **Fortune Telling** (predicting future events through mystical tools and intuition)
 - **Tarot Reading** (interpreting symbolic cards to access hidden knowledge)
 - **Divination** (seeking knowledge through means like casting lots or signs)
 - **Mediumship** (communicating with spirits, ancestors, or the deceased)
 - **Alchemy** (transforming substances and the spirit towards ultimate perfection)
 - **Crystal Healing** (using stones to channel healing energies and frequencies)
 - **Sacred Geometry** (universal patterns found in nature and sacred spaces)
 - **Astrology** (analyzing celestial bodies to gain insight into life and destiny)
 - **Numerology** (reading numbers as symbols of spiritual truths and paths)
 - **Synchronicity** (experiencing meaningful coincidences as divine messages)
 - **Spirit Guides** (receiving wisdom from non-physical beings)
 - **Omen Reading** (interpreting signs from nature as guidance)
 - **Scrying** (gazing into mirrors, crystals, or water for visions)
 - **Runecasting** (using ancient rune stones for divination)
 - **Pendulum Divination** (using a swinging pendulum intuit answers)
 - **Dowsing** (locating hidden objects, water, or energies using rods or pendulums)
 - **Prophecy** (receiving knowledge through divine inspiration)
 - **Ceremonial Magic** (formalized magical practices involving ritual and invocation)
 - **Folk Magic** (local and ancestral magical traditions)

■ **Threshold Worlds (inner and outer realities meet, blend, and cross over):**

- **Shamanic Journeying** (entering altered states to travel spiritual realms and bring back wisdom)
- **Vision Quests** (solitary journeys into nature to seek visions and life guidance)
- **Channeling** (allowing non-physical beings to speak through the practitioner)
- **Trance States** (inducing altered consciousness to bridge inner visions and outer communication)
- **Lucid Shamanism** (dreaming while fully aware and interacting with other realms)
- **Entheogenic Experiences** (using sacred plants or substances to enter expanded consciousness)
- **Psychic Mediumship** (blending psychic insight with spirit communication)
- **Sacred Rituals** (ceremonies that bridge human consciousness with divine forces)
- **Automatic Writing** (allowing spirit or subconscious messages to flow through writing)
- **Mystical Pilgrimages** (traveling to sacred sites for spiritual initiation)
- **Animal Spirit Work** (connecting with animal spirits for guidance and transformation)
- **Elemental Magic** (working directly with spirits of earth, air, fire, and water)
- **Oracle Work** (becoming a vessel for divine messages through ritual or invocation)
- **Ceremony of Passage** (rituals marking transformation between states of life, death, rebirth)
- **Coven Work** (practicing magic and ritual in a group setting, blending individual and collective energies)
- **Ritual Possession** (temporary merging with a spirit or deity for wisdom or power)

Scientific Fill

fig. 11.



How does science affect the appearance of reality?

Hard sciences and/or ‘objective’ measuring strategies seek to quantify and understand the world, and our experience of it, through systematic observation, calculation, experimentation, and analysis. This process of acquiring and organizing knowledge is built upon evidence, which provides compelling grounds for confidence in the sciences as sources of ‘truth’ or authorities on ‘reality’. Scientific processes, tools, and concepts are continuously evolving and being updated though, which calls us to consider how heavily we rely on them to understand and relate to our world and experiences. To examine how science may affect the appearance of reality, let's take inventory of some of its most common methods and applications:

Scientific Methodologies

■ **Observation** _____

- **Naturalistic**
 - Observing “in the wild,” with no intervention.
- **Structured & Systematic**
 - Observing with predefined protocols or checklists to record occurrences or behaviors to ensure consistency and comparability across observers and settings.
- **Participation**
 - Observing from a place of full immersion
- **Spectating**
 - Observation from an outside perspective to avoid contaminating the observed.
- **Covert vs. Overt Observation**
 - Covert: Subjects are unaware they’re being studied (use sparingly, with strict ethical oversight).
 - Overt: Subjects know they’re being observed; consent and transparency are maintained.
- **Trace Material**
 - Observing physical effects or “left-behind” evidence.
- **Case Studies**
 - Observation conducted through in-depth, multi-method combinations of interviews, archival records, tests, and behavioral notes on groups or individuals.
- **Surveys & Self-Report**
 - Observation through structured questionnaires.

- **Instrumental**
 - Observation through tools like satellites, drones, seismographs, telescopes, and microscopes.
- **Automated & Sensor-Based Recording**
 - Observation through remote data collection tools like motion detectors, biotelemetry collars, environmental probes etc. to continuously log behaviors or conditions.
- **Time-Lapse & High-Speed Imaging**
 - Observation through compressing or expanding time to reveal patterns invisible in “real time” (e.g., plant growth, projectile dynamics).

■ Hypothesizing

- **Inductive**
 - Forming general hypotheses based on patterns or repeated observations.
 - + Opens new paths of inquiry; grounded in real data.
 - Can lead to overgeneralization; not guaranteed to be true.
- **Abductive**
 - Making the best possible inference to explain an observation (educated guesswork).
 - + Helps generate creative, plausible explanations in uncertain contexts.
 - Not always correct; the “best” guess can still be wrong.
- **Analogy-Based**
 - Drawing parallels between known systems and unfamiliar ones to propose new ideas.
 - + Useful for exploring uncharted territory
 - Analogies can mislead if the systems aren’t truly comparable.
- **Theory-Driven**
 - Deriving hypotheses from an established theory or model.

- + Anchors inquiry in coherent frameworks.
 - Can bias thinking and limit creativity or exploration of anomalies.
- **Intuition & Expert Insight**
 - Using informed hunches based on experience, training, or deep familiarity.
 - + Can accelerate discovery in complex fields.
 - Prone to cognitive biases; hard to replicate or justify.
- **Heuristic Methods**
 - Applying mental shortcuts or rules-of-thumb to frame hypotheses (e.g., Occam's razor).
 - + Efficient starting points for thinking.
 - Can ignore complexity or exceptions.
- **Serendipity**
 - Unplanned or unexpected findings spark new hypotheses.
 - + Opens up novel areas of inquiry.
 - Not a reliable or replicable method; often retrospective.
- **Modeling & Simulation**
 - Using computational or mathematical models to propose hypotheses about system behavior.
 - + Can test theoretical scenarios rapidly and safely.
 - Hypotheses depend on model accuracy and assumptions.
- **Null Hypothesis Framing**
 - Creating a default "no effect" hypothesis to compare against experimental outcomes.
 - + Central to statistical testing and falsification.
 - May overlook subtle effects or alternative hypotheses.
- **Exclusion & Elimination**
 - Ruling out alternative explanations until a single viable hypothesis remains.

- + Useful in complex or diagnostic contexts.
- Assumes that *all* other options have been considered.

■ Experimentation

● **Controlled Laboratory**

- Conducted in tightly controlled settings to isolate variables.
 - + High internal validity; strong control over confounding variables.
 - Often low ecological validity—may not reflect real-world conditions.

● **Field Experiments**

- Experiments conducted in natural environments.
 - + High ecological validity; realistic behaviors.
 - Less control over variables; external factors can interfere.

● **Randomized Controlled Trials (RCTs)**

- Participants are randomly assigned to conditions or treatments.
 - + Gold standard for causal inference; minimizes bias.
 - Expensive, time-consuming, and may not generalize to all populations.

● **Longitudinal Experiments**

- Track the same subjects over a long time period.
 - + Great for studying development, change, or delayed effects.
 - Risk of participant dropout (attrition); resource-intensive.

● **Blind & Double-Blind Designs**

- Hides condition information from participants and/or researchers.
 - + Reduces bias and placebo effects.
 - Logistically complex; not always feasible.

● **Simulation & Computational Experiments**

- Model complex systems virtually or mathematically.
 - + Safe, scalable, and ideal for extreme conditions.
 - Heavily dependent on assumptions; can oversimplify reality.

■ Measurement & Quantification

● Instrument-Based

- Using physical tools to measure observable quantities (e.g., rulers, thermometers, scales).
 - + Highly precise and repeatable.
 - Instruments can drift or malfunction and are limited to physical properties and so exclude abstract or internal phenomena.

● Surveys & Questionnaires

- Self-reported responses to structured prompts.
 - + Efficient for gathering large-scale human data
 - Subject to distorted personal testimony

● Psychometric Testing

- Standardized tests to measure cognitive, emotional, or personality traits (e.g., IQ tests, Big Five inventories).
 - + Offers structured, validated scales for complex human traits.
 - Cultural and situational biases; may not capture full nuance.

● Image-Based Measurement & Analysis

- Using photos, video, satellite images, or scans to extract data (e.g., growth over time, object detection).
 - + Visual records can be reanalyzed and shared.
 - Requires image processing skills; susceptible to resolution and angle artifacts or signal issues which can reduce accuracy.

● Rating Scales & Indices

- Aggregated measures or scores (e.g., pain scales, Human Development Index).

- + Simplifies complex phenomena into interpretable metrics.
- May obscure underlying variability; sometimes arbitrary weighting.

- **Content Analysis & Coding Schemes**

- Systematically quantifying text, speech, media, or behavior (e.g., counting themes, gestures, keywords).

- + Translates qualitative data into countable units.
- Coding can be subjective; inter-rater reliability is critical.

- **Statistical Estimation & Inference**

- Using statistical models to estimate parameters (mean, variance, regression coefficients).

- + Allows generalization from samples to populations.
- Assumes certain distributions; easily misused without context.

- **Proxy Variables & Indirect Measurement**

- Measuring something observable to estimate something less tangible (e.g., tree rings to infer age or climate).

- + Enables measurement when direct access is impossible.
- Assumes a strong and stable relationship between proxy and target variable.

- **Archival & Historical Data Quantification**

- Turning to past records (censuses, logs, manuscripts) to realize data.

- + Access to longitudinal or otherwise unavailable data.
- Data may be incomplete, inconsistent, or not originally intended for analysis.

■ Analysis

- **Statistical Analysis**

- Using mathematical tools to summarize, compare, and interpret data sets.

- + Provides objective, quantifiable insights; supports generalization.

- Can be misused or misinterpreted; assumes proper data conditions (e.g., normality, independence).
- **Descriptive Statistics**
 - Summarizing data through central tendencies (mean, median) and variability (standard deviation, range).
 - + Overview of data distribution and trends.
 - Can obscure relationships and causation; can hide underlying patterns.
- **Inferential Statistics**
 - Using a subject sample to derive estimates and suggest properties of its larger population.
 - + Enables generalization and significance testing.
 - Results depend on sample quality; risk of Type I/II errors.
- **Qualitative Content Analysis**
 - Interpreting patterns, themes, and meaning in non-numerical data like interviews or texts.
 - + Rich, detailed understanding of complex phenomena.
 - Subjective interpretation; harder to replicate.
- **Comparative Analysis**
 - Comparing different datasets, groups, or conditions to find similarities or differences.
 - + Reveals contrasts and patterns across cases.
 - Must control for confounding variables; overgeneralization is a risk.
- **Causal & Correlational Analysis**
 - Assesses the relationship or association between two variables to determine whether they influence each other.
 - + Central to scientific explanations and policy implications.
 - Causality is hard to prove without experimental control.

- **Trend & Time-Series Analysis**
 - Examining patterns over time to detect shifts, cycles, or long-term changes.
 - + Useful for forecasting and monitoring changes.
 - Vulnerable to noise or misleading seasonal fluctuations.
- **Meta-Analysis**
 - Statistically combining results from multiple studies to find overall trends.
 - + High statistical power; clarifies broader patterns.
 - Depends on study quality and consistency; publication bias can skew results.
- **Error Analysis**
 - Identifying and quantifying errors in measurement or process.
 - + Helps improve accuracy and reliability.
 - Sometimes reveals issues after data collection is complete.
- **Sensitivity Analysis**
 - Testing how changes in assumptions or variables affect results.
 - + Assesses model robustness and uncertainty.
 - Can be computationally intensive; assumes meaningful input ranges.
- **Visual Analysis**
 - Direct visual inspection of samples (e.g., via microscopes, imaging software).
 - + Reveals structure, morphology, and features not visible to the naked eye.
 - Interpretation can be subjective; requires expertise.
- **Cognitive Task Analysis**
 - Breaking down mental tasks to study decision-making and expertise.
 - + Reveals hidden processes and knowledge structures.
 - Difficult to quantify; best suited for expert subjects.

Inflamed Fill

fig. 12.



How do our preferences affect the appearance of reality?

Our individual scopes of consideration, what attracts and holds our attention, and our distinct situations provide each of us with unique access to the world. Our particular interests and areas of expertise can both expand and restrict how we navigate, receive, and process the world. The differences between people may broaden and contextualize our individual experiences and understandings, however, our conscious and unconscious inclinations may also become comfort zones and/or insulated/stagnant thinking. To examine how our personal preferences may affect what we perceive to be 'real' and/or 'true', let's consider a few common biases and some motivations that frequently drive them to develop.

Biases

■ Attention and Memory Biases

- **Selective Attention** (We may focus on certain details based on personal relevance while overlooking others (e.g., noticing your name in a loud room))
- **Mood Congruence Effect** (We may recall memories that match our current mood)
- **Flashbulb Memory Effect** (We may remember emotionally charged events more vividly and confidently, even if inaccurately)
- **Hindsight Bias** (We may see events as predictable after they happen – the "knew it all along" effect)

■ Belief and Judgment Biases

- **Confirmation Bias** (We may prioritize information that supports existing beliefs while overlooking or ignoring contradictory evidence)
- **Cognitive Dissonance** (We may alter thoughts to reduce discomfort from conflicting information)
- **Anchoring Bias** (We may over rely on the first piece of information encountered)
- **Availability Heuristic** (We may estimate the likelihood of events based on how easily examples come to mind, causing rare but memorable events to appear more frequent or probable than they actually are)
- **Representativeness Heuristic** (We may make judgments based on resemblance to a stereotype or mental prototype)
- **Belief Bias** (We may accept arguments based on believability rather than logic)

■ Social and Group Biases

- **In-Group Bias** (We may favor members of our own group over outsiders)
- **Authority Bias** (We may value opinions of authority figures over independent judgment)
- **Bandwagon Effect** (We may adopt beliefs because they are popular)
- **Peer Pressure** (We may adapt behavior to gain social acceptance)
- **Out-Group Homogeneity Bias** (We may perceive out-group members as more similar to each other than in-group members)
- **False Consensus Effect** (We may overestimate how much others share our beliefs)

■ Emotional and Motivational Biases

- **Loss Aversion** (We may fear loss so much that it outweighs the value of potential equivalent gains)
- **Self-Fulfilling Prophecies** (We may have expectations about outcomes that influence our behavior toward realizing them)
- **Risk Compensation** (We may take greater risks when feeling protected, e.g., driving faster with seat belts)
- **Affect Heuristic** (We may judge risks and benefits based on emotions rather than facts)

■ Self-Perception Biases

- **Self-Serving Bias** (We may attribute successes to self and failures to external factors)
- **Dunning–Kruger Effect** (We may overestimate competence when lacking skill; underestimating our ability when truly skilled)
- **Egocentrism** (We may struggle to understand perspectives outside our own)

- **Illusion of Transparency** (We may overestimate how well others can read our emotions)
- **Spotlight Effect** (We may overestimate how much attention others pay to our appearance or behavior)

■ Heuristics and Mental Shortcuts

- **Stereotyping & Implicit Bias** (We may use generalized beliefs to judge individuals)
- **Halo Effect** (We may let one trait influence our overall impression or idea of someone)
- **Gambler's Fallacy** (We may believe past random events affect future outcomes)
- **Planning Fallacy** (We may underestimate the time needed to complete tasks)

■ Expectation Effects

- **Placebo Effect** (We may experience positive outcomes from believing a treatment works)
- **Nocebo Effect** (We may experience negative outcomes from believing something will harm)
- **Sunk Cost Fallacy** (We may persist in failure because of prior investment)
- **Expectation Bias** (We may see what we expect to see and ignore contradictory evidence)

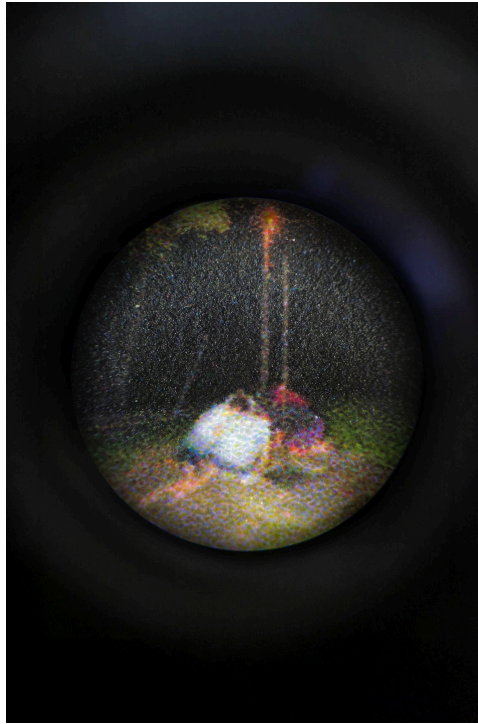
■ Moral and Perspective Biases

- **Moral Intuition** (We may employ gut feelings to determine moral judgments before reason)

- **Moral Licensing** (We may justify questionable actions after doing something “good”)
- **Actor-Observer Bias** (We may attribute others' actions to character but our own to situation)
- **Just-World Hypothesis** (We may believe people get what they deserve, leading to victim blaming)
- **Egocentric Moral Bias** (We may judge actions more harshly when others commit them vs. when we benefit ourselves)

Formative Fill

fig. 13.



How does cumulation affect the appearance of reality?

Most of our everyday experiences are the result of cumulative elements and factors. We are ourselves, aggregations of material, behavior, ideas, and past events. Many such collections are invisible to the naked or immediate eye; occurring on microscopic, social, or historical scales for example. Our individual pools of sensory experiences, internal neural processing, and social interactions give rise to beliefs, ideas, and mental models that help us interpret 'reality' and our experience of it. To examine the role of such cumulative forces and activity, let's consider these instances in which many different sources, materials, people, and contexts etc. converge to produce concepts or wholes:

Assemblies

■ Cosmology

- **Planet Formation** – Dust particles, gas molecules, gravitational forces, accretion disks, turbulence.
- **Star Formation** – Hydrogen atoms, helium atoms, gravitational collapse, fusion reactions, magnetic fields.
- **Galaxy Formation** – Stars, gas clouds, dark matter, interstellar dust, gravitational interactions.
- **Black Holes** – Stellar mass, gravitational collapse, event horizons, spacetime curvature, singularities.
- **Cosmic Web** – Galaxies, dark matter, intergalactic gas, voids, filaments, gravitational clustering.

■ Physics

- **Phase Transitions** – Molecules, thermal energy, pressure, intermolecular forces, critical points.
- **Superconductivity** – Cooper pairs, lattice vibrations, low temperatures, electron pairing.
- **Magnetism** – Atomic spins, electron interactions, magnetic domains, external fields.
- **Chaos Theory** – Nonlinear systems, sensitivity to initial conditions, strange attractors, fractals, bifurcation.
- **Emergent Spacetime** – Quantum entanglements, informational degrees of freedom, tensor networks, microstates.

■ Materials Science

- **Metamaterials** – Engineered microstructures, dielectric components, metallic elements, periodic patterns.

- **Smart Materials** – External stimuli (temperature, pressure, electric field), shape-memory alloys, piezoelectricity, self-healing polymers.
- **Composites** – Distinct material phases, fibers, matrices, interfaces.
- **Alloys** – Different metal atoms, atomic arrangements, solid solutions, cooling rates.
- **Crystallization** – Atoms, regular lattice patterns, nucleation sites, temperature control.

■ Technology

- **Cloud Computing** – Servers, data storage, virtual machines, network protocols, remote access, data security.
- **Autonomous Vehicles** – LIDAR sensors, machine learning algorithms, GPS, real-time mapping, decision-making systems.
- **Artificial Intelligence (AI)** – Algorithms, training data, machine learning models, neural networks, optimization techniques.
- **Augmented Reality (AR)** – Cameras, sensors, real-time data processing, 3D models, user interfaces, displays.
- **Wearable Technology** – Sensors, data analytics, wireless communication, battery power, user interface, health tracking.

■ Biology

- **Genetic Regulation Networks** – Genes, transcription factors, regulatory sequences, epigenetic marks, protein interactions.
- **Embryonic Development** – Zygote, cleavage, differentiation, stem cells, morphogen gradients.
- **Multicellular Organisms** – Individual cells, signaling molecules, extracellular matrix, genetic instructions, differentiation cues.
- **Circadian Rhythms** – Light cues, clock genes, neural pathways, melatonin, biological oscillators.
- **Endocrine Signaling** – Hormones, glands, target cells, receptors, feedback loops.

■ Ecology

- **Trophic Pyramids** – Energy flow within an ecosystem through biotic and abiotic components.
- **Food Chains** – Producers, herbivores, carnivores, decomposers, omnivores, detritivores, primary consumers, secondary consumers, tertiary consumers.
- **Pollination Networks** – Flowering plants, insect pollinators, birds, environmental signals, seasonal timing.
- **Soil Microbiomes** – Bacteria, fungi, archaea, organic matter, root exudates, moisture, mineral particles.
- **Water Cycle** – Evaporation, condensation, precipitation, infiltration, transpiration, surface runoff.

■ Social Systems

- **Markets** – Buying and selling decisions, supply and demand signals, pricing mechanisms, goods and services.
- **Democracy** – Individual votes, public debate, representation systems, institutional frameworks.
- **Social Movements** – Protests, shared narratives, collective action, media influence.
- **Educational Systems** – Teachers, students, curricula, assessments, institutions, educational policies.
- **Criminal Justice System** – Laws, law enforcement, courts, prisons, legal procedures, societal norms.

■ Cultural Systems

- **Language Evolution** – Spoken words, idioms, grammar patterns, cultural transmission.
- **Norms and Etiquette** – Repeated behaviors, peer feedback, sanctions, social learning.
- **Art Movements** – Individual artworks, shared techniques, cultural influences, aesthetic trends.

- **Rituals** – Symbolic actions, repetition, community participation, cultural context.
- **Mythologies** – Stories, symbols, oral traditions, archetypes.

■ Ideas/Concepts/Theory/Philosophy

- **Consciousness** – Neural signals, brain regions, sensory inputs, feedback loops, cognitive integration.
- **Mathematical Theories** – Axioms, theorems, logical derivations, symbolic language, proof structures.
- **Scientific Paradigms** – Experiments, models, accumulated evidence, peer review, theoretical frameworks.
- **Social Contract Theory** – Collective agreement, governance, individual rights, mutual benefit, moral obligations.
- **Moral Philosophy** – Reasoning, cultural norms, moral intuitions, ethical frameworks, philosophical arguments.

Reformed Fill**fig. 14.**

How do memories affect the appearance of reality?

Calling upon our previous experiences and understandings is essential to orienting ourselves towards, and participating in the world. Each of us employs memory on a daily basis; from remembering where our toothbrush is and how to brush our teeth, to recalling what house we're in and who we even are. Memory is conceptually rooted in the past, relating to things that 'have been' or 'were', but this information directly informs how we interface with the immediate present. To examine how our memories may influence what we perceive to be 'real' and/or 'true' let's consider different types of memory and some common ways that we wield them:

Memory Types & Stages

- **Gathering:** We take in information from our environment.
 - **Sensory Register**
 - Holds raw incoming sensory impressions to be integrated and attended to.

- **Encoding:** Our brains translate information into an easily stored format.
 - **Short-Term/Working Memory**
 - Keeps a small amount of information briefly active so as to manipulate it via phonological loops, visuospatial sketchpad, central executive, and episodic buffer.

- **Storage & Retrieval:** Our brains organize and keep translated information maintained to remember.
 - **Long-Term Memory**
 - Stores explicit, episodic, semantic, implicit, prospective, and autobiographical information more permanently:

Memory Activity

- **Memory Retrieval**
 - **Recall & Reconstruction:** Retrieving memories requires actively piecing together details, often altering them based on present knowledge.
 - **Recognition:** Identifying previously encountered information relies on matching new stimuli to stored memories.
 - **Priming & Familiarity:** Prior exposure to a stimulus makes related concepts easier to recognize and recall unconsciously.

- **Context-Dependent:** Memories are more accessible when the physical environment matches the original learning setting.
- **State-Dependent:** Memories may be more easily accessed when they match or coincide with our emotional or physiological states at the time of desired retrieval.
- **Implicit Memory Activation:** Past experiences constantly shape our perception and behavior without conscious awareness.

■ Memory Distortions

- **Misinformation Effect:** Exposure to misleading information after an event can corrupt and distort original memories.
- **False Memories & Confabulation:** The brain can invent or fill gaps in memory with fabricated but believable details.
- **Source Monitoring Errors:** We often misattribute where, when, or from whom we acquired a memory.
- **Schemas & Expectation Bias:** Preexisting mental frameworks influence what we notice, encode, and remember.
- **Confirmation Bias:** We may remember information that aligns with our existing worldviews better than information that conflicts with our personal beliefs.
- **Consistency Bias:** We may revise, alter, and edit memories to make them more consistent with our current or desired attitudes or understandings.
- **Hindsight Bias:** Outcomes may seem obvious to us in retrospect, causing us to miscalculate the predictability of events.
- **Imagination Inflation:** If we repeatedly imagine an event, sensation, or activity it can feel like a real memory from being continually cognitively reinforced.
- **Cryptomnesia:** We may mistakenly believe an idea is our own even though it comes from another source.
- **Déjà Vu:** We may experience a sense of familiarity without consciously recalling a related memory or source.
- **Mandela Effect:** We may, as a group, misremember a specific event, fact, or detail, even if it is known to be false.

- **Rosy Retrospection:** We may remember past experiences as being more positive than they were.
- **Egocentric Bias:** We may exaggerate our centrality or importance in events (aka 'main character syndrome').

■ Encoding and Consolidation

- **Selective Attention:** We may only encode the object of our active focus, rendering unattended details easily forgotten.
- **Emotional Arousal and Flashbulb Memories:** Highly emotional or sensorily intense experiences may yield vivid but often inaccurate memories.
- **Sleep and Memory Consolidation:** Sleep stabilizes and enhances memory retention for long-term storage and everyday use.
- **Chunking:** Grouping information into larger related units may improve memory capacity and recall by batch preservation.
- **Method of Loci (Memory Palace):** Associating information with spatial locations may help retrieve memories through mental navigation.
- **Elaborative Processing:** Personally relevant or meaningful analysis of information during encoding may strengthen the memories' durability and longevity through intimate connection and integration with our existing knowledge bases.
- **Interference (Proactive and Retroactive):** Incoming or recollected memories can disrupt the structures of our understandings, leading to distortion and instability.
- **Motivated Forgetting:** We may consciously or unconsciously suppress, repress, or block out undesirable memories.
- **Reconstructive Memory:** Each time we use a memory it is reshaped by our new experiences and contexts inflecting themselves upon it.

■ Memory Aids

- **Note-Taking:** Writing reiterates information by externalizing memory, supporting more accurate recall later.

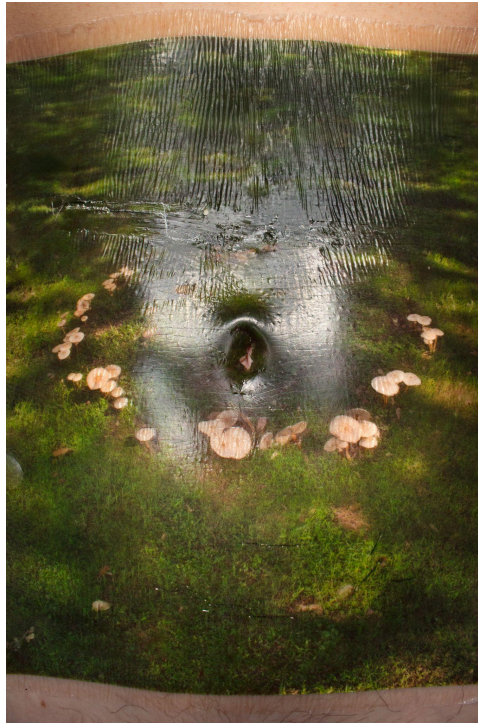
- **Photography and Video:** Visually documenting experiences can preserve some memory details but also risks overwriting our natural recall.
- **Digital Memory:** Technological tools extend memory management and storage beyond biological limits, reducing the cognitive load of maintaining our own memories.
- **Memory Prosthetics:** Devices like wearable tech or apps act as "second brains" supporting recall.
- **Externalized Cognitive Maps:** Using diagrams, mind maps, or spatial layouts enhances memory navigation and structure.

■ Social & Collective Memory

- **Cultural Narratives and Collective Histories:** Societal stories frame both collective identity and personal memory.
- **Group Recollection and Memory Alignment:** Discussing memories socially can reinforce or alter individual recollections.
- **Collective Forgetting:** We may selectively erase uncomfortable histories from collective consciousness on a societal level.
- **Historical Revisionism:** Collective memories are often deliberately reshaped for political or ideological reasons / in service of larger agendas and entities.
- **Bodily Memory:** We may biologically inherit memories that we did not collect or directly experience ourselves.
- **Transactive Memory Systems:** In relationships or teams, individuals specialize in remembering different information collaboratively.
- **Crowdsourced Memory and Wikis:** Collaborative platforms create dynamic shared memory systems.
- **Festivals and Memorials:** Public rituals help communities collectively preserve and reinforce memories.
- **Cultural Artifacts as Memory Anchors:** Objects like monuments or artworks serve as durable memory cues.
- **Social Media Memories and "On This Day" Features:** Digital platforms regularly prompt shared remembrance.

Flesh Fill

fig. 15.



How do our bodies affect the appearance of reality?

Each of us inhabits a fluctuating recipe of cellular, chemical, and genetic materials. Our physical forms provide the instruments and capacity to host our human experiences; serving as an access point to the world and the primary location of our existence. In this way, the human body becomes a threshold that 'reality' must move between to manifest us as individuals and allow us to perceive at all. Internal and external sensations and conceptualizations are mediated by the conditions and abilities of our bodies, so let's consider our physical ingredients and activities to examine the ways they may influence what we perceive to be 'real' or 'true':

Bodily Composition

■ **Material Construction**

- **Key molecular compounds**
 - Water: ~60% of body mass
 - Proteins: ~20%
 - Lipids (fats): ~12%
 - Carbohydrates (glycogen, glucose): ~1%
 - Nucleic acids (DNA/RNA): <1%
 - ATP and other small biomolecules ~1%
- **Major elements** (~99% of body mass)
- **Macrominerals** (~0.85% of body mass)
- **Trace elements** (each <0.01% of mass)

■ **Sensory Systems**

- **Traditional Five Senses (Exteroception)**
 - Sight (Vision)
 - Hearing (Audition)
 - Touch (Somatosensation)
 - Taste (Gustation)
 - Smell (Olfaction)
- **Internal Senses (Interoception & Proprioception)**
 - Proprioception (Body Awareness)
 - Balance (Vestibular System)
 - Temperature Sensation (Thermoception)
 - Pain Perception (Nociception)
 - Internal Bodily Awareness (Interoception)
- **Cognitive & Neural Perception**
 - Pattern Recognition
 - Time Perception
 - Multisensory Integration
 - Memory & Perception

■ Biological Foundations and Internal Influences

- **Genetics and Heredity:** DNA shapes physical traits, personality tendencies, and health risks from birth.
- **Developmental Biology and Early Experiences:** Prenatal environments and childhood development impact brain wiring, emotional regulation, and cognition.
- **Sex and Gender Differences in Biology:** Chromosomal and hormonal variations influence brain structure, cognition, and behavior patterns.
- **Brain Structure and Function:** Regions like the prefrontal cortex and amygdala regulate decision-making, emotions, and social behavior.
- **Neurotransmitters and Hormones:** Chemical messengers such as dopamine, serotonin, and oxytocin control mood, motivation, and bonding.
- **Epigenetics and Environmental Gene Influence:** Life experiences modify gene expression without altering DNA, affecting health and personality.
- **Gut Microbiome and Mental Health:** The bacterial ecosystem in the gut shapes cognitive function, emotional states, and social behavior.
- **Immune System and Behavior:** Chronic inflammation and immune responses impact mood, cognition, and mental health conditions.
- **Circadian Rhythms and Sleep Patterns:** Biological clocks regulate sleep, mood, energy, and cognitive performance across the lifespan.
- **Physical Health and Longevity:** Metabolism, cardiovascular function, and immune strength determine resilience, vitality, and aging.
- **Sensory Perception and Individual Differences:** Variations in sensory systems affect how individuals experience pain, color, sound, and touch.
- **Evolutionary Biology and Behavioral Traits:** Behaviors like cooperation, aggression, and risk-taking are rooted in evolutionary survival strategies.

■ Physical Manipulation and Traditional Body Shaping

- **Exercise and Physical Training:** Targeted movement builds strength, endurance, and reshapes the body.

- **Posture and Movement Correction:** Alignment adjustments improve health, performance, and aesthetics.
- **Contortion and Extreme Flexibility:** Specialized training expands physical movement possibilities.
- **Binding, Shaping, and Compression:** Practices like corsetry and cranial shaping physically alter body structures.
- **Fasting, Diet, and Nutritional Manipulation:** Controlled intake modifies body composition, performance, and well-being.
- **Hormonal Treatments:** Hormone therapies influence growth, gender characteristics, and metabolic processes.
- **Pharmaceutical Enhancements:** Drugs and supplements are used to alter body function, cognition, and mood.
- **Traditional Body Conditioning:** Scarification, ritual endurance, and extreme body modifications express cultural or personal identity.

■ Cosmetic and Aesthetic Alterations

- **Makeup and Beauty Enhancements:** Cosmetics temporarily modify facial features and skin appearance.
- **Hair Styling and Modification:** Color, shape, and length adjustments alter identity and expression.
- **Body Art:** Tattoos, piercings, scarification, and branding permanently mark and modify the body.
- **Fashion, Clothing, and Adornment:** Garments and accessories reshape silhouettes and signal social identity.
- **Dentistry and Orthodontics:** Teeth are altered for health, function, and beauty.
- **Cosmetic Dentistry:** Procedures like whitening and veneers enhance the aesthetic appearance of smiles.
- **Temporary Body Modifications:** Body paint, henna, and nail art offer short-term physical changes.

■ Surgical and Structural Modification

- **Orthopedic Surgery:** Structural surgeries correct or enhance skeletal and muscular systems.
- **Cosmetic and Reconstructive Surgery:** Surgeries reshape or rebuild body features for aesthetic or functional goals.
- **Prosthetics and Bionic Enhancements:** Artificial limbs and devices restore or enhance human capabilities.
- **Organ Transplants and Tissue Engineering:** Replacement and regeneration of organs extend life and function.
- **Neurosurgery and Brain Modifications:** Surgical interventions alter brain pathways for therapeutic or enhancement purposes.
- **Gender Affirmation Surgery:** Surgeries align physical traits with gender identity.
- **Body Sculpting Surgery:** Liposuction, implants, and body contouring refine or drastically change body shape.
- **Artificial Organs and Bioprinting:** 3D-printed tissues and synthetic organs replace or augment biological function.

■ Psychological and Cognitive Alterations

- **Hypnosis and Suggestibility Training:** Induced trance states alter memory, behavior, and perception.
- **Brainwashing and Psychological Reprogramming:** Coercive techniques reshape beliefs and identity.
- **Cognitive Behavioral Therapy (CBT):** Structured interventions rewire thought patterns to change behavior and emotions.
- **Psychedelic-Assisted Therapy:** Controlled use of psychedelics promotes profound psychological healing and transformation.
- **Sensory Deprivation and Enhancement:** Manipulating sensory input sharpens or distorts perception and cognition.

- **Virtual Reality Therapy:** Immersive simulations treat trauma, anxiety, and cognitive disorders.
- **Lucid Dreaming Training:** Conscious control of dreams offers pathways for psychological exploration and creativity.

■ Technological and Genetic Enhancements

- **CRISPR and Gene Editing:** Precision techniques modify genes to prevent disease or enhance traits.
- **Cloning and Genetic Duplication:** Biological copying of cells or organisms for research, therapy, or enhancement.
- **Endocrine Manipulation and Biochemical Engineering:** Tuning hormonal systems alters development and biological function.
- **Neural Implants and Brain–Machine Interfaces:** Cybernetic links between brains and machines augment cognition or control.
- **Exoskeletons and Augmented Mobility Devices:** Powered suits enhance strength, endurance, or restore mobility.
- **Sensory Augmentation:** Technology extends human perception beyond natural limits (e.g., infrared vision, ultrasonic hearing).
- **Biohacking and DIY Enhancement:** Individuals self-modify their biology using experimental methods.
- **Biomechanical Integration:** Biological systems are fused with mechanical parts for hybrid functionality.
- **Electromagnetic and Radiation Exposure:** Controlled energy exposure influences healing, stimulation, and biological change.
- **Cryonics and Biostasis:** Freezing bodies or organs preserves them for potential future revival.
- **Synthetic Biology:** Engineering novel biological systems beyond natural evolutionary forms.
- **Artificial Intelligence and Memory Externalization:** AI systems extend or simulate human memory and cognitive processes.

Referential Fill

fig. 16.



How do references affect the appearance of reality?

Our idea of any given subject is rarely derived from the subject alone but is rather constructed of cumulative beliefs about its components, materials, function, history, and context. The use of references has been essential to human survival and development; noticing what may be dangerous even if we have not encountered it before, identifying whether food is fresh or spoiled, and recognizing the body language of others for example. In using the systems and routes of practical and conceptual relation to understand 'reality', a single erroneous connection may threaten the entirety of an idea/understanding. To examine how our referential thought processes may inform what we perceive to be 'real' or 'true' let's consider some common referencing practices:

References

■ Linguistic References: How Language Constructs Meaning

- **Language and Symbols:** Humans rely on linguistic structures and symbols to communicate abstract and concrete ideas, shaping their understanding of the world.
- **Contextual References:** Words derive meaning from surrounding language and situational cues.
- **Metaphors and Analogies:** Analogies and metaphors help people draw connections between new and familiar concepts, facilitating learning and problem-solving.
- **Historical and Literary References:** Texts and stories provide cultural frameworks for interpretation.
- **Idioms and Common Phrases:** Shared sayings carry condensed, culturally specific knowledge.
- **Etymological Origins:** The history of words shapes their evolving meanings and connotations.
- **Semantic Fields and Word Networks:** Words are understood through their relation to other terms.
- **Pragmatic Use and Implication:** Meaning often depends on speaker intention and listener inference.

■ Cognitive and Memory-Based References: How the Mind Makes Sense

- **Memory and Personal Experience:** Individuals reference past experiences and memories to interpret current events and predict future outcomes.
- **Schemas and Mental Models:** Pre-existing frameworks help organize new information.
- **Pattern Recognition:** The brain identifies recurring structures and predicts outcomes.

- **Associative Memory:** Memories are linked through networks of related experiences.
- **Prototypes and Categorization:** Mental templates help classify and interpret stimuli.
- **Expectations and Predictive Processing:** We anticipate events based on past patterns.
- **Cognitive Heuristics:** Mental shortcuts influence perception and judgment.
- **Reconstructive Memory:** Recalled memories blend actual events with imaginative details.

■ Visual and Sensory References: How We Interpret the Senses

- **Sensory and Perceptual Cues:** Understanding the world depends on processing sensory input, such as recognizing spatial depth through visual cues or identifying objects through touch.
- **Color and Contrast Comparisons:** Colors gain meaning through relative differences.
- **Size and Perspective Cues:** Spatial understanding relies on relational sizing and angles.
- **Facial Recognition and Expression Reading:** Emotional and social information is extracted from faces.
- **Symbolism and Iconography:** Visual symbols communicate complex ideas rapidly.
- **Motion and Change Detection:** Our senses are attuned to movement and dynamic shifts.
- **Multisensory Integration:** Inputs from different senses combine to create coherent perceptions.
- **Perceptual Constancy:** Objects are perceived as stable despite changes in viewpoint or conditions.

■ Scientific and Logical References: How We Systematize Knowledge

- **Scientific Models and Frameworks:** Science constructs models—such as the atomic model or climate models—to represent complex systems and make predictions.
- **Standards and Units of Measurement:** Shared metrics allow objective comparison.
- **Mathematical Models and Formulas:** Quantitative systems describe relationships and predict outcomes.
- **Experimental Controls and Baselines:** Controlled setups ensure reliable observations.
- **Historical Data and Statistical Trends:** Patterns over time inform present understanding.
- **Comparative Analysis:** Evaluating similarities and differences refines insights.
- **Falsifiability and Hypothesis Testing:** The strength of a theory lies in its testability.
- **Systematic Classification (Taxonomies):** Organizing complexity into hierarchies supports comprehension.

■ **Cultural and Social References: How Society Frames Reality**

- **Social and Cultural Norms:** People use cultural references, traditions, and social norms to navigate interpersonal interactions and societal expectations.
- **Pop Culture and Media References:** Collective imagery shapes contemporary thought.
- **Historical Events as Lessons:** History provides a framework for understanding present events, offering lessons from past successes and failures.
- **Social Norms and Traditions:** Accepted practices provide behavioral templates.
- **Interpersonal Comparisons:** Self-understanding is shaped through comparison with others.

- **Moral and Ethical Frameworks:** Societies define shared standards of right and wrong.
- **Collective Memory:** Groups retain shared versions of history and meaning.
- **Language Dialects and Variations:** Regional or social language differences signal identity and belonging.

■ **Artistic and Creative References: How We Construct Symbolic Meaning**

- **Intertextuality:** New works reference and reinterpret existing texts and traditions.
- **Stylistic Influence:** Artistic movements inspire forms and conventions across media.
- **Genre Conventions:** Genres provide recognizable patterns for creating and interpreting works.
- **Symbolism and Visual Metaphor:** Art embeds layered meanings through imagery.
- **Musical Sampling and Remix Culture:** Borrowed elements create new cultural artifacts.
- **Aesthetic Ideals:** Concepts of beauty influence interpretation and emotional impact.
- **Creative Reframing:** Novel combinations shift how familiar ideas are perceived.

■ **Psychological and Emotional References: How We Relate Internally**

- **Personal Experiences and Memory Triggers:** Individual history shapes subjective reality.
- **Emotional Associations:** Feelings attach themselves to people, places, and ideas.
- **Empathy and Perspective-Taking:** Imagining others' experiences expands understanding.

- **Projection and Transference:** Internal emotions are unconsciously attributed to external sources.
- **Psychological Anchoring:** First impressions strongly bias later perceptions.
- **Identity Construction:** Self-narratives integrate memories, feelings, and social feedback.
- **Cognitive Dissonance Resolution:** Mental discomfort drives reinterpretation of conflicting ideas.

■ **Metaphysical and Philosophical References: How We Conceptualize Existence**

- **Religious and Philosophical Doctrines:** Religious texts, philosophical theories, and ethical frameworks offer structured ways to interpret existence, morality, and purpose.
- **Philosophical Thought Experiments and Analogies:** Logical exploration reveals assumptions and paradoxes.
- **Existential and Ontological Models:** Fundamental questions address being, meaning, and consciousness.
- **Cosmological and Mythological Narratives:** Stories explain origins, structures, and ultimate purposes.
- **Ethical Theories:** Reasoned systems evaluate moral principles and human behavior.
- **Epistemological Foundations:** Theories of knowledge define how (and whether) we can know truth.
- **Mysticism and Transcendental Experiences:** Direct encounters with "ultimate reality" offer alternative frameworks.

■ **Comparative and Decision-Making References: How We Evaluate and Decide**

- **Comparative Thinking:** The human mind relies on comparisons—such as cost-benefit analysis or moral dilemmas—to make decisions and judgments.
- **Expert Testimony and Authority Figures:** Trusting expert knowledge, such as medical professionals or scientific consensus, provides individuals with

reliable references for decision-making.

- **Moral and Ethical Dilemmas:** Ethical frameworks help navigate complex decisions and the implications of actions.
- **Judgment Biases and Heuristics:** Cognitive shortcuts influence choices and evaluations in uncertain conditions.
- **Cost-Benefit and Risk Assessment:** Decision-making often involves evaluating trade-offs and potential outcomes.

Floating Fill

fig. 17.



How does context affect the appearance of reality?

Each of us come from and exist within a context. Similarly, information, objects, materials, sensation, and other living entities are linked to their original source and present situation. In many instances, the history and current conditions of something helps us recognize, interact with, and understand it. This practice yields any given subject as being kind of suspended in sets of other ideas and information. To examine how contextual content may influence what appears to be 'real' or 'true' let's consider some internal and external contextual frameworks:

Contextual Considerations

■ **Physical Context**

- **Material Conditions:** Physical objects, infrastructure, and resources that shape human experience.
- **Physical Layout:** Architectural designs, building arrangements, and spatial organization.
- **Health and Well-being:** Factors influencing physical health, fitness, and wellness.
- **Environmental/Ecological State:** The condition of natural resources, ecosystems, and pollution levels.
- **Safety & Security Concerns:** Factors affecting personal security, safety protocols, and risk mitigation.
- **Sensory Stimuli:** External physical conditions such as noise, light, temperature, and touch.

■ **Temporal Context**

- **Seasonal Cycles:** The impact of seasons on behavior, agriculture, and lifestyle.
- **Crisis or Emergency Conditions:** Situations requiring immediate attention, like natural disasters or public health crises.
- **Historical Context:** The influence of past events and historical precedents on current situations.
- **Economic Conditions:** Fluctuations in the economy that influence behavior, decisions, and policies.
- **Timeframe & Deadlines:** The pressure and expectations of specific time constraints or long-term goals.
- **Cultural Festivals and Holidays:** Events that mark specific times of year and carry cultural significance.

■ Social Context

- **Social Structures:** The organization of relationships, social roles, and hierarchies within a community.
- **Family Dynamics:** The roles, relationships, and emotional bonds within family units.
- **Social Norms & Expectations:** Shared cultural values and behavior guidelines that dictate social interactions.
- **Ethnic Composition:** The diversity and cultural makeup of a population.
- **Public Opinion:** The general collective mindset and attitudes toward social issues or events.
- **Gender Norms:** Societal expectations surrounding gender roles and identity.

■ Cultural Context

- **Cultural Beliefs and Practices:** Deep-rooted traditions, customs, and values influencing behavior.
- **Language and Discourse:** The way language, communication, and discourse shape perception and interactions.
- **Religious Beliefs:** Spiritual values, practices, and doctrines shaping behavior and worldview.
- **Social Rituals & Ceremonies:** Traditional practices, ceremonies, and rites that strengthen social cohesion.
- **Identity Politics:** Political and social movements centered around the rights and representation of marginalized groups.
- **Cultural Rituals:** Established customs and behaviors that define identity and group membership.

■ Environmental Context

- **Geographical Setting:** The influence of physical geography, such as mountains, rivers, and climate, on life.

- **Topography:** Natural landforms, landscape features, and their influence on human activities.
- **Pollution Levels:** The degree of environmental contamination affecting health and ecosystems.
- **Natural Disaster Risks:** Geographic areas prone to natural events like earthquakes, floods, or storms.
- **Sustainability Practices:** Eco-friendly practices that aim to preserve resources and minimize harm to the environment.
- **Climate and Weather:** The weather patterns and their influence on daily life, agriculture, and industry.

■ Technological Context

- **Technological Adoption Rate:** The pace at which new technologies are integrated into society.
- **Digital Infrastructure:** The framework supporting the internet, networks, and digital communication.
- **Data Availability & Quality:** Access to reliable and accurate data that influences decision-making.
- **Digital Divide:** The gap between individuals or communities with varying levels of access to digital technologies.
- **Technological Interoperability:** The ability of different technological systems to work together seamlessly.
- **Algorithmic Biases:** The presence of unintended bias within automated decision-making systems.

■ Emotional & Psychological Context

- **Psychological Climate:** The emotional tone within a group or organization, influencing overall morale.
- **Emotional Atmosphere:** The emotional state of an environment, like stress, joy, or anxiety.

- **Psychological Safety:** The feeling of being able to express oneself without fear of negative consequences.
- **Motivational Drivers:** Internal and external factors that drive behaviors, such as ambition or fear.
- **Cognitive Load:** The mental effort required to process and understand information, which affects decision-making.
- **Personality Traits:** Stable personal characteristics that influence responses to different contexts.

■ Legal & Governance Context

- **Legal Framework:** The formal legal systems, rules, and regulations governing behavior and actions.
- **Judicial System:** The courts and judicial processes responsible for administering justice.
- **Ethical Considerations:** The moral principles guiding decisions, behavior, and societal expectations.
- **Governance Policies:** Public sector and institutional policies shaping governance and public decision-making.
- **Privacy Regulations:** Laws that protect personal information and regulate its collection, storage, and usage.
- **Intellectual Property Laws:** Legal frameworks protecting creativity, inventions, and trademarks.

■ Economic & Infrastructural Context

- **Economic Conditions:** The state of the economy, such as recession, growth, or inflation.
- **Supply-Chain Context:** The production and distribution networks influencing goods and services availability.
- **Labor Market Dynamics:** Workforce characteristics, including unemployment rates and skill levels.

- **Transportation Network Quality:** The accessibility and efficiency of transportation systems.
- **Healthcare System Structure:** The organization and availability of healthcare services within a community.
- **Credit Accessibility:** The ease or difficulty with which individuals or businesses can access financial resources.

■ Geographic & Spatial Context

- **Geographic Setting:** The physical location, climate, and natural resources that affect a region.
- **Urban vs. Rural Settings:** The contrast between densely populated urban areas and rural environments.
- **Neighborhood Safety:** The security and risk factors in local residential or commercial areas.
- **Topography and Land Use:** The geographical layout of land and its influence on human activities.
- **Digital Connectivity:** The availability of internet and communication networks in a particular region.
- **Seasonal Cycles:** How the changing seasons influence regional culture, work patterns, and lifestyles.

■ Institutional & Organizational Context

- **Institutional Policies:** Guidelines and rules followed within organizations, governments, or institutions.
- **Educational Level:** The overall educational background and access to learning resources.
- **Organizational Hierarchy:** The structure of authority and responsibility within an institution or company.
- **Leadership Style:** The approach taken by leaders to guide decision-making, motivation, and conflict resolution.

- **Crisis Management Protocols:** Established systems and plans for responding to unexpected challenges or emergencies.
- **Employee Wellness Programs:** Programs aimed at maintaining mental and physical health within organizations.

■ Spiritual & Metaphysical Context

- **Spiritual Beliefs:** The values and worldview shaped by religious or spiritual systems.
- **Cosmological Narratives:** The stories or myths about the origins and nature of the universe that influence perspective.
- **Existential Frameworks:** Philosophical approaches to understanding meaning, purpose, and existence.
- **Rituals and Ceremonies:** Sacred practices or ceremonies that influence individual and collective identity.
- **Transcendence & Enlightenment:** Concepts related to spiritual awakening, higher consciousness, and personal growth.
- **Religious and Philosophical Doctrines:** Structured systems of belief that guide moral reasoning and existence.

'For Real' Fill

fig. 18.



How does reality appear to you?

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BIOGRAPHY

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