# THEORIES

Given that language is the means to accomplish many different ends, such as artistic expression, historical accounts, marketing tools, and propaganda, how is written language used to understand ourselves and the world around us?

Language is used to pursue and acquire knowledge through the development of theories.

***Def»****Theory* ≡ a system of meanings used to provide an explanation which is created or formed using only:

- an accepted, well-known (natural) language;
- explicit, standard definitions and language practices which overrule and supplement those of the well-known language;
- explicit, standard assumptions (called axioms)

Remember that Goal III is "the ability to provide an explanation, any explanation, that meets the expectations of the science community for clarity and consistency." Thus, our desire to provide explanations naturally requires that we address what is proper and productive for creating and developing theories.

Below are carefully chosen rules and vocabulary to govern theories in the work we do together on acquiring knowledge.

**Communication: the Active Context for a Theory**

In the Communication Section, we established the importance of knowing the active context in order to determine true and false. What is the context for a theory? For maximum control and clarity, we open up a fresh new context with good boundaries that is not connected to or contained in existing meanings. This task uses the mind's ability to openize.

## BLANK CONTEXT RULE

***A theory begins with the creation of a new blank context.***

What is meant by a "blank context" is one that does not contain existing meanings that have been differentiated and named. Starting with a new blank context assures that the mental workspace where we develop a theory is disconnected and independent from existing names, meanings, and contexts.

This rule is necessary in order to determine what is present. It establishes clear boundaries and prevents enmeshing between contexts.

Consider that the best practice for any construction site is to separate the area where the construction is being carried out from other activities or projects in the surrounding area to have necessary control, efficiency and certainty that things will work the way they are supposed to.

**Construction: Raw Materials, Simple Capabilities, and Axiom Rules**

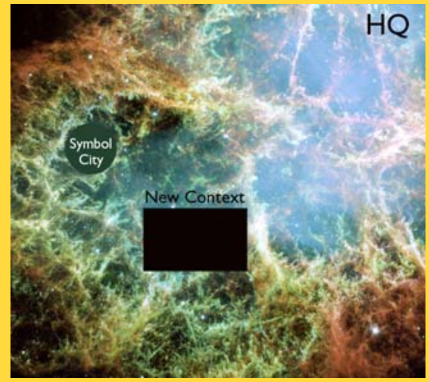
Here we consider the restrictions on Construction within HQ so that a theory will be clear and consistent.

We want to enforce the protocol that construction in a theory context Th must be done using stuff and forces that are present in Th.

This is guaranteed by the Not-Chaos Axiom [A result or restriction is present in a construction site if and only if it has been effected by a force in this construction site.] and the Go Axiom [A rule effects by being present, and a capability effects by being executed so that it uses what is available and appropriate.]

***Def»****To develop in Th* ≡ constructed or defined in the theory context of Th

Given that a theory context starts out blank, we must introduce the first concepts and forces that will be employed. Let these first concepts, capabilities and rules




OPEN A NEW CONTEXT TO START A THEORY

There is a lot going on in a person's mind. The beginning of creating a theory should start by establishing a new context that is empty of noun and verb meanings.

This is the only way to keep track of what meanings are present and which ones are not.


ACTIVITY AT A CONSTRUCTION PROJECT

Just like the case for physical construction sites, our new construction site for explanations needs raw materials (concepts) and capabilities to be delivered.

Note in the image below that raw materials and capabilities are present. Structures, walls and other features are present because they have been produced by activity at the construction site.

A theory has a setting that is like this construction site. It is set apart from all other activity. Axioms determine the raw materials, capabilities and rules that are present at the beginning. Then these are used to develop new concepts and intellectual structures.

Raw Materials

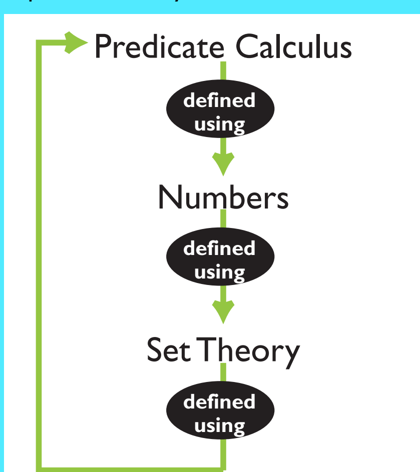
Simple Capabilities

Introducing Initial Meanings

Just like the case for physical construction sites, our new construction site for explanations needs raw materials (concepts) and capabilities to be delivered. Additionally, we can set up rules to govern the construction site.

We call these first concepts, capabilities and rules - that are not created or defined in a theory context Th - *initial meanings*.

Scholars, when left to their own devices - without any rules - have not always made the best choices for initial meanings. As discussed in the Introduction, the selection of initial meanings is critical for achieving clarity, consistency and long-term reliability. Therefore, we need an Intial Meanins Rule to govern this important aspect of a theory.




Example of What Not to Do

The Predicate Calculus of Mathematical Logic is a formal discipline for rigorous deductive reasoning. The initial meanings include an infinite list of variables: $x_1$, $x_2$, $x_3$, etc.; an infinite list of constants: $a_1$, $a_2$, $a_3$,...; plus an infinite list of function letters, $f_i^j$ and an infinite list of predicate letters, $A_i^j$ having a numeric superscript and subscript.

- that are not created or defined in a theory context Th - be called *initial meanings*.

For theories, we don't want ad-hoc uncontrolled materials or capabilities coming and going. We also do not want non rigorous, mushing-together of contexts - rather we want to respect defining boundaries.

For example, consider that math, as it has been practiced to-date, has some important non-rigorous enmeshing between math and geometry. Commonly, in the classroom, standard development of mathematics is done within a context that only contains number concepts (and variables that represent numbers), then sort of out of the blue a *line* and *points* on the line - concepts from the context of geometry - are introduced in order to develop the concept of a real number. The association of numbers to points on the line is done by axiom rule. I submit that this enmeshing of contexts is problematic for achieving the level of knowledge and understanding that are in keeping with the goals of science.

The following rule sets forth the current proposed restrictions for the initial meanings of a theory to achieve our goals of consistency and clarity.

## Initial Meanings Rule

***The initial meanings of a theory Th comply with the following:***

***a) are present in HQ prior to the beginning of Th***

***b) can be listed, such that the list has a beginning and an end***

***c) comply with the Ready Set Axiom***

***d) are transferred into the context of Th via an axiom***

***e) if developed in a different theory, other-Th, then ALL the initial meanings from other-Th must be included as initial meanings of Th.***

(a) enforces avoidance of a situation where Th could be contained in a concept introduced into Th. [In this case the theory would become part of itself, the whole. Such a case violates the difference between part and whole.] This condition avoids conditions that could lead to a paradox.

Consider that if the list does not have a beginning or an end, then communication of the list is problematic for achieving productive work since it is never completed. If an infinite list can be communicated with finite language, then there is a mechanism or means for determining the next item on the list, and in this case the means to effect the next item should be explicitly identified as an initial meaning (simple capability) of the theory. We want to avoid ambiguous or hidden forces. Furthermore, in the past, scholars have used groups of infinite things achieve weirdness, negative results, and magic.[6]

The restriction that the initial meanings comply with the Ready Set Axiom (c) is redundant, for the purpose of emphasis; because this paper assumes that all the work we do together on knowledge complies with all the Axioms/Rules it sets forth.

(d) states that the proper method to introduce initial meanings into a theory context, Th, is by an explicit declaration. Consider the alternative. If initial meanings are not explicitly declared by axiom, there is room for disagreement about the initial conditions of a theory. Making the declaration via an axiom also provides the means to prove that an initial meaning is present.

Initial meanings are either from natural language or from another theory. Part (e) of this rule enforces the idea that a theoretical concept or conforce is dependent on the initial meanings in the context where it was defined or built.

6 An example. It is currently an accepted fact in mathematics that the distance given by any group of countably-many points is zero, while the distance given by a group of uncountably-many points defines distance and in some cases space.
Also consider that the Predicate Calculus of Mathematical Logic has lists of initial meanings, such that each list has no end, via the use of numeric subscripts. Gödel exploits this use of numbers (implicit reliance on to-add-one) to develop a form of circular definition to create a paradox/contradiction.

Consider that this rule does not specify whether a meaning should be taken from natural language or a theory. For example, it is conceivable that one theory developer might take the idea of a line from natural language, and another might use the associated concept from a formal theory of geometry. Consider however, that using the concept from natural language, does not provide the means to specify straight vs non-straight, infinite vs finite, or what it means for lines to be parallel. A line from natural language comes from common (non theoretical) experience such as an under-line, a line in the sand, a line of people at the checkout counter, or yard lines on a football field.

### Definition: Privileged HQ Meanings

Here we consider the restrictions on Definition within HQ so that a theory will be clear and consistent.

Definition processes require some general HQ meanings in addition to theory meanings.

Definition can involve mental capabilities of a general nature, not specific to the theory itself. There could be danger to the integrity of theory meanings, however, if we allow just any HQ meanings to be part of definition activity. We want to take a minimal group of HQ meanings that are just for definition tasks, that support theoretical development and that do not cause problems.

What kind of restriction on HQ meanings will protect clarity and consistency?

1. The meanings must be of a general nature, non-context-specific, available anywhere in HQ.

2. The meanings must be supportive of definition tasks, as identified in the definition section.

Following are the definition tasks as they apply to meanings.

The definition process for a meaning, whether it is used to define some stuff or a force, includes:

- a source that provides access to meaning - a context
- a standard
- the means to separate the meaning that matches the standard from all other meaning
- the means to maintain separation - via a canonical name.

Thus, with this in mind, we turn to some key HQ meanings.

Remember in the previous section on Communication, some conjunctions and prepositions were identified and defined: Not, and, or, if...then, if and only if, of, /, by, which (or such that). We call these *approved-HQ-tools*. We need these.

We also need a generic concept.

*Def»* ❍ ≡ a concept present in the active theory context

The following rule sets forth the current proposed restrictions for the HQ meanings we use to define theory meanings such that a theory/explanation achieves consistency and clarity.

## HQ Meanings Rule

***HQ meanings that can be used to define a theory meaning include: Def», Syn», ≡, ❍, approved-HQ-tools, from...to, to be, to equal, and to patternmatch.***

"*Def»*" signifies that a definition follows. This separates out a definition rule from other communication objectives.

"*Syn»*" signifies that a syntax rule follows. This is useful for specifying how the name of a force is written with respect to the things it uses or acts on.

"≡" signifies that the character string on the left is the canonical name for the meaning standard on the right.

"❍" is an open slot for a noun meaning that can refer to any concept in the active theory context. It involves the mental capability to openize which is available throughout HQ.

Currently, approved-HQ-Tools include the well-known prepositions of Logic: Not, and, or, if...then, if and only if - plus "of," "/," "by," and "which" (or "such that"). Consider the definitions offered in the Communication section. These meanings are


Definition Activity

In defining a theory meaning, we find what we want in the theory's context and then separate it from everything else in the theory, then assign a name to it.

We find that we need certain resources from the mind [HQ] to individuate a meaning and package it in a name.

What is a simple minimal list of HQ tools that we need for this purpose? The current working list is given by the HQ Meanings Rule.

Babu / Reuters

Patternmatching

Make each one according to the same pattern. Making something according to a pattern is a pretty common human activity. And we can recognize when something matches a pattern and when it does not.

Danish Siddiqui / Reuters

Making Well-Defined Things from a Source of Undifferentiated Stuff

This person is taking undifferentiated stuff (laterite dust) to make bricks.

A theory context provides a source of undifferentiated meaning that is a source for making the meanings that we assign to names.

not context-specific and they provide the means to connect meanings for setting forth a standard. Are there any other prepositions that need to be included, and should the non-Logic prepositions be allowed?

"From...To" sets forth a direction and is useful for defining a force.

"To be" can be used only when it is used as a copula to link subject and predicate. In this case, it's role is in keeping with the approved-HQ-tools. We recognize that "to be" has had meaning specific to the context of philosophy, but this sense of the word is rejected for theoretical work. The truth table offered for "to be" provides the means to unabiguously determine present versus absent for a declarative statement using this meaning.

"To equal" [=] is used to indicate that a name and another name refer to the same meaning. Historically, "to equal" has been used primarily in the context of math, but this paper defines it so that it is meaningful for any context. Scholars have found it to be a clear-cut useful meaning.

Consider why "to equal" is so useful. An existing name provides a kind of separation from everything else. (It is the package that contains the meaning.) "To equal" provides the means to use the existing separation involved in an existing name - to establish a boundary, or separation, that can be employed for defining a new meaning.

"To patternmatch" [#] is used to indicate that a meaning and another meaning fit the same pattern.

Just like "to equal" is useful for establishing a single boundary (associated with an existing name) that can be employed for defining a new meaning, "to patternmatch" establishes multiple boundaries associated with an existing pattern. The multiple boundaries with the associated relationships of the pattern sets forth defining boundaries that can be employed for defining a new meaning. (This will become more clear in the context of math as I develop it in 1/+ Theory.)

Scholars can decide if the list provided in the HQ Meanings Rule is sufficient or whether other HQ words will gain approval for use in definition standards for a theory meaning.

## Construction Techniques

The following construction techniques are useful for creating theory meanings whilc supporting our goal for clarity and consistency.

### Do·Steps

Take a capability and apply it to an available concept. This is a do·step. It produces a result. The result is present in the theory's context [Not Chaos Axiom].

Based on historical precedent, the order of do·steps is shown via parens.

*Definition of a language practice:*

> A do·step that is enclosed by parens, ( ), or brackets, [ ], is executed prior to other do· steps referred to by characters outside of the respective parens, or brakcets.

### Construction Templates and Patternmatching

Consider a pizza as a kind of pattern. We can swap toppings, say mushroom instead of pepperoni. So in this case, pizza{crust, sauce, pepperoni} # pizza{crust, sauce, mushroom}. We can also use a construction template and swap capabilities. For example, instead of deep-frying potato slices, we could treat them with oil and bake them. In this case, potato-crisp{slice potato, deep-fry, cool} # potato-crisp{slice potato, treat-with-oil-and-bake, cool}. An established pattern provides a means to create new things via substitution. The substitution can be with respect to stuff or a force.

## Definition Techniques

The following definition techniques are useful for defining theory meanings while supporting our goal for clarity and consistency.

### Defined by Construction Do·Steps

Show how to construct something and assign it a name. The construction process provides the means to determine that the resulting concept is present. Thus, the Stuff Axiom is satisfied.

### Inductive Definition

This is a special case of being defined by construction to·do steps. An initial meaning is given, then a capability is applied to this initial meaning, then the capability is applied to the result, then the capability is applied to that result, and so on, indefinitely.

Example: natural number ≡ 1, and ❍ such that ❍ = natural number + 1

### Fill-in-the-Blank Method

It turns out that even though a theory context starts as blank, it inherits from the mind a source of undifferentiated homogenous meaning. (Apparently, any place in the mind offers a source of meaning.) In other words, a theory starts with no differentiated meanings that are packaged in words, but it has a kind of resevoir of undifferentiated meaning that can be tapped for definition processes, to form differentiated meanings. [This will become more apparent when you see this definition method applied in an actual theory.]

This is the method that is employed when a reader comes across a new, unknown word and learns it from how it is used in the active context.

It is also the method that is used for defining the concept of zero in the Context of Math:

zero ≡ ❍ such that 1 + ❍ = 1

People in ancient history had a hard time accepting this concept because it was unlike any counting numbers, it did not match anything physical. Over time, however, scholars recognized that this is a meaning is available in the Context of Math, it is well-defined (and useful).

## Putting Theories Together

Sometimes it is advantageous for knowledge acquisition to combine/merge theories. An example is provided by Analytic Geometry. Mathematics is a theory which principally develops knowledge with respect to numbers. Geometry is a separate theory which develops knowledge with respect to spatial relationships. Analytic geometry is a theory which combines the meanings of both number-related mathematics and geometry. Thus, scholars develop and use the theories of numbers and geometry separately, as well as the theory which is a combination these, namely analytic geometry.

To put theories together, check whether the initial meanings of each theory comply with the Ready Set Axiom, and check to make sure that the axiom rules do not violate each other.

If these conditions are met, then execute the following. Establish a blank context in an unoccupied part of the mind; determine that the axiom rules of all the designated theories are present in this new context; take the initial meanings of each theory to be merged and put copies of these meanings in the new, combined context.

The initial meanings of each theory are subsequently present in the new context. All that could be constructed in each individual theory can be constructed in the new, combined theory. If concepts from one theory are appropriate for the capabilities of another theory, then additional construction opportunities are available. New sequences of do·steps are also available.

### Summary Regarding Communication

In summary, the activity of developing a theory is about establishing a context, then doing construction and definition work within the context.

A theory starts with a blank context. Initial meanings are carefully chosen following the Initial Meanings Rule and transferred into the blank context via axiom. Definition work employs theory meanings plus some special general-use HQ meanings.

A context (any active context), i.e. a construction site in a person's mind, has undifferentiated meaning that can be used to create/learn new meanings via a definition technique we call Fill-In-The-Blank Method.

We have the ability to put certain theoretical contexts together to create a kind of compound theory.

**THIS CONCLUDES THE DEFINITION OF PLACE OF UNDERSTANDING**