

Chapter Six

A Theory of Definition & Concepts

Abstract: This chapter has four parts:

I. It is hypothesized that whenever a person asserts how a linguistic entity (i.e., word, phrase, symbol, definiendum) has been used, is used, or is going to be used; a person can only be interpreted as asserting a *reportive* definition, *theoretic* definition, or a *stipulative* definition. If this linguistic theory is true, then we should be able to understand any definition of a definiendum-to-definiens form (in a context) as being one of these three types. This '*tripartite definition*' of 'definition' is either *true* or *false*.

II. Six kinds of concepts are described as part of a descriptive metaphysics: (1) natural kind concepts, (2) group resemblance concepts, (3) fixed definiens concepts, (4) fictional entity concepts, (5) definite description concepts, and (6) proper name concepts. As a measurement system, these concepts formulate a (non-neutral) metaphysical system.

III. The relationship between three kinds of concepts (viz., natural kind, fixed definiens and group resemblance) and the kinds of definitions that they are typically associated with is explored. These relationships help explain the normal uses of reportive, theoretic, and stipulative definitions in the physical, mathematical, and social sciences.

IV. The '*tripartite theory of definition*' in section **I** (above) is confirmed. With the methodology of conceptual analysis, other kinds of definition are examined (e.g., real, nominal, implicit, recursive, etc.). These other kinds of definitions are shown to be identical to, fall under, be explainable, or refutable under the three primary types.

Part I: A Tripartite Theory of Definition

With a theory of definition, I hypothesize that whenever a person asserts how a linguistic entity (i.e., word, phrase, symbol, definiendum) has been used, is used, or is going to be used; that person can only be interpreted as asserting a reportive (i.e., lexical) definition, theoretic definition, or a stipulative definition. If this hypothesis is true, we should be able to understand any definition of a definiendum-to-definiens form (in a context) as being one of these three types. If this hypothesis is false, then we should be able to find an instance of a linguistic token-to-meaning form that cannot be interpreted as reportive, theoretic, or stipulative. The tripartite theory is *not* an *a priori* truth; it is a social scientific linguistic truth that could be disconfirmed with counterexamples.

Introductory Beliefs about Definitions

What is a 'definition' as a definiendum-to-definiens relationship? To guide our pre-theoretic intuitions, let's start out with a question. Each of the seven assertions below is an example of a definition. True or false?

- 1) 'Knowledge' means 'cognition, or the fact of knowing something through acquaintance, or range of one's information or understanding, or the sum total of truth, information, and principles acquired by humankind.' (Source: A standard dictionary).
- 2) 'Water' means 'a clear liquid that falls as rain, and makes up streams, lakes, and seas, and is composed of H₂O.' (Source: A man on the street).
- 3) 'Knowledge' (i.e., for a person **S** to know **p**) means that '1) **p** is true, 2) **S** believes **p**, 3) **S** believes **p** upon a set of premises that are relevant for why **p** should be believed, and 4) there exists no unresolved nor unconsidered undermining evidence that would effectively lead **S** to doubt or disbelieve **p**.' (Source: Chapter One).
- 4) 'Water' means 'a substance composed of H₂O, which freezes at zero degrees centigrade, and has a high maximum density at 4 degrees centigrade, and a high specific heat.' (Source: A physical scientist).
- 5) I shall at this moment name my new puppy 'Spot.' (Source: A dog owner declaring the name of her new puppy).
- 6) In the remainder of this essay, I abbreviate 'trigeminal neuralgia' as 'TN.' (Source: An article about nerve disorders. The author proposes a short symbol for a long one to save space and for easier reading).
- 7) A person is 'tall' if he or she is 6 feet in height or greater. (Source: A person evaluating how many tall people are playing in a high school basketball league).

I hope the reader has responded 'true' to the above question. In each case, a linguistic expression, the definiendum, is the subject of the sentence. It is related as being 'equivalent' to a definiens, which is stated with sentences or phrases that already have a meaning (i.e., an intelligibility) to the reader. We'll explore this equivalence.

A Tripartite Theory of Definition

These examples serve as a guide to the 'theory of definition' hypothesized here. A **'definition'** is a sentence that connects a mark or sound (i.e., a definiendum) to a meaningful definiens in the context of one the following three functions:

1) A **'reportive definition'** (or 'lexical definition,' 'nominal definition') reports or describes the generally accepted or community equivalence between a definiendum and a definiens. A reportive definition is correct (i.e., true) if its definiens is an accurate report of the usual sense(s) of a definiendum. A standard dictionary contains reportive definitions.

2) A **'theoretic definition'** (or 'real definition,' 'natural definition,') affirms the standard equivalence between a definiendum and a definiens, but represents an attempt to analyze the 'nature' or 'associated material conditions' of the entity being discussed. Entities designated by a theoretic definition are assumed to have a self-unity, or an independent nature that allows them to have essential properties that may be subject to analysis. In physical science, objects such as water, acid, gold, kinetic energy, mass, electron, gene, protein, and enzyme are thought to belong to 'natural kind' categories. In Philosophy, the concepts of knowledge, truth, justification, mentality, cause, law, necessity, identity, number, explanation, freedom, beauty, goodness, justice, and existence have been treated as having an objective nature. A theoretic definition is correct (i.e., true) if its definiens truly describes instances (i.e., extensions) of the object defined. Attention to evidence, reasons, and arguments is required to establish the truth of a theoretic definition.

3) A **'stipulative definition'** introduces a specialized definiens for a definiendum. This occurs in the following three contexts: (a) the initial naming of an entity where the entity is newly-discovered, newly-introduced, newly-created, or newly-renamed, or (b) in the notational abbreviation of one linguistic expression for another (meaningful) linguistic expression, or (c) in a precise formalization where a reportive definiendum-to-definiens relation is generally affirmed but a definiens alteration (or explication) is proposed for pragmatic, technical, or personal reasons.

The evidential support for the tripartite theory of definition is based upon the observations of speech and writing patterns found in natural and artificial languages. The theory should account for definitions that are found in the physical sciences, mathematics, and elsewhere. All other kinds of definitions (e.g., real, nominal, analytic, ostensive, synonymous, recursive, explicit, implicit, precisising, persuasive, operational, essential, disjunctive, circular, verbal, conventional, intensional, extensional, contextual, explicative, functional, conditional, impredicative, partial, axiomatic, constructive, explanatory, procedural, direct, legislative, discursive, etc.) should be identical to, fall under, be explainable, or refutable under these three primary types. The theory is a hypothesis about the actual limits (and modes) of how persons can specify their use of a linguistic symbol. With introspection and conceptual analysis, the theory is confirmed.

Although there is an ancient distinction between so-called 'real' and 'nominal' definitions, and 'definition' is often briefly discussed amid philosophical inquiries, there is a conspicuous absence of any long-term analyses of the nature of definition as a unified concept.¹ The tripartite theory presented here, is similar to that of Irving Copi and Carl Cohen (2005) in their *Introduction to Logic*, and Patrick Hurley (2009) in *A Concise Introduction to Logic*. It is claimed by these authors that there are *five* kinds of definition classified according to their purpose: 1) reportive definitions, 2) theoretic definitions, 3) stipulative definitions, 4) precisising definitions, and 5) persuasive definitions.² I agree with this functional classification of definition, except that precisising and persuasive definitions are not separate kinds of definition but are species of stipulative definition. It has been said that definitions 'impose boundaries' and we'll inquire how.

With the tripartite theory, it is observed that the above definitions 1 and 2 (about 'knowledge' and 'water') are reportive definitions; definitions 3 and 4 (about 'knowledge'

¹ That there are very few explicit theories of 'definition' is confirmed by several sources. The only book-length treatment of this topic that I am aware of is Richard Robinson's *Definition* (1950). In the December 1993 volume of *Philosophical Studies*, guest editor Marian David, chose 'Definitions' as a topic for article submission because despite their important role in analytic philosophy "there is hardly any literature" about definition. In that same volume, Nuel Belnap (1993) is disappointed about not finding substantial modern theories of definition, especially in texts that are histories of logic. (See appendix for 'history of definition').

² The roots of these theories are attributable to Irving Copi. His articles, "Analytic Philosophy and Analytic Propositions" (1953) and "Further Remarks on Definition and Analysis" (1956) are foundational.

and 'water') are theoretic definitions, and definitions 5, 6, and 7 (about 'Spot,' 'TN,' and 'tall') are examples of three kinds of stipulative definition. If the reader understands this definition of 'definition' (by function) and how the example definitions correspond to the three kinds of definition, then one understands most of this theory.³ Theoretic definitions are often found in physical science theories and stipulative definitions are frequently found in logic and mathematical reasoning. Although this theory is relatively simple, it has important consequences for addressing a number of philosophical issues.

I. Reportive Definitions

The concept of a reportive definition is familiar. This kind needs little elaboration and only a few examples. The truth (or falsity) of a reportive definition depends upon whether the sense(s) attributed to the linguistic entity are in fact the senses attributed to the symbol by a community. The entries in any standard dictionary are examples of reportive definitions. Reportive definitions are intended to be true-to-actual-usage. For example, the standard dictionary definition that 'mountain' means 'a large mass of earth or rock rising to considerable height above the surrounding landscape' is a true report of how English-speaking people use the word. But dictionaries are not the only source of reportive definitions. When asked for the definition of a term, a person can report a definition about the word's usual or standard uses. Reportive definitions, as to be shown below, are the primary input for precisely defining some philosophical concepts.

A language community can consist of large or small groups of people. In a large language community, a term (i.e., symbol, phrase) can come to have an associated definiens that can be subject to a dictionary report or description. New terms and their reportive definitions come into existence frequently. The social media term of 'selfie' gained popularity and was added to dictionaries as 'the action of taking one's own portrait

³ Because I limit interest to definitions of a definiendum-to-definiens form, the theory doesn't characterize the miscellaneous uses of the word 'define' or 'definition.' I am not interested in its complete grammar as illustrated in these sentences: 1) Rock music defines the dress of many of today's teenagers. 2) The black picture frame provides better definition for the photograph against the white wall. 3) The new presidential administration seeks to define its new foreign policy. 4) Diligent work in the weight room has helped the athlete gain greater body definition. Wittgenstein (1953) held an anti-theoretical stance towards analyses, because he believed that ordinary language terms have loose 'family resemblance' relations in their various normal uses and senses. Grice (1989) similarly believes that we can only describe a word's use. In contrast, I believe 'definition' may be examined as a natural kind concept analyzable by theoretic definition.

on a cell phone or other photographic device.' Not only do reportive definitions come into being from wide-spread community acceptance; there are other cases where only a few people constitute a 'language community.' For example, if a particular auto mechanic had nicknames for different kinds of vehicles, and used the nicknames in discourse with his customers, it could be reported by his customers that in this mechanic's lexicon, the term 'fliptopper' means 'an automobile that has a convertible top.' A person's idiosyncratic use of a term can be reported as a reportive definition.⁴

I chose the term 'reportive definition' (as opposed to lexical, nominal, or verbal definition) because 'reportive definition' is descriptive and easy to remember. This term is neutral, while the other terms may carry some unwanted metaphysical baggage.

II. Theoretic Definitions

The second kind of definition is a 'theoretic definition.' A theoretic definition is an assertion that generally affirms the reported equivalence between a definiendum and a definiens, but it also proposes to analyze the 'nature' or the 'associated material conditions' with respect to a particular entity or to a kind of entity. An example of a particular entity whose definiens changed with a change in belief is the concept of 'earth.' The Pre-Socratics believed that the earth was flat, and that the earth was at the center of the universe. For the ancient Greeks, the reportive definition of 'earth' was:

'Earth' is 'the flat pancake-shaped object that we stand upon.'

This definition was true as a reportive definition, but because of advances in travel and astronomy, the definiens and definition of 'earth' was roughly amended to:

'Earth' is 'the round spherical object that we stand on, which is the third planet from the sun.'

⁴ Quine (1953) is in serious error saying that with (reportive) dictionary definitions "The lexicographer is an empirical scientist, whose business is the recording of antecedent facts; and if he glosses 'bachelor' as 'unmarried man' it is because of his *belief* that there is a *relation of synonymy* between those forms, implicit in general or preferred usage prior to his own work" (p. 24, italics added). On the contrary, 'synonymy' is a relationship between linguistic entities (e.g., words, phrases) recognizable as being substitutable within a sentence, without loss of propositional content. The sentences 'Jones is mad,' and 'Jones is angry' mean the same thing, because 'angry' means (i.e., is substitutable for) 'mad' in English sentences. Contrary to Quine, the lexicographer's work is 'empirical' only in the sense of recording the senses of the *reported uses* of a linguistic entity (the definiendum). Lexicographers and dictionaries *do not report* existing *synonymies*.

Theoretic definitions often appear in the empirical sciences. Hilary Kornblith (1993) provides a description of a physical 'natural kind' as a product of 'homeostatic property clusters.' A 'homeostatic relationship' is where a relatively stable state of equilibrium between interrelated physiological factors is maintained, even in the face of changes of environment. The concepts of 'homeostatic causal relationships' and 'property clusters' are likewise developed by Richard N. Boyd (1988, 1991). Below is some text of Kornblith's account of physical natural kinds. He concisely states a view endorsed here:

Natural kinds involve causally stable combinations of properties residing together in an intimate relationship (p. 7). It is nature which divides the world into kinds by creating stable clusters of natural properties residing in homeostatic relationships. Some properties are *essential* to natural kinds because they are part of this homeostatic cluster or an inevitable part of it; other properties of members of the kind are merely accidental (p. 56, italics added).

Kornblith's remarks provide the grounds for 'natural kinds' and 'natural kind entities' as *the epistemic objects* of theoretic definitions. Examples of entities that have essential properties and theoretic definitions are found in physics (electron, kinetic energy, heat, torque, centripetal force) chemistry (acid, salt, gold, other periodic chart elements and compounds), biology (gene, mice, marsupial mice, and octopus), astronomy (black hole, planet), and philosophy (truth, knowledge).

Examples of Natural Kind Concepts

Example #1 (natural kind): 'Electron'- A paradigm example of a natural kind entity is the concept of an 'electron' in physics and chemistry as a subatomic particle.⁵ The name 'electron' was coined by physicist, George Stoney in 1891, and retained its use after the affirmation of the existence of a particle with a negative charge and a certain charge-to-mass ratio. As a theoretic natural kind entity, the definiens of 'electron' has

⁵ The emergence of an electron as a natural kind entity came in response to various empirical and conceptual problems. Although J.J. Thomson is often given credit for the discovery of the electron in 1897 with his experimental work, it is more accurate to think that the concept of an electron was gradually incorporated into the ontology of physics and chemistry as a product of accumulating evidence from the 1890's into the 1920's. Greame Gooday (2001) states that the establishment of the electron as an entity in physics around 1910 was not the outcome of any single set of experiments but occurred as a combination of work in diverse areas such as spectroscopy, electrical conduction, the thermal properties of matter, cathode rays, x-rays, and radioactivity theory.

evolved over the past one hundred years as scientific measurement and concepts have evolved. The concept of an electron is now associated with properties such as quantum numbers, wave-particle duality, indeterminate position-momentum, among others.⁶

Example #2 (natural kind): 'Acid'- An example in chemistry is 'acid.' An acid is defined as 'any chemical compound that, when dissolved in water, gives a solution with a hydrogen ion activity greater than in pure water (i.e., a pH less than 7.0).'⁷

Example #3 (natural kind): 'Salt,' 'Gold' and other Compounds and Elements- Chemists are concerned with 'natural kind' compounds and elements. An example of a natural language concept made more precise by chemistry (similar to 'water') is the theoretic definition of 'salt' as sodium chloride (NaCl). Other chemical examples are readily available, such as 'gold' being identical with the element with an atomic number of 79. In 2010, the periodic chart of chemical elements lists 117 natural kind elements, and each has a unique theoretic definition (by atomic number).⁸

Example #4 (natural kind): 'Mice,' 'Marsupial Mice'- Quine in his essay "Natural Kinds" (1969) says that physical scientists have developed systems of 'kinds' in a trial-and-error process of theorizing, whereby things are grouped into new kinds which lend themselves to better inductions. With respect to the biological similarity of marsupial mice to ordinary mice, Quine says "We all still say that a marsupial mouse is

⁶ The electron is capable of having a 'theoretic definition' that encapsulates its properties (charge, mass, spin) as a homeostatic entity. Buchwald and Warwick (2001) state that the concept of an electron has remained stable during the past century: Unlike the other two fundamental building blocks of atoms- the proton and the neutron, which are now believed to be composed of the more fundamental quarks- the electron has remained a truly elementary particle. The electron's fundamental characteristics- its charge and its mass- have also become better known over time (pp. 16-17).

⁷ Acids can occur in solid, liquid, or gaseous form depending on the temperature, and can exist as pure substances or in a solution. There are *three* competing *theoretic definitions* of acid (Arrhenius, Bronsted-Lowery, and Lewis) which *vary* in terms of *different measurement concepts*. The (objective) homeostatic properties of acids make them instrumental in practical uses. Acids can be used to remove rust and other corrosion from metals. They can also be used as an electrolyte in a wet cell battery, such as sulfuric acid in a car battery. Acids are used as additives to drinks and foods, as they alter taste and serve as preservatives.

⁸ More examples of natural kinds in chemistry and medical science: 1) The hormones of 'testosterone' and 'estrogen' found in the bodies of men and women, 2) In the brain, there exists 'dopamine' which exists as a chemical messenger in the ability to feel pleasure and pain, 3) Scientists have recently detected a hormone called 'glucocorticoid' produced in people's bodies during stressful times, and when produced in excess, can cause skin irritation, 4) Researchers have recently identified a substance 'furanocoumarin' that is found in grapefruit juice, that interferes with an intestinal enzyme called CYP3A, that makes ineffective the absorption of prescription drugs ingested by patients.

more like an ordinary mouse than a kangaroo, except when we are concerned with genetic matters" (p. 129). Although marsupial mice have a resemblance (in appearance) to ordinary mice, they are genetically closer to kangaroos and opossums.⁹

Example #5 (natural kind): 'Centripetal force'- acts inward on a body that rotates or moves along a curved path and directed towards the center of the path or the axis of rotation and is measured $\text{Mass} \times \text{Velocity squared}$, divided by Radius.

Example #6 (natural kind): 'Truth'- The 'correspondence theory' of truth is the most popular theory going back to Aristotle. A simple correspondence theory states: A proposition **p** is 'true' just in case it corresponds to facts or the world. A correspondence theory states that **p** (a belief, proposition, assertion, etc.) is true if it corresponds (or correctly describes) a state of affairs. 'Truth' can be understood as a *natural kind concept* and as a *relationship* between persons and states of affairs (i.e., how things are), or alternatively, it can be *stipulated* as a *property* of sentences/propositions.¹⁰ Another correspondence definition (as a relationship between persons and states-of-affairs) that doesn't use the term 'correspondence' is from A.N. Prior (1971, pp. 21-22): "To say that S's belief that **p** is 'true' is to say that one believes that **p** and (it is the case that) **p**."¹¹

⁹ Kornblith (1993) says that Quine's attention to natural kinds was a precipitating event for recent interest in natural kinds. Kornblith says: "Although Quine did not, of course, introduce the notion of natural kind in philosophy, he did reintroduce it. So far as I can tell, there was virtually no discussion of natural kinds in Anglo-American philosophy in this century until the appearance of Quine's paper in 1969. Even historically important contributions to work on natural kinds were little examined. Aristotle's work on essential properties... was not taken seriously prior to Quine's essay. And Locke's seminal work on real and nominal essence was given even less attention... It is safe to say that things have changed dramatically since that time. The notion of natural kind plays a crucial role in current theories of reference, in philosophy of mind, in philosophy of science, and even in some quarters in ethics" (p. 5).

¹⁰ From the perspective here, philosophers should be primarily concerned with truth as correspondence, and less concerned with evaluating how the *property* of a **p** assumed to be true, relates to other propositions (e.g., implication, entailment, and so on). Too much discussion is centered around logical consequence and possible worlds necessity and possibility. Alfred Tarski's 'semantic conception' of truth, where *truth* is conceived as a *property of sentences* (e.g., in a model) is discussed later in this chapter.

¹¹ Implied in the correspondence theory is an affirmation of '**realism**': 1) the world exists objectively, independently of the ways we think about it, and 2) our thoughts and claims are often about the world. This suggests that propositions can be objectively true or false depending upon how the world is. Is there an alternative theory to the correspondence theory of truth? Until recently, there were none. Alternative theories of truth didn't appear until the nineteenth and twentieth centuries (e.g., pragmatic theory, coherence theory, and deflationary-redundancy theory). None of these alternative theories is widely accepted.

III. Stipulative Definitions

A third kind of definition are those of the 'stipulative' kind. Within the stipulative kind, there are three subcategories: a) initial naming definitions, b) linguistic abbreviations, and c) formalized definiens for pragmatic, technical, or personal reasons.

(a) Initial Naming Definitions

Initial naming definitions, as a form of stipulative definition, have the function of *introducing a new term* to denote an entity.

Example #1 (initial naming): x is 'Jessica Alba' - The initial naming of a child fixes a proper name (i.e., a linguistic entity) to a particular object. For example, Jessica Alba, an American television and film actress, was named by her parents, Catherine and Mark Alba, around the time of her birth on April 28, 1981: 'Our child is named Jessica.'

Example #2 (initial naming): x is an 'Electron'- The name 'electron' was coined by physicist George Johnston Stoney in 1891 that gradually came to be used to refer to the theoretic existence of negatively charged subatomic particles.

Example #3 (initial naming): x is a 'Rigid Designator'- The term 'rigid designator' was coined by Kripke (1980) as a linguistic entity that 'designates the same object in all possible worlds in which the object exists and never designates anything else.' It was introduced as a definiendum to a new fixed-definiens metaphysical concept.

Example #4 (initial naming): x shall be called a 'Frisbee'- Another example of an initial naming definition concerns the historical naming of the 'Frisbee.' The Frisbee is a flying disc that is generally plastic and is thrown and caught for recreation.¹²

Example #5 (initial naming): x shall be called a 'Metre'- In 1675 the name 'metre' was introduced as an idea for a universal measurement unit, by Italian scientist, Tito Livio Burattini. The name was derived from the Greek term 'metron' that means 'a measure.' In the late nineteenth century, the French National Assembly played a role in

¹² The word's history is as follows (from Wikipedia): The Frisbie Pie Company (1871-1958) of Bridgeport, Connecticut, made pies that were sold to many New England colleges. College students used the empty pie tins as a sport and called the discs 'frisbies.' Eventually the disc was produced and marketed by the Wham-O Corporation as the 'Pluto Platter.' In 1957, Wham-O cofounder, Richard Knerr, noticed that East Coast college students were still calling the disc a 'frisbie.' As a way to stimulate sales, he decided to give the flying discs the additional brand name 'Frisbee' (with the same pronunciation). The disc was officially renamed 'Frisbee' by Knerr. The lesson here is that Knerr did not assert a true proposition about what the flying disc should be renamed; he simply had authority to stipulate a name as he saw fit.

helping define the 'metre' (or 'meter' as spelled in America) as being fixed with ostensive reference to the markings on a particular platinum-iridium metal bar, at the temperature of the freezing point of ice. The Assembly guiding the establishment of a standardized unit of length had the respect and authority to introduce a new name 'metre' (a term that had a history of vague and imprecise use) into a technical definiens which had reference to a particular stick. The future use and measure of 'meter' was stipulated by a fixed definiens (viz. the marks on a stick in Paris) by the French National Assembly.¹³

(b) Abbreviatory Definitions

The function of a definitional abbreviation of the 3b variety is the *substitution* of a shorter term (the definiendum) for a longer expression (the definiens). A necessary condition of a successful abbreviatory definition is that it connects a mark or a sound (i.e., definiendum) to a *meaningful definiens*. For any definiendum-to-definiens relationship to have a cognitive intelligibility for persons involved, the definiens must have content that is (to some degree) understandable to the parties involved.

Example #6 (abbreviations): x is the 'Lessee' and y is the 'Lessor'- Legal documents often contain stipulative definitions which are abbreviations. For example, in an apartment rental contract, the 'lessee' (John Smith) and the 'lessor' (Brown Management Company) are defined by the names that sign the contract. The proper names of 'John Smith' and 'Brown Management Inc' are the definiens of terms 'lessee' and 'lessor.' The reportive definitions of 'lessee' and 'lessor' do not change. As a matter of typographical convenience and consistency, linguistic terms ('lessee,' 'lessor') are substituted for proper names of the contracting parties.

Example #7 (abbreviations): 'CFF' means x, 'Late Payment Charge' means y.'- A billing invoice for consumer utility services typically has stipulated definitions of the 3b variety. For example, a natural gas service billing to its customers might use the following stipulative definitions: 'CFF' = 'one hundred cubic feet,' 'Late payment charge'

¹³ Kripke (1980) maintains that this definition of 'meter' fixes a reference, rather than an abbreviation or relation of synonymy. Kripke claims that the speaker that rigidly fixes the definiendum 'meter' to a stick S as the definiens, knows *a priori* that 'Stick S is one meter long at t' (p. 56). While I agree that the initial naming of a 'meter' isn't an abbreviation or a relation of synonymy, I strongly deny (as argued in chapter twelve) that there is any *a priori* knowledge involved with the historical fixed stipulation of 'metre' to a stick as a unit of measurement.

= 'charge that covers administrative and carrying costs of late payments.' As a matter of convenience, a shorter term is substituted for a lengthy one.¹⁴

(c) Precise Formalized Definitions

Precisely formalized definitions involve terms that might already have an established use (and reportive definition) but where a definiens alteration is proposed for *pragmatic, technical, or personal* reasons. The function of a precise formalization is to *modify the definiens* of the *definiendum* for practical application or explanatory detail.

Example #8 (pragmatic formalization): x is 'Wetlands'- An example of a federal government redefinition of the 3c form has occurred in the United States under presidents George Bush Sr. (1991), George W. Bush Jr. (2001), and Donald J. Trump (2019) with respect to the term 'wetlands.' Under revised definitions of 'wetlands' the percentage time that a land is under water (such as a marsh) is increased, which reduces the amounts of wetlands. For example, if a 'wetland' is defined as being under water 30% of the time, and later 'redefined' as being under water 50% of the time, then the land under water 30% of the time, is no longer a protected wetland. This increases available commercial land for business interests to the detriment of the natural environment.¹⁵

Example #9 (pragmatic, abbreviations): 'Light,' 'Low Calorie,' 'Calorie-free'- An example of a set of stipulative definitions that are of the 3c form comes from the United States Food and Drug Administration (FDA). In November 1991, with a concern about what Americans eat, the FDA proposed these (simplified) definitions as summarized by the Associated Press: 'Light' means 'One third fewer calories.' 'Low' means 'Less than forty calories.' 'Free' means 'Less than five calories.' These definitions were proposed to help specify the content of the food so that the labels (light, low, free) are consistent. Manufacturers are required to adopt this terminology.

¹⁴ With these examples, to understand that 'CFF' designates 'one hundred cubic feet' there must be a shared understanding (at least vaguely) of what a cubic foot is. When 'John Brown' is designated as the lessee of a rental agreement in a contract, there must be a person, John Brown, who is the definiens for 'lessee.'

¹⁵ This redefinition of 'wetlands' was *not* based upon any new scientific findings about what constitutes a wetland. Instead, the change of definition reflects a value judgment about environmental protection in relation to the economic benefits and costs of setting aside marginal land. Environmentalists argue that former definitions should be retained because wetlands are important for water quality, wildlife habitat, and protection from floods. In favor of the new definition are the oil and gas industries, real estate agents, land developers, and some municipalities and landowners.

Example #10 (pragmatic, abbreviations): x is a 'Resident'- Consider an actual example of how two states, Illinois and Wisconsin, define the criteria for being a 'resident' of that state for student tuition fee purposes. In the United States, because of tax policies, it is typical for public colleges to charge higher tuition to nonresidential students than to students who are legal residents of the state. It is up to state governments to define what a 'resident' is, for tuition purposes. In Illinois, a person is considered a 'resident' if for *at least six months* prior to enrollment the person is employed full-time by an Illinois employer. In Wisconsin, a person is considered a 'resident' if for *at least twelve months* prior to enrollment the person is employed full-time by a Wisconsin employer. These definitions stipulate what a 'resident' is for pragmatic financial reasons.¹⁶

Example #11 (technical formalization): 'Truth' in a Language- Alfred Tarski presents a 'semantic theory' of 'truth' in "The Semantic Conception of Truth and the Foundations of Semantics" (1944). He sought to make the correspondence theory of truth more precise by defining how 'a *sentence* in a language can be true.' With Tarski's semantic conception of truth, 'truth' is a *property* of sentences (in a given formal model) and sentences are truth bearers. Tarski's interest was to understand how object language sentences can have the extensional property of 'truth' within a system of well-formed sentences using a meta-language. After much labor, Tarski arrives at a definition of 'truth' and 'falsehood,' using a meta-language, with the following definition: "a sentence is true if it is satisfied by all objects and false otherwise."¹⁷

Example #12 (technical formalization): 'Analytic sentence'- The search for a consistent and fruitful definition of 'analyticity' has been a topic of interest for Western philosophers, particularly since the time of Kant. A simple definition is that (a) An 'analytic sentence' is a sentence that is true solely in virtue of the meaning or definition of

¹⁶ After the decision has been made (and it is law) what constitutes a 'resident' for tuition purposes, the definition of 'resident' when published in a financial aid publication is of the stipulative form 3b. In the publication, 'resident' is stipulated to be synonymous with the definiens enacted by the state's government.

¹⁷ The details of Tarski's program and the significance of his refined definition aren't important here. What is important is that Tarski is offering a *definition of 'truth in language L' of the stipulative 3c form*. It is widely agreed that Tarski's stated intention of offering a precise 'theoretic definition' of the correspondence theory of 'truth' was a failure, but his definition of 'true in language L' is appreciated as a (formal) success.

its terms. An alternative: (b) An 'analytic sentence' is a sentence that is true relative to and entailed solely by the fixed definiens definitions in the vocabulary and the syntactical rules of a language *without* the explicit use of any discrete *inference rules*. This alternative definition is discussed below and in greater detail in chapter fourteen.

Example #13 (technical formalization): A '**proposition**' is an abstract object to which a person is related by a belief, desire, or other psychological attitude, typically expressed in a language containing a psychological verb ('think,' 'deny,' 'doubt,' etc.) followed by a that-clause. The psychological states in question are called propositional attitudes. (Source: *The Cambridge Dictionary of Philosophy*).

Example #14 (technical formalization): An '**intension**' is the meaning or connotation of an expression, as opposed to its extension or denotation, which consists of those things specified by the expression. The intension of a declarative sentence is often taken to be a proposition and the intension of a predicate expression (common noun, adjective) is often taken to be a concept. (Source: *The Cambridge Dictionary*).

Example #15 (technical formalization): '**Economic equilibrium**' is a state of affairs where there is no excess demand: a state of affairs in which at the going prices nobody wants to go on exchanging. (Source: Daniel M. Hausman (1984), an economist).

Example #16 (technical formalization): '**Reasoning**' is the mental activity of transforming information to reach conclusions. Reasoning is involved in problem solving and decision making. It is also a skill closely tied to critical thinking (Source: Kemp & Tenebaum (2009), psychologists). Reasoning can be abductive, inductive, or deductive.

Example #17 (technical formalization): An '**axiom**' is an independent foundational prescriptive assertion that underlies a set of stipulative definitions; including the vocabulary, grammar-syntax, and inference rules that measure a specified domain. Axioms cannot be deduced from other sentences in a formal system. An axiom is typically adopted if it helps map (or represent) the physical world (or linguistic discourse) in a fruitful way. (Source: This definition is advocated in chapter seven).

Example #18 (personal formalization): '**Happiness**'- Many personal definitions of 'happiness' have been offered: (a) *Aristotle*, philosopher: 'Happiness' is the meaning and purpose of life, the whole aim and end of human existence. (b) *Sonja*

Lyubomirsky, psychologist: 'Happiness' is the experience of joy, contentment, or positive well-being, combined with a sense that one's life is good, meaningful and worthwhile.
(c) *Ingrid Bergman*, actress: 'Happiness' is good health and a bad memory.¹⁸

Example #19 (personal formalization): Mark Shead's senses of 'leadership' are: (a) a person's being able to guide or inspire others; (b) the process of social influence in which one person can enlist the aid and support of others in the accomplishment of a common task; (c) isn't a position that you hold, but an activity that requires skill.^{19 20}

Summary of the Tripartite Theory of Definition

P.T. Geach (1976) similarly recognizes a difference between *real* (i.e., theoretic), *nominal* (i.e., reportive), and *proposed* (i.e., stipulative) definitions. In the following text, Geach summarizes his intuitions about the concept of definition (pp. 41-42):

It has long been traditional to distinguish between *real* and *nominal* definitions. *Real definitions* aim at marking out a class of things that shall correspond to a natural kind, like gold or acids... We need, then, to recognize the natural kinds of things, and to conceptualize this recognition in a form of words describing a given kind: such is the real definition, which naturally scientists keep on updating. *Nominal definition* on the contrary is concerned with the use of a term. One sort of nominal definition accepts established usage, and is concerned to sort out and characterize as accurately as possible the actual uses of a word; this is the sort of definition you find in a good dictionary—though dictionaries will also contain a certain number of what would count as real definitions, of the sort just described. *Another sort of nominal definition* does not merely accept whatever happens to be the current usage, but constitutes a proposal for tightening up the use of a term; under the proposal, the term would mostly be applied as it now is, but with stricter criteria; or again, the proponent of the definition may suggest that we abandon some current uses and retain only one preferred use.²¹

¹⁸ 'Happiness' may be technically formalized too. In a research study, psychologists Lee Anne Harker and Dacher Keltner (2001) stipulatively defined (as an operational definition) that 'happiness' is to be measured as having a genuine smile (i.e., a 'Duchenne smile' that creates little wrinkles around the outer corner of the eyes). Similarly, there are technical formalizations in psychology for 'intelligence' and 'frustration' while both of these terms are usually deemed as group resemblance concepts when used in natural language.

¹⁹ Mark Shead, (2018, Leadership501.com) says that "No leadership definition is correct, but the careful analysis of multiple leadership definitions can help us better understand what it means to be a leader."

²⁰ Conceptual engineers that attempt to ameliorate 'defective concepts,' such as Haslanger (2000), Capellen (2018), Eklund (2015), and Richard (2014) essentially *prescribe* their 'personal formalizations' to others. It is agreed with Deutsch (2020) that the recent 'hype' of 'conceptual engineering' deserves no attention.

²¹ Carnap often referred to this kind of definition as an 'explication,' where a *stipulated refinement* of an ordinary term (or imprecise concept) is proposed for more precise theories.

In sum, similar to Geach (1976), Copi (1953, 1956, 2005), and Hurley (2009) I have hypothesized the following disjunctive definition for the concept of 'definition' when understanding this concept as a natural kind entity:

- x** is a '**definition**' in a definiendum-to-definiens relationship if and only if it is
- (1) reportive, or
 - (2) theoretic, or
 - (3) stipulative;
 - (3a) an initial naming assertion, or
 - (3b) an abbreviation, or
 - (3c) a precise formalization for practical, technical, or personal reasons.

This definition is a theoretic definition. This tripartite definition is either *true* or *false* as a description of the nature and material conditions of the concept of 'definition.'²² The tripartite theory is a social scientific conceptual truth, which if false, could be disproved by counterexample(s). The challenge for a skeptic is to provide a single counterexample.

Part II: A Theory of Concepts

Until recently, 'concept' was not an explicit item of interest in philosophy. But nevertheless, it was understood as having metaphysical, epistemic, and semantic importance. For empiricists, there were two kinds of concepts. Most concepts and propositions are generated by sense experience (i.e., empirical and *a posteriori*). Other concepts and propositions are a relationship of ideas (i.e., analytic and *a priori*).

Since Rosch and Mervis's journal article, "Family Resemblance Studies in the Internal Structure of Categories" (1975), and Smith and Medin's *Categories and Concepts* (1981), theories have shifted to an understanding of concepts as being psychologically and physiologically determined. A definition of 'concept' accepted by many contemporary psychologists, philosophers, and cognitive scientists is that a 'concept' is a mental representation expressible by words in a language (e.g., Laurence and Margolis, 1999, p. 8). Psychologist Laura King (2010) defines 'concepts' as mental categories that are used to group objects, events, and characteristics (p. 231). Concepts are sub-propositional mental representations that function to categorize entities. It is

²² This definition of 'definition' presupposes an intentionality of sentence use, and that this intentionality is a property of (human) mental systems.

argued below that persons hold mental representations of certain categories (e.g., 'water,' 'chair,' 'triangle,' 'Spiderman,' 'the first person on the moon,' and 'Abraham Lincoln') with associated thoughts (or tacit beliefs) about the entities that these words represent.

The Classical Theory of Concepts

We start with a brief history of concepts. Aristotle brought attention to 'natural kind' concepts where a term (i.e., definiendum) represents an entity (or entities) that are thought to have intrinsic properties and an independent nature. Aristotle said that a definition is an account of 'what a thing is.' We illustrated this thought with theoretic definitions, above, where the objects of these definitions are assumed to have a natural self-unity that can be described (e.g., water, electron, acid, gold, gene, truth, knowledge, and so on). Aristotle was keenly interested in biology and thought that biological items were also natural kinds, and that they could be defined upon a hierarchal form of 'definition by genus and differentia.' For example, in modern times different kinds of 'octopus' may be defined according to their physical traits into classes, subclasses, super orders, orders, genus, suborder, superfamily, and family. Under these classifications, there are umbrella octopi, telescope octopi, glass octopi, blanket octopi, and so on.²³

Plato, a teacher of Aristotle, had a different vision of concepts. Plato believed that all individual objects (natural or mathematical) fall into the types they do, because they participate in a non-spatial, non-temporal perfect abstract *Form*. The definition of a Form (e.g., knowledge, justice, beauty, circle) was thought to be subject to a rational analysis of the intensions (i.e., meanings) of concepts that cover individual objects. Plato's theory of Forms did not distinguish between 'natural kind definitions' and 'mathematical definitions.' Plato discounted physical inquiries as fallible interpretations from our (sometimes) unreliable senses and intellect. Knowledge of the definition of a

²³ Aristotle held that the proper methodology for obtaining definitions of 'substances' was by means of discovering their genus and differentia. Kinds of things were classified according to a hierarchy from very general identifying characteristics to less-general particular identifying characteristics. A complete definition proceeds from genus to species. Recent articles indicate that Aristotle had difficulties developing a consistent concept of definition because he was unable to bring the notions of 'form,' 'matter,' 'essence,' and the method of 'definition by genus and differentia' into a systematic relationship. See Cassidy (1967), Cohen (1981), Deslauriers (1990), Evans (1967), Le Blond (1979), Koterski (1980), and Witt (1989).

Form allows one to know the necessary and sufficient conditions for whether an object participates under that Form and is of a kind.

From the classical writings of Aristotle and Plato, the idea of 'necessary and sufficient conditions' is central to a theory of concepts, such as a definition of 'square':

An entity x is a 'square' if and only if:

- 1) x lies in a plane and is a closed figure.
- 2) x has exactly four straight sides.
- 3) each of x 's sides are equal.
- 4) each of x 's interior angles are equal (at 90 degrees).

Each of the four conditions of this definition of 'square' is necessary for something to be a square and taken together they are jointly sufficient for x 's being a square.²⁴ Definitions that specify individually necessary and jointly sufficient conditions for being x have been called 'analytic definitions.' These defining features, in this view, should not *in fact* be possessed by all and only things that are x ; rather it should be *necessary* (in some sense) that all and only things that are x possess them. Only things possessing all of the defining features can be x , and anything possessing them all is *ipso facto* x . It is a definition where the corresponding biconditional is true in all possible worlds. Murphy (2002) states the classical claims: (1) Concepts are mentally represented as definitions. A definition provides characteristics that are necessary and jointly sufficient for membership in the category, and (2) Every object is either in or not in the category, with no in-between cases. With the law of excluded middle, every statement is true or false (p. 15). On this theory, there are definite (material or abstract) conditions that determine when a concept (or term) properly applies to an extra-linguistic item. Physical scientists, mathematicians, and philosophers are interpreted as seeking necessary and sufficient conditions for the identification of concepts and the classification of items falling under those concepts. The 'classical theory' suggests that concepts are mental representations that encode a necessary and sufficient conditions definition for various entities.²⁵

²⁴ It might be noted that the satisfaction of the first two conditions alone, isn't sufficient, because x could be a rectangle with these two. The first three alone are also not sufficient, since x could be a rhombus (i.e., a four-sided equilateral without equal angles).

²⁵ We will encounter other different explicit conceptions of 'concept' in following chapters, including Frege, Russell, Tarski, and Carnap. Other notable philosophers with various explanations of 'concept' include Locke, Berkeley, Descartes, Leibniz, Hume, C.I. Lewis, Davidson, Putnam, Churchland, and Fodor.

Challenges to the Classical Theory of Concepts

A big problem for the 'classical theory' is that there have been *few* (if any) *successful* analyses of concepts, other than mathematical concepts or very simple concepts. The theory has largely been abandoned especially with Wittgenstein's (1953) introduction of 'family resemblance' concepts and Rosch and Mervis' (1975) 'prototype theory.' With a 'prototype model' of concepts, it is emphasized that in evaluation of whether a given item reflects a certain concept, persons compare the item with the most typical items(s) in that category as a whole (rather than describing a single ideal member). Besides this model, Gregory Murphy, in *The Big Book of Concepts* (2002) also distinguishes the 'exemplar' and 'knowledge' theories of concepts.

But in the defense of a 'necessary and sufficient conditions' analysis for *some* concepts, it has been emphasized here that there are 'theoretic definitions' for many natural kind physical entities e.g., 'water' = H₂O. This definiens is both necessary and sufficient for x to be 'water.' Further, it is argued that the concepts of 'knowledge' and 'definition' may be fruitfully treated as natural kind entities and defined according to some necessary and sufficient (including disjunctive) conditions. Additionally, some group resemblance concepts like 'art' can be given a necessary and sufficient conditions disjunctive analysis of *their standard use*. While it is abundantly clear that *most concepts* are *not* analyzable under a necessary and sufficient conditions approach, *some are*.

Historical Metaphysical Worldviews About Conceptual Frameworks

As stated, 'concepts' function to categorize different kinds of entities. Historically, philosophers have asked, what are the basic entities, categories, and kinds that need to be conceptualized? What kinds of beings exist? Are there necessary truths? What are they? But plausibly, these are the *wrong questions* to ask. These questions take *existence* and *necessity* to be the pivotal concepts in describing the metaphysics of 'reality.'²⁶

A better metaphysical approach, as suggested by Kant, is to study the structure of our thought. Kant believed that metaphysics should be self-reflective and delineate the most general structures of our thought about the world. Metaphysical statements

²⁶ G.W. Leibniz's (1675) rationalist worldview about existence, necessity, and possibility is influential.

shouldn't concern the fundamental structure of a mind-independent reality. Metaphysics should be about the fundamental structure of 'reasoned thought' about reality. Kant believed that the structure of our own thought was accessible to us. Anti-realist metaphysicians believe that there is no independent 'reality' of necessary existents.

Hilary Putnam (1983) similarly, holds a Kantian-like view that *metaphysics* (e.g., about questions of ontology) is a descriptive enterprise *about our conceptual framework*. Our conceptions and beliefs about the world are species relative. Had our physical faculties (e.g., brain, perceptual system, physical stature) been different, we would have very different conceptions of the world. Our thought is always mediated by conceptual understanding and natural language. The traditional metaphysician cannot provide the ultimate structure of reality. Putnam (2004) states that the whole idea that the world dictates a unique 'true' way of dividing the world into objects, situations, propositions, etc. is a piece of philosophical parochialism (p. 51). This Kant-Putnam *anti-realist* methodology of analysis is adopted here.

What is a Concept?

What is a concept and how does it compare to a definition? As understood here, a concept is a *functional physical entity* found in sentient creatures; where in humans they are sub-propositional psychological entities that with extended thought, can be described or stipulated in detail with language. Concepts are not empirical beliefs; they have a different form and function. Concepts function to categorize entities.

Six Kinds of Key Concepts

We now turn to the notion of what kinds of 'concepts' there are. As stated, for a human to possess a concept is to have a capacity for having beliefs about the applicability of the concept in certain contexts. A major scientific goal in psychology is to understand what kind of mental representations there are. Let us pursue this goal by surveying the kinds of concepts discussed among physical scientists, social scientists, philosophers, psychologists, mathematicians, and persons using ordinary language. (There is some 'conceptual engineering' going on here, with improvements meeting theoretical ends).

With consideration of twentieth century discussions in philosophy and psychology, there seems to be distinctions between several main kinds of concepts: (1) natural kind concepts, (2) group resemblance concepts, (3) fixed definiens concepts, (4) fictional entity concepts, (5) definite description concepts, and (6) proper name concepts. Below, we will describe the intuitions that frame these kinds of concepts.

(1) *Natural kind concepts* are about natural kind entities. A natural kind entity is thought to have intrinsic properties (and/or extrinsic properties) with an independent nature. Aristotle recognized that there were certain 'substances' (e.g., animals, plants) that were 'naturally unified' and possess a self-contained form.²⁷ Quine (1969a) and Putnam (1975) revived the concept of 'natural kinds' in terms of having essential properties that can be identified in possible worlds.²⁸ Natural kinds are subject to a theoretical definition where their 'nature' or 'associated material conditions' are analyzed and discovered.²⁹

(2) *Group resemblance concepts* are about entities that have a superficial resemblance or loose similarity; but may not have a set of individually necessary and jointly sufficient conditions that defines the entity as a kind.³⁰ Group resemblance concepts are characterized by *borderline cases* where the term's proper application (in context) may be somewhat indeterminate. According to sources in empirical psychology, group resemblance concepts are mental representations whose structure encodes a

²⁷ A modern Aristotelian view of 'substance composition' is provided by Robin Findlay Hendry (2023) in "Structure, Essence and Existence in Chemistry," *Ratio* 36: 274-288. (A very compelling essay).

²⁸ As described above, Kornblith (1993) offers a physical analysis of natural kinds that involves causally stable combinations of properties residing together in an intimate relationship. It is thought that members of a natural kind possess necessary and sufficient conditions (an essence) for having membership in a kind. The essence contributes to the production of superficial observable properties of the kind.

²⁹ See Eleonore Neufeld (2022): 'Psychological essentialism' is the hypothesis that humans represent some categories as having an underlying essence that unifies members of a category, and in physical entities is causally responsible for their typical attributes and behaviors. We represent some categories as having an 'essence' but leave open what precisely the nature of the essence actually is.

³⁰ Wittgenstein (1953) makes prominent the idea of 'family resemblance' concepts where the referents of certain predicates need not have a set of essential commonalities between them. Wittgenstein's example is that the concept of 'game' includes board-games, card-games, ball games, Olympic Games, and so on. There is no fixed boundary (i.e., necessary conditions) that makes a given activity a game. Instead, the word 'game' has various uses within a language community, and people simply learn the uses of the term.

statistical analysis of the properties that most of their members (or extensions) tend to have. These predicates are sometimes called 'cluster concepts' because there is a cluster of properties associated with entities that fall under a concept or items that fall under these concepts may be associated as being similar to paradigm prototypes or exemplars. Any explicit definition of the content (e.g., principles, characteristics) of a group resemblance concept is what is the same across individual persons, given that there are similar (or identical) characteristic properties in mind for items that are covered under that concept. Examples of group resemblance concepts include 'game,' 'chair,' 'house,' 'toothpaste,' 'friend,' 'mountain,' 'noise,' 'good,' 'rational,' 'poverty,' 'old,' 'rude,' 'democracy,' 'information,' 'explanation,' 'tall,' 'flat,' 'bald,' and 'art' (most concepts).

(3) *Fixed definiens concepts* (i.e., 'closed concept,' 'formal concept') have two characteristics that make up their uniqueness. First, a fixed definiens concept is a term that is stipulatively defined to *unequivocally identify* any item(s) that fall under its definition. The definiens is precise enough to distinctly exclude any entity that doesn't fall under the definition. Second, a fixed definiens concept is stable and not subject to alteration (without creating a new concept). The definiens determines what a term's proper referents (or extensions) are, if any. These terms will all have a *necessary and sufficient conditions* definition for their proper use because either (1) they have been explicitly and deliberately formulated that way (e.g., 'bachelor') or (2) were conceived to have some discoverable fixed definiens (e.g., 'limit,' 'derivative') or (3) defined by a recursive definition (e.g. the 'successor' of ordinal number x is the next ordinal number, or $x + 1$), or (4) are formalized functions (e.g., $(m)x$ is the mother of x for all persons).³¹

With fixed-definiens concepts, *the consistency* of an informative fixed definiens in its relationship to other concepts is sought. Although fixed definiens concepts are

³¹ Frege states in the *Foundations of Arithmetic* (1884) that: "If we are to use a symbol to signify an object, we must have a criterion for deciding all cases whether y is the same as x , even if it is not always in our power to apply this criterion" (section 62). Frege (1903) says that only with defective knowledge is the question not decidable. He maintains that in a formal theory "a definition of a concept (of a possible predicate) must be complete; it must unambiguously determine, as regards to any object, whether or not it falls under the concept (whether or not the predicate is truly assertable of it). Thus, there must not be any object as regards which the definition leaves in doubt whether it falls under the concept... the concept must have a sharp boundary" (Geach, ed. 1970, p. 159). In *Begriffshrift* (1879), every symbol introduced was given a fixed sense and fixed denotation (or extension).

stipulatively defined to unequivocally identify any item(s), or precisely define the item(s) that fall under its definition, on occasions the definiens of a fixed definiens concept is difficult to consistently state, and requires refinement (i.e., explication, concept analysis), so as to be precise, informative, and consistent with other related concepts.

Examples of fixed definiens concepts occur in (a) kinship/gender vocabularies (e.g., a 'bachelor,' 'vixen'), (b) the deductive sciences (e.g., a 'valid deductive argument' is 'an argument where if the premises are true, it is impossible for the conclusion to be false'), (c) grammatical concepts; indexicals/pronouns (e.g., 'I' refers to speaker), (d) the use of connectives (e.g., 'not' is to make negative a given proposition), and (e) miscellaneous instances (e.g., the 'equator' is an imaginary circle around the earth).

(4) ***Fictional entity concepts*** are about entities created (or brought into existence) at a certain time through the acts of an author or storyteller. We ordinarily accept that we can talk about fictional entities to account for the truth of various intuitively true sentences that purportedly refer to fictional things. For example, it can be said that it is true that 'Lois Lane was a friend of Superman.'³²

(5) ***Definite description concepts*** are phrases used to designate, denote, or specify entities that may or may not exist (or may be fictional). The concept of 'the first man on the moon' designates Neil Armstrong. The concept of 'the first person on Mars' designates nothing. The concept of 'poisonous plant for human consumption' has many instantiations. The concept of 'a fat jolly fellow from the North Pole that delivers presents' designates a fictional Santa Claus. The concept of the 'largest known prime number' designates a large number most recently discovered by a mathematician using a computer. 'The oldest man in Australia' designates some person. The concept 'the couch in my living room' designates a particular concrete physical entity (in a context). Definite description concepts can be used to refer to (or assert descriptions of) particular items.

³² A so-called 'fictional realist' position is assumed. That is, it is accepted that there are ontologies of fictional characters in natural languages. An ontology of fictional entities is accepted in order to account for intuitively true sentences that are used to purportedly refer to those fictional entities. Kripke (2011), van Inwagen (1977), and Thomasson (1999, 2003) among many others, endorse the idea that persons can possess the concept of fictional entities, and that fictional entities are a legitimate domain of existents.

(6) *Proper name concepts* are understood to designate or denote particular existing or fictional entities (when used in a context). Several pre-theoretical beliefs:

a) A proper name is normally used in a context where a listener can infer the speaker's intended referent. The same proper name can designate different entities in different contexts. 'Aristotle' when used in one context designates an ancient Greek philosopher. 'Aristotle' when used in another context can designate the late husband of the late Jackie Onassis.

b) Most times a listener can understand that a term designates a proper name concept, even if one doesn't have familiarity with its referent. For example, even if one is unfamiliar with the term 'Godel' when told that 'Godel proved some important mathematical theorems' in a complete sentence, its use as a proper name (referring to a certain mathematician) is inferred.

c) Some entities have more than one proper name. 'Samuel Clemens' and 'Mark Twain' are used to designate the same author of Huckleberry Finn.

d) Fictional entities can have a proper name. 'Harry Potter' designates a fictional character in novels by J.K. Rowling.

e) Persons can use a proper name with very little information about what the proper name designates, and this descriptive information may *not uniquely* designate a single object. If the only thing one knows about the Greek philosopher Aristotle *is* that he was a famous Greek philosopher, the use of 'Aristotle' in a sentence (in context) would designate that unique famous Greek, although there are many other famous Greek philosophers. (This final intuition is controversial and is discussed in detail in chapters ten and twelve).

In viewing these six kinds of concepts as manifested in the brains of humans, we suppose them to be physically instantiated akin to how beliefs, values, and intentions are found (by function) in the brain. Concepts (and associated word meanings, definitions) are mental structures. On the view of concepts as mental representations, persons manipulate mental symbols in much the same way language is the manipulation of linguistic symbols. Concepts allow speakers to use sentences to refer to various 'things.' Concepts allow us to classify things and access memorized information about them.

This distinction of six kinds of concepts isn't exhaustive. Many words fall outside of this categorization and are conceptualized (and defined) only according to their *use*. For example, 'there' is defined by a dictionary as having three senses/uses: 1) as an adverb 'to indicate in or at that place' (e.g., there is the cat), 2) as a pronoun (e.g., there's a pen here), and 3) as a noun (e.g., 'get away there,' 'you take it from there'). Most concepts are defined by their use or are group resemblance; and are explicitly defined in dictionaries.³³

Also, certain terms and concepts evolve with a change in their use. For example, the concept of 'marriage' has recently moved from being a fixed definiens concept (i.e., a legal union between a man and woman) to a group resemblance concept (i.e., a legal union between loving partners of any gender). The concept of a 'planet' has recently moved from being a group resemblance concept to a scientific natural kind (see chapter twelve). The concept of 'truth' as a natural kind concept (i.e., a relationship between persons and states of affairs) has been reinterpreted as a fixed definiens concept by Tarski (i.e., as a property of sentences; or as a truth-in-language L). Concepts are naturally classified according to their function and use by persons, and the use of concepts isn't completely determined as a reflection (nor a representation) of how the world is.³⁴

Let us aptly name this theory as the 'Six-Kinds' theory of concepts.

³³ Optional comment: Wittgenstein (1953) thought that *word meanings* were to be identified with *use conditions*. Strawson (1950) claimed that to talk about the 'meaning' of a word (or sentence) is to talk about the rules, habits, and conventions governing its correct use (p. 328). In short, on a 'use theory,' for a *linguistic expression* to have a *meaning*, is for it to be governed by *rules of use*. Indrek Reiland's essay 'Rules of Use' (2023) attempts to reinvigorate the idea that having a meaning is a matter of being governed by a rule of use and that meanings are to be thought in terms of use-conditions. (From the perspective here, the notion of 'rule of use' is vague, and it is unclear how a 'use norm' can 'govern' over native speakers).

³⁴ Optional example: The predication of 'color' (e.g., the empirical recognition of different shades of 'red' or 'pink') tends to be a 'group resemblance' conceptualization for individuals. Given contingencies in perceptual apparatus, the appearance and classifications of color 'kinds' or 'shades,' may sometimes vary, but the core dictionary definitions of 'red' and 'pink' remain standard. The concept of 'color' has been studied by scientists as a (*theoretic*) 'natural kind' physical phenomenon, and colors have been given a (*stipulative*) 'fixed definiens' definition in terms of wavelengths.

Part III: The Relationship between Concepts and Definitions

In part I, we paid attention to the nature of 'definition' and three kinds of definition. In part II, we provided a speculative summary conceptual analysis of the concepts that frame our thinking about the world and about ourselves.³⁵ In part III, we examine the relationship between natural kind concepts, fixed definiens concepts, group resemblance concepts and the value of the information generated from the precise explication of the definiens of these kinds of concepts.

I. Natural Kind Concepts & Theoretic Definitions

With redundancy, theoretic definitions are instances where an assumed natural kind entity is believed to have some objective condition(s) that are *necessary (essential)* and/or sufficient for its particular instantiation. The 'if and only if' connective found in most theoretic definitions indicates that there are essential conditions. Entities designated by a theoretic definition are believed to have a self-unity, or an independent nature.

II. Fixed Definiens Concepts & Formalized (3c, 3b) Stipulated Definitions

The term 'fixed definiens concept' (i.e., 'closed concept,' 'formal concept') is a kind of concept that has two characteristics that make up its uniqueness. First, a fixed definiens concept is a term that is stipulatively defined to *unequivocally identify* any item(s) that fall under its definition. The definiens is precise enough to distinctly exclude any entity that doesn't fall under the definition. Second, a fixed definiens concept is stable and not subject to alteration (without creating a new concept).

Examples of *initially fixed* fixed definiens concepts (assuming a single sense) are as follows. The definiens determines what a term's proper referents (i.e., extensions) are, if any. These terms all have a *necessary and sufficient conditions* definition because they are formulated that way:

A. Examples within kinship/gender vocabularies:

Example #1: A 'bachelor' is an unmarried male.

Example #2: A 'vixen' is a female fox.

³⁵ This six-kinds theory of concepts denies a principle of naive empiricism: that 'concepts' are a product of the contents of empirical experience or are otherwise analytic. The view that an 'empirical assertion' has content (or meaningfulness) only if it has an explanation in terms of (verifiable) sensory experiences is false. The view that the concept of an 'analytic assertion' (an assertion true solely in virtue of the meaning or definition of its terms) has theoretical value is false. See chapters 12 and 14 for details.

B. Examples of 3b abbreviations within the deductive sciences (logic and mathematics):

Example #3: A '**singular term**' is any word or phrase that designates or purports to designate (or denote, refer to) some one thing.

Example #4: A '**prime number**' is a natural number greater than 1 that has no positive divisors other than 1 and itself.

Example #5: A number n is '**even**' iff there exists an integer k such that $n = 2k$.

Example #6: The point at which two line-segments meet, is called a '**vertex**.'

Example #7: 'x is a **triangle**' if and only if x lies in a plane, x is closed, x has exactly three sides, and x has straight sides.

C. Examples grammatical concepts: connectives, abbreviations, prepositions, indexicals:

Example #8: '**Not**' is to make negative a given proposition.

Example #9: The symbol '**v**' is to be used to designate 'not'.

Example #10: '**At**' is used to indicate a point in time or space.

Example #11: '**I**' refers to self or to a speaker.

D. Miscellaneous fixed definiens concepts in science, social science, ordinary language:

Example #12: '**Relative humidity**' is the ratio of partial pressure of water vapor in a parcel of air to the saturated vapor pressure of water vapor at a given temperature.

Example #13: '**Gross domestic product**' is the total final dollar value of all goods and services produced within a country's border in a given year.

Example #14: A '**turkey**' is where a player makes three consecutive strikes when bowling.

These measurement terms were all, at some time, given a formalized (initially) fixed definiendum-to-definiens relation (3c, 3b) for the systematic measurement of a domain.

The Use of Fixed Definiens Concepts in Mathematics

Logicians and mathematicians as a matter of methodology attempt to formulate precise fixed definiens concepts so that every extension (i.e., object, entity) determinately falls under (or doesn't fall under) the fixed intension (i.e., the fixed definiens concept). Fixed definiens concepts will be discussed in chapter seven.³⁶

³⁶ As will be stated in chapter seven, *not all* fixed definiens concepts are defined by simple initial stipulation. For example, the mathematical concepts of 'derivative' and 'limit' now have precise-formula definiens. Historically, this required mathematicians to research (i.e., precisely explicate) these concepts from their initial less precise stipulative 3c formalizations. Complex 'recursive definitions' and 'definitions of functions' are also stipulative.

III. Group Resemblance Concepts & Precise Stipulative Definitions

Most of our ordinary terms such as predicates, verbs, and adjectives are group resemblance concepts. Group resemblance concepts (and their reportive definitions) are the product of pragmatic human interests and represent entities that have a loose set of identifying properties. In most instances, there is no set of necessary and sufficient conditions that define the concept as a kind. With group resemblance concepts, attention is paid to *how persons use a term* in natural language and its normal application. A precise definition of a group resemblance concept might provide necessary conditions for *when* item **x** belongs to the kind, but the definition might *not* specify *a single condition* as necessary (or essential) for an item to be of the kind. Or it may specify *one or several* necessary conditions. An adequate (precise stipulative) definition of any group resemblance term should fit with people's understanding, and use of the concept.³⁷

Group Resemblance Concepts May Be Precisely Defined According to Use

The definitions of 'game,' 'chair,' 'sports bar,' and 'pain' are examples of how the reported use of these concepts can be descriptively analyzed, but with added precision and clarity. The conceptual investigation of a group resemblance concept sometimes involves around an investigation of persons' intuitive beliefs about the applicability of particular concepts to certain extensions, and ultimately reveals a public concept.³⁸ With

³⁷ In detail, the disjunctive conditions (or unified explanation) for what it is for an entity to be an 'instance' (or an 'extension,' 'denotation') under a group resemblance concept, is determined by what conditions the entity satisfies, or follows, or is consistent with, or falls under, the concept's standard use. The precise definitional question is, what are the (essential) things that are unique and common to the concept, and/or how do they differ from things that do not fall under the concept. For **x** to be a member of a resemblance kind **K** (i.e., under a predicate), **x** must have some disjunctively sufficient conditions to be of kind **K**.

³⁸ J.S. Mill (1882) recognizes a 'group resemblance' definitional analysis: "The inquiry, therefore, into the *definition*, is an inquiry into the resemblances and differences among those things; whether there be any resemblance running through them all; if not, through what portion of them such as a general resemblance can be traced; and finally, what are the common attributes, the possession of which gives to them all, or to that portion of them, the character of resemblance which has led to their being classed together. *When these common attributes have been ascertained and specified*, the name which belongs in common to the resembling objects acquires a distinct instead of a vague connotation; and *by possessing this distinct connotation*, becomes susceptible of definition" (p. 191, italics added).

group resemblance concepts, attention is paid to *how persons use a term* in natural language and its correct application.

Explicitly formalized definitions of group resemblance concepts are judged as *true* or *false* depending on the accuracy of their proposed classification standards for what items (should) fall under a given concept. Clarification and consistency are sought. As was discussed above, a precisely formalized definition may involve a term that already has an established use but where a definiens alteration is proposed for *pragmatic* or *technical* reasons. The function of the formalization is to modify the definiens of the definiendum for practical application or for explanatory detail. We will briefly analyze formalized definitions (or explications) of seven group resemblance concepts.

Example #1 (group resemblance): 'game' -- **x** is a 'game' if **x** is an activity or diversion where some set of non-contradictory conditions is obtained:

- (1) **x** involves a body of rules.
 - (1a) **x** involves improvised rules.
- (2) **x** involves winning or losing.
 - (2a) **x** involves entertainment without winning or losing.
- (3) **x** involves amusement.
 - (3a) **x** involves serious competition.
- (4) **x** involves skill, and a little luck.
 - (4a) **x** involves mostly luck, with little skill.
- (5) **x** involves multiple players.
 - (5a) **x** involves a single player.

A disjunction of some of these ten conditions describes the human activities of engaging in board games, card games, ball games, and so on.

A child throwing a ball against the wall by himself may satisfy conditions 1a, 2a, 3, 4, and 5a. A group of children playing pin-the-tail-on-the-donkey may be playing a game that satisfies conditions 1, 2, 3, 4a, and 5. A world championship chess competition satisfies conditions 1, 2, 3a, 4, and 5. A game of solitaire would satisfy conditions 1, 2, 3, 4a, and 5a. In these examples, there is no exact duplication of material conditions (much less necessary and sufficient conditions) that makes 'ball throwing,'

'pin-the-donkey-tail,' 'chess' and 'solitaire,' as being examples of a 'game'. Wittgenstein (1953) famously called attention to this example.

Example #2 (group resemblance): 'chair' -- A 'chair' is a physical object that can vary in size, color, and material. In order for **x** to be a 'chair' perhaps conditions 1, 2, and 3 are necessary in conjunction with some disjunctive set of additional conditions:

- (1) is an artifact.
- (2) is designed for sitting.
- (3) has a capacity for seating (at least) one person.
- (4) has a back.
- (5) has armrests
- (6) has legs.
- (7) is portable.³⁹

Multiple studies (e.g., Frank Keil 1989) suggest that we privilege functional features when categorizing artifacts.

Example #3 (group resemblance): 'sports bar.' -- An example of a group resemblance concept is 'sports bar.' Historically, the term (and concept) of a 'sports bar' came into popular use in the United States around 1975. Most entities that are commonly classified as a 'sports bar' have televisions and serve alcohol. But just serving alcohol and having televisions is not typically deemed sufficient for an establishment to be called a sports bar. Instead, there is some combination of attractions as having sports memorabilia decor, darts, billiards, foosball, volleyball, sponsorship of softball teams, or jukeboxes that are 'sufficient' for a venue to be called a sports bar. Group resemblance concepts have *human-determined* sets of necessary and sufficient conditions for an **x** to be of a **K**.

But does this open-ended character of the properties that sports bars usually have, leave it impossible to precisely define (or analyze) what a 'sports bar' is? No, there is

³⁹ Details: If conditions 1-3 are conceived to be necessary, they are not jointly sufficient since we would not say that open-air stadium seating on large unmarked concrete steps with no armrests, as examples of chairs. We would say that 'this stadium doesn't have chairs.' Although 1-3 are satisfied, do ordinary adult car seats count as chairs? Whether conditions 1 and 2 are necessary can be disputed. Could we not find a naturally occurring stone that was shaped with a back and armrests and brought home and used as a chair? Condition 3 is necessary, but not sufficient for **x** to be a chair, since a kitchen countertop has the capacity for seating a person, but its satisfaction isn't sufficient for the kitchen countertop to be a chair. The set of conditions sufficient for **x** to be a chair seems to be in context, a disjunctive set of the seven conditions.

again, a disjunctive definitional approach. We determine whether an establishment is a sports bar by observing its properties (and whether they are sufficient) *compared to our implicit concept* of what a 'sports bar' is. Or another way to classify whether *x* is a sports bar is to *compare it to an explicit paradigm* (i.e., exemplar) of what a full-fledged (all conditions) sports bar is (or could be):

'sports bar'-- *x* is a 'sports bar' if *x* possesses a sufficient set of the following characteristics: (1) serves alcohol (necessary), (2) has televised sports (necessary), (3) has billiard tables, (4) has dart games, (5) has sports memorabilia, (6) has foosball tables, (7) has volleyball facilities, (8) sponsors team sports, and so on.

This definition states that having televised sports and serving alcohol are necessary conditions for *x* to be a sports bar. Besides these, there are other sets of (value-weighted) *sufficient conditions* for *x* to be a sports bar. In part, the location of an establishment and the characteristics of nearby establishments (as non-intrinsic, relational extrinsic factors) may determine whether *x* is classified as a 'sports bar.'

Example #4 (group resemblance): 'pain' -- 'Pain' is defined in a dictionary as "a localized or generalized unpleasant body sensation or complex of sensations that causes mild to severe physical discomfort and emotional distress and typically results from bodily disorder (such as injury or disease)."

The concept of 'pain' has been precisely technically formalized (in 1979, 2011) by the International Association for the Study of Pain (IASP). The IASP is a leading association of basic and clinical pain researchers and pain management specialists, and their definition of pain has been widely adopted throughout the world. Below, is slightly edited version of their latest definition and note (it hasn't changed much since 1979):

'Pain' is an unpleasant sensory and emotional experience, associated with actual or potential tissue damage, or described in terms of such damage.

The inability to communicate verbally does not negate the possibility that an individual is experiencing pain and is in need of appropriate pain-relieving treatment. Pain is always subjective. Each individual learns the application of the word through experiences related to injury in early life. Biologists recognize that those stimuli which cause pain are liable to damage tissue. Accordingly, pain is that experience that we associate with actual or potential tissue damage. It is unquestionably a sensation in a part or parts of a body, but it is always unpleasant

and therefore, an emotional experience. Experiences which resemble pain but are not unpleasant, e.g., pricking, should not be called pain.... This definition avoids tying pain to a stimulus. Activity induced in the nociceptor and nociceptive pathways by a noxious stimulus is not pain, which is always a psychological state, even though we may well appreciate that pain most often has a proximate physical cause. (IASP Committee on Taxonomy, 2011).⁴⁰

Example #5 (group resemblance): 'tall,' 'flat,' 'empty' - Ordinary adjectives such as 'tall,' 'flat,' and 'empty' are typically used in a context to grade objects for practical purposes (in comparison to 'short,' 'bumpy,' 'not empty').

(1) **'Tall'**: Whether a person is 'tall' is variable. A person who is 6'4 would be described as 'tall' if the domain of comparison was a group of high school students; but wouldn't be considered 'tall' if the domain of comparison was that of a league of professional basketball players. The truth of sentence '*x* is tall' is in part, judged by *S's standards* and *audience standards* (that are *usually the same*). There are no necessary or sufficient (contextual) conditions for determining whether '*x* is tall,' there are only normative (or pragmatic) standards for judging whether *x* is tall (relative to a domain).

(2) **'Flat'**: Whether a large field is 'flat' is determined in accordance with its proposed practical use. For landing a small airplane on a given field, the field may be deemed flat. For playing a game of croquet among professionals, the same field may be deemed as unsuitably 'bumpy.' In general, 'flat' objects have an appearance associated with prototypes or paradigm exemplars within the domain specified. The standards used by speakers result from a context of attribution, including the intentions and presuppositions of speakers and listeners.

(3) **'Empty'**: Whether a given drinking glass is 'empty' of water, is based on some arbitrariness and context. If the contents are poured out and a few lingering drops remained at the bottom, the glass would still be called 'empty.' There isn't a contradiction in the fact that the glass still has something in it and being empty.

⁴⁰ The concept of 'pain' has received a lot of philosophical attention recently. For example, see *The Complex Reality of Pain* (2020) by Jennifer Corns, and journal articles by Aydede (2017), Kiverstein et. al. (2022), Salomons et. al. (2022), Coninx (2023), and Liu (2023).

Example # 6 (group resemblance): ‘bald’ – This concept is equivalently defined by two standard dictionaries:

- (1) ‘Bald’ - Having little or no hair on the scalp.
- (2) ‘Bald’ - Having a scalp wholly or partly lacking hair.

Both of these are reportive definitions, where the two sentences express the same true proposition about the ordinary use of the term ‘bald’ in the English language.

In practice and context, a wide indefinite set of **S**’s are predicated as being bald. Is there a truth to these assertions? Yes, in most cases, when a sincere **S** says that ‘**S1** is bald,’ **S** is asserting something true. But there is a problem. What about legitimate cases of disagreement similar to the attribution of a ‘flat’ road? The group resemblance response here maintains that there exists *no independent objective* (or metaphysical) *criteria* for *when* the predicate “bald” does or does not apply to any given man, e.g., such as exactly the number of hairs of some length, thickness, and distribution, etc., that will guarantee **S**’s baldness, through all the different patterned possibilities.⁴¹ Although it is most often a matter of truth whether a group resemblance predicate applies to a given **S**, in some other cases where there is sincere and genuine disagreement, the truth of ‘**S1** is bald’ is *indeterminate*.⁴² Again, the content of a group resemblance concept such as ‘bald’ is the same across individuals to the extent that individuals have similar (or slightly variant) characteristic properties in mind for items that are covered under this concept.⁴³

⁴¹ Not everyone agrees with this. This group resemblance response conflicts with metaphysical arguments about ‘vagueness’ from Williamson (1994) and Fine (2020).

⁴² This inclusion of propositions that may be judged as ‘indeterminate’ rather than ‘true’ or ‘false’ is controversial. Classical logic and semantics presuppose that every sentence is either ‘true’ or ‘false’ (i.e., the principle of bivalence). The semantic value of a predicate is thought to be its ‘extension’ (i.e., the set of objects of which it is true). The claim that “bald” is sometimes ‘indeterminate’ in borderline cases is inconsistent with the principle of bivalence, and the claim that it is a matter of ‘truth’ whether a predicate applies to a specific item (or extension). The alleged ‘truth’ of ‘the principle of bivalence’ and the cogency of formal semantics when applied to philosophical problems is challenged in this book.

⁴³ A contextualist such as Stewart Cohen (1991, 1999) has a different explanation of the group resemblance terms ‘tall,’ ‘flat,’ ‘empty,’ and ‘bald.’ Contextualists claim that the truth value of sentences using these terms depends on contextually determined standards. For example, whether the word ‘tall’ applies to an object **x** depends in part on the context of attribution. When **S** predicates ‘tall’ of something **x**, there is typically a contextually determined standard for the application of the term. **S**’s claim is *true* if and only if the designated **x** meets that standard. The word ‘tall’ expresses different properties in different contexts. From the view here, Cohen’s ‘semantic explanation’ of group resemblance concepts in terms of a sentence’s ‘truth-value’ in context doesn’t seem to be a natural explanation.

Example #7 (group resemblance): ‘critical thinking’ – This concept is the topic of *Critical Thinking* written by Jonathan Haber (2020). He supports ‘critical thinking’ as being preferable to decisions made on ‘emotion.’ Haber explains the origins of the concept and introduces several definitions. He says that one skill that researchers and educators agree that ‘critical thinkers’ should possess, is the ability to look at a problem from different perspectives (p. 2). Haber offers this precisely formalized pragmatic stipulative definition from The Foundation for Critical Thinking (criticalthinking.org):

‘Critical thinking’ is that mode of thinking- about any subject, content, or problem—in which the thinker improves the quality of his or her thinking by skillfully analyzing, assessing, and reconstructing it. Critical thinking is self-directed, self-disciplined, self-monitored, and self-corrective thinking. It presupposes assent to rigorous standards of excellence and mindful command of their use. It entails effective communication and problem-solving abilities, as well as a commitment to overcome our native egocentrism and sociocentrism.

Part IV. How Can a Tripartite Theory of Definition Be Verified? (Optional)

While a theory of the six basic kinds of concepts is open to philosophical and empirical debate as to whether it captures basic aspects of our metaphysical and functional linguistic thinking, the truth of the tripartite theory of definition is more clearly verifiable. The tripartite theory maintains that all definiendum-to-definiens relationships can be objectively quantified as falling under these three kinds of definition as based upon a speaker’s intent and the context of the assertion. All other previously identified kinds of definitions should be identical to, fall under, be explainable, or refutable under these three primary types. How can this hypothesis be verified?

In order to verify the truth of this definition of 'definition,' philosophers need to investigate language use in various situations when the notion of 'definition' is invoked as a definiendum-to-definiens relationship. A method of evidential confirmation is to examine previously identified kinds of definitions and determine whether they can be interpreted as identical to, falling under, explainable, or refutable under these three types. Also, if one were to find definition(s) that weren't classifiable as one of these five categories, then the tripartite theory would be disconfirmed (with appropriate strong argument). Let us survey (and respond to) some of the eighteen kinds of definitions

listed under the entry of 'definition' as discussed by Takashi Yagisawa in *The Cambridge Dictionary of Philosophy* edited by Robert Audi (1999):

Real Definition

Cambridge Dictionary: A 'real definition' is the specification of the metaphysically necessary and sufficient condition for being the kind of thing a noun (usually a common noun) designates. E.g.: 'element with atomic number 79' for 'gold.'

Response/analysis: A 'real definition' is best interpreted as equivalent to a 'theoretic definition' where an assumed natural kind entity is presumed to have some objective condition(s) that are necessary (essential) and/or sufficient for its instantiation.

Nominal Definition

Cambridge Dictionary: A 'nominal definition' is the definition of a noun (usually a common noun), giving its linguistic meaning. Typically, it is in terms of macro-sensible characteristics: e.g., 'yellow malleable metal' for 'gold.' Locke spoke of nominal and real essence.

Response/analysis: The distinction between 'nominal' definiens i.e., *about words*, compared to 'real' definiens that are *about things* is a distinction that sometimes equates 'nominal definitions' as '3b abbreviations.' Cohen & Nagel (1934) state:

... a *nominal definition* is an agreement or resolution concerning the use of verbal symbols. A new symbol called the definiendum is to be used for an already known group of words or symbols (the definiens). The definiendum is thus to have no meaning other than the definiens. A nominal definition is a resolution and not anything true or false, and while nominal definitions do not extend our real knowledge, they aid in scientific inquiry... we economize space, time, and attention or mental energy if we use a *new* and *simple symbol* for a group of old familiar ones. (p. 228, italics added).

Besides the claim that the definiens of a 'nominal definition' is about the *use* of a word (i.e., the definiendum) and that the definiens of a 'real definition' is about a thing, the nominal-realist distinction is also associated with 'existence' claims. Sir Thomas Heath (1925, 1956) states that the distinction is sometimes drawn as follows:

...'nominal definitions' are only intended to explain the *meaning* that is to be *attached* to a given term, whereas 'real definitions,' besides declaring the meaning of a word, *affirm at the same time the existence of thing* defined or, in geometry, the possibility of constructing it... (pp. 144-145, italics added).

No matter the exact status of 'nominal definition,' the nominal-real distinction mistakenly suggests that in a definiendum-to-definiens relationship, it is the *definiens* that is the *primary subject* of the definition. This is in sharp contrast with the tripartite theory, where the *definiendum* is always the *subject* of a definition. A 'definition' is conceived as a sentence that connects a mark or sound (i.e., a definiendum) to a meaningful definiens. So-called 'nominal definitions' are understandable in context as *stipulative* (e.g., a 3b abbreviation, a simple symbol for a group of familiar ones) or *reportive* (e.g., "gold" is a precious yellow metal often made into jewelry or coins).

Explicit/Implicit Definition

Cambridge Dictionary: An 'explicit definition' is a definition that makes it clear that it is a definition and identifies the expression being defined as such: e.g., 'Father' means 'male parent'; 'For any x , x is father by definition if and only if x is a male parent.' An 'implicit definition' is a definition that is not an explicit definition.

Response/analysis: A better explanation is that implicit definitions are found as 'axioms' in deductive systems. An 'axiom' is composed of undefined primitive terms and is not provable from other propositions (and axioms) within the formal system. The role of an axiom (and its content) within a formal system is to characterize certain primitive (undefined) terms. The undefined terms of an axiomatic system do not have any definite meaning (other than from their occurrence in the axioms) and may be interpreted in any way that is consistent with a given set of axioms. Axioms can be assumed-true only under a consistent interpretation (or model) that gives meaning to a formal system. In modern geometry, 'point' and 'line' are not explicitly defined. Similarly, in set theory, the words 'set,' and 'element' (i.e., 'set membership,' 'belongs') are undefined terms. Implicit definitions are stipulative, where a consistency of related concepts is sought.

Recursive Definition

Cambridge Dictionary: A ‘recursive definition’ (also called inductive definition) is a definition in three clauses where (1) the expression defined is applied to certain items (the base clause); (2) a rule is given for reaching further items to which the expression applies (the recursive, or inductive clause); and (3) it is stated that the expression applies to nothing else (the closure clause). E.g.: ‘John’s parents are John’s *ancestors*; any parent of John’s ancestor is John’s ancestor; nothing else is John’s ancestor.’ By the base clause, John’s mother and father are John’s ancestors. Then by the recursive clause, John’s mother’s parents and John’s father’s parents are John’s ancestors; so are their parents, and so on. Finally, by the last (closure) clause, these people exhaust John’s ancestors.

Response/analysis: The tripartite theory maintains that all three clauses of a recursive definition are examples of a technically formalized or abbreviatory definition.

Precising Definition

Cambridge Dictionary: A ‘precising definition’ is a definition of a vague expression intended to reduce vagueness. Two examples: (a) ‘snake of average length’ is precisely defined as a ‘snake longer than half a meter and shorter than two meters,’ and (b) ‘wealthy’ is defined as ‘having assets ten thousand times the median figure.’

Response/analysis: Precising definitions are typically stipulated in a 3c pragmatic mode to be unambiguous and consistent. A precising definition extends the use of a reportive definition by including additional criteria to narrow the set of things meeting the definition. Legal definitions are a good example: In Illinois (USA), for public university in-state tuition purposes, a person is considered a ‘resident’ if for *at least six months* prior to enrollment the person is employed full-time by an Illinois employer. In Wisconsin, a person is a ‘resident’ if for *at least twelve months* prior to enrollment the person is employed full-time by a Wisconsin employer. These definitions define what a ‘resident’ is, for the purpose of in-state tuition assessments, without affecting the reportive definition of ‘resident.’ Another example: ‘**x** is an ‘adult’ iff **x** is at least 18 years of age.’

Ostensive Definition

Cambridge Dictionary: An ‘ostensive definition’ is a definition by an example in which the referent is specified by pointing (or showing) in some way. For some examples, ‘kangaroo’ applies to all and only animals like *that*, where *that* is accompanied by pointing to a particular kangaroo. ‘Red’ is *that* color, where the word ‘that’ is accompanied with a gesture pointing to a patch of colored cloth.

Response/analysis: Ostensive definitions are best interpreted as ‘reportive’ in most instances but might be ‘stipulative’ in others (e.g., where a non-standard definiendum is used when pointing to an object for some special purpose).

Persuasive Definition

Cambridge Dictionary: A ‘persuasive definition’ is designed to affect or appeal to the psychological states of the persons to whom the definition is given. For example, a “politician” can be defined as a ‘self-serving manipulator.’

Response/analysis: Another example; “abortion” is ‘the ruthless murdering of innocent human beings,’ as opposed to ‘a safe and established procedure whereby a woman is relieved of an unwanted fetus.’ Hurley (2009) says that “the purpose of a persuasive definition is to engender a favorable or unfavorable attitude toward what is denoted by the definiendum” (pp. 88-89). The term ‘persuasive definition’ was introduced by Charles Stevenson (1944) as part of his emotive theory of meaning. A persuasive definition is an example of a ‘personally formalized’ stipulative definition.

Circular Definition

Cambridge Dictionary: A definition should not be circular. If ‘desirable’ defines ‘good’ and ‘good’ defines ‘desirable,’ these definitions are circular.

Response/analysis: The Cambridge Dictionary doesn’t explicitly define what a ‘circular definition’ is, but it uses the term while stating four traditional rules for making a good definition. In dictionaries, a ‘circular definition’ is defined as a definition in which the definiendum or a variant of it, appears in the definiens, i.e., the definiens relies substantially on reference to the term defined or a close synonym. Textbook examples of

circular definitions: (1) “Science” is the activity engaged in by scientists, (2) “Silence” is the state of being silent. (3) A “compulsive gambler” is a person who gambles compulsively. From the perspective of the tripartite theory, the definition of ‘circular definition’ is a reportive definition and its instances uninformative.

Definition by Genus and Species

Cambridge Dictionary: A ‘definition by genus and species’ is when an expression is said to be applicable to some but not all entities of a certain type and inapplicable to all entities not of that type, the type in question is the genus, and the subtype of all and only those entities to which the expression is applicable to the species: e.g., in the definition ‘rational animal’ for ‘human,’ the type *animal* is the genus and the subtype *human* is the species. Each species is distinguished from any other of the same genus by a property called the *differentia*.

Response: An example of a definition by genus and species is the easiest way of explaining this concept. Let us use the term ‘octopus.’ A reportive definition from a standard dictionary defines an ‘octopus’ as ‘any of various sea mollusks with eight long arms furnished with suckers.’ Biologists interested in species of octopus can classify octopi by genus and differentia. An abbreviated illustration of the classification of different orders, genus, suborders, and families of octopi starting at ‘order octopoda’:

Class CEPHALOPODDA

Subclass Nautitloidea

Subclass Coleida

Superorder Decapodiforms: squid, cuttlefish

Superorder Octopodiforms

Order Vampyromorphida: vampire squid

Order Octopada

Genus Keuppia (incertae sedis)

Genus Palaeoctopus (incertae sedis)

Suborder Cirrina: finned deep-sea octopus

Family Opisthoteuthidae: **umbrella octopus**

Family Amphitretidae: **telescope octopus**

Family Vitreledonellidae: **glass octopus**

Superfamily Argonatoida

Family Alloposidae: seven-arm octopus

Family Ocythoidae: tuberculate octopus

Family Tremoctopodidae: **blanket octopus**

Kinds of octopuses (such as umbrella, telescope, glass, blanket, etc.) can be described by their various natural properties according to this (abbreviated) classification system. The above classification system shows how the definitions of different kinds of octopi by genus and differentia *could* be understood as theoretic definitions about natural kinds.

But there is a contemporary school of thought that biological species categorization is ultimately one of group resemblance and human interests. With Darwin's theory of evolution, related kinds may be more continuous, and less independent or theoretically objective as once assumed. Biological entities are in a perpetual state of evolution that makes their properties fluent. Environmental factors and homeostatic causal processes may alter the (essential) properties of a species.⁴⁴

Summary & Conclusion

With a tripartite theory of 'definition' we have hypothesized that there are seven ways that a definiendum-to-definiens relationship may be specified: (1) reportive, (2) theoretic, (3) initial naming, (4) abbreviatory, (5) pragmatically formalized, (6) technically formalized, or (7) personally formalized. If there are no counterexamples to the postulation of three basic kinds of definitions (reportive, theoretic, and stipulative), then the tripartite theory is a true account of how persons (in context) can specify their intended use of a linguistic entity in a definiendum-to-definiens relationship.

⁴⁴ There is abundant literature about the issues of whether biological species really designate natural kind entities, and the problems of what criteria should be counted to classify entities as members of a species. Kornblith (1993) discusses these problems from a philosophical perspective. Whether biological terms represent natural kind entities (e.g., gene, mice, marsupial mice, and octopus) and are subject to theoretic definitions is left open for debate. It might be that some biological kinds are group resemblance concepts subject to definition analyses based upon their observable (factual) differences.

We have described six kinds of concepts. A theory of concepts is crucial to understanding the purposes of definitions in three kinds of 'conceptual analyses.' The question of what terms represent *natural kind concepts* and have a 'theoretic definition' is an important one. We compared this with *group resemblance concepts* where a precise definiens involves classification standards for how persons use a term in a language. With *fixed definiens concepts* it is the consistency of stipulated fixed definiens definitions and precise formalizations, and their relations that is sought by logicians, mathematicians, and many philosophers. It is contended here that all three kinds of conceptual analyses can be informative.