



kitchen blender, and the sun. Definition of a force requires:

Z. *access to a source of activity and change* in which the force being defined is active, such as:

- a work area in which a person actively works with a hammer
- a kitchen in which a person is using a blender
- physical activity on Earth’s surface

Y. *a standard* which is unique to the force being defined, such as a direction of succession:

- from: boards and nail, to: board joined to board by the nail
- from: some foodstuff with a given structure, to: a homogeneous mix
- from: darkness to: light

X. *the means to separate* that which matches the standard from that which does not match, which is given by the means to separate: a) initial conditions before force is active, then b) what the force effects as an output, and the means to distinguish (a) then (b).

W. *the means to maintain separation*, that is the means to maintain a consistent direction of succession for this particular force versus all possible change.

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

- a source that provides access to the desired something
- a standard
- the means to separate the desired something that matches the standard from everything else
- the means to maintain separation.



#### FAILURE TO MAINTAIN SEPARATION

The means to maintain separation between the boards and everything else failed due to a railway accident. Some boards still match the desired standard, but some do not. [picture by Chris Carlson / AP]

## Order Versus Chaos

We’ve looked at some examples of successful definition processes. And we have observed some aspects that are common between these examples. Another observation is that these definition processes assume the ability to maintain order.

The ability to separate involves patternmatching, and the ability to maintain separation involves making restrictions; these in turn depend on a consistent state of order. The best way to get at a deeper understanding is to look at the opposite of order.

Imagine a place where anything could happen... a place where different people could occupy the same location at the same time, things could spontaneously appear and disappear, and a grown plant could sequentially precede the sprouted seed it comes from. Any attempt to maintain separation between different things or actions would not be successful.

In such a scenario, there are no reliable boundaries. Everything gets mixed up.

**In such a place, we can only grab on to the whole setting, i.e. everything, or nothing.** There are no consistently distinguishable parts, elements or activity.

## Vocabulary and Assumptions

Following are some carefully chosen assumptions and vocabulary to govern the definition work we do together.

Note: In order to convey these principles and standards, the word “something” will be used. “Something” is a pronoun. It is used to refer to any meaning, it could be a noun meaning or a verb meaning.

The following definitions are in the spirit of common usage (natural language), while aiming for more precision in service of our goals.

*Def* **Rule** refers to the means to effect a limit or restriction.

*Def* **Chaos** refers to a setting in which all rules, limits and restrictions are absent.

*Part...* **whole distinction:**

*Def* **Part** refers to that which is not all and not none.

*Def* **Whole** refers to that which is all.

*Separation:*

*Def* **Separate** Something is *separate* from something else iff no part of something is a part of something else.

*Def* **Joined** refers to not separate.

The ability to distinguish between what something is and what it is not is an ability that shows up early in life. Consider that a baby can identify his or her mother versus everything else. A baby clearly knows his or her Mama versus everything that is not-the-Mama.



Baby girl with her mother

The clarity we want for science requires that a definition separate the something being defined from everything else - no ambiguous gray area.

In working together on knowledge, definitions must enable us to distinguish between what something is and what it is not - to distinguish when something matches the standard and when it does not. If this is not the case, then the noun meaning, verb meaning sentence meaning, or idea is like a chaotic setting, it is equivalent to everything or nothing. This is formally stated in the following axiom.

## NOT-NOTHING ASSUMPTION

***Something is not everything or nothing if and only if something is separate from not-something.***

This assumption claims that if what-something-is joins with what it is not, then how it differs from everything or nothing is ambiguous.

“Something” is a pronoun that refers very generally to any possibility. Let X be a symbol to represent “something,” then this axiom can be expressed:

X is not [everything or nothing] iff X is separate from not-X.

For example, the color black is separate from all that is not black. If black is not separate from all that is not black, then sometimes white could be black, joy could be black, teaching could be black, or music could be black.

A unique verb meaning also needs a distinct identity. For example, we'd can make a clear distinction so that the force 'to mix concrete' is separate from 'not to mix concrete.'

## FORCE ASSUMPTION

*The definition standard for a force provides the means to determine a direction: from what it acts on, to what it effects.*

This assumption claims that the means of identifying a unique a force is given by the direction associated with change from one state to another state.

For example, (see sidebar) the defining-limit of the force provided by a mixer is from: separate stuff in the bowl, to: stuff joined together uniformly. Activity or change associated with this direction (to mix) can be distinguished from other types of activity and change (not-to-mix).

## STUFF ASSUMPTION

*The definition standard for some stuff provides the means to determine if it is present or absent.*

This assumption claims that the standard for some stuff provides the means to determine the difference between it's presence and it's absence.

For example, [see sidebar] consider the presence of the sun versus its absence. Does the identity of the sun include the heat we feel lying on sand at the beach? The canonical academic definition of "sun" should provide a unique, authoritative means to distinguish between the sun and all that is not the sun.

Similarly, the presence of joy (a noun meaning) is different from the absence of joy and the separation

between the presence and absence of joy provides the basis for a definition standard.

With respect to personal knowledge, an individual supplies the authority for determining definition standards. With respect to the knowledge base of society, a community of respected scholars supplies the authority for determining definition standards.

*Maintaining separation:*

*Def* Something is *contained in* [abbreviated  $\subseteq$ ] something-else iff whenever something else is present, then something is present.

For example, chocolate chips are contained in chocolate chip cookies. Hydrogen is contained in the sun, Or hopelessness is contained in depression.

*Def* *To violate* refers to breaking or damaging a rule, restriction, or definition so that it does not effect in keeping with its standard.

For example, when a person drives faster than the speed limit, then he or she violates one or more traffic rules. If the ability to maintain separation with respect to a definition process fails, then the corresponding definition rule is violated.

*Definition standards related to a force:*

*Def* The *domain* of a force refers to all that can be affected or used by the force.

*Def* The *scope* of a force refers to all that can be effected by the force.

*Note* that a rule is a force, since it is a means to effect. **A rule is a force whose definition standard is from: randomness, to: consistent order.**

*Def* Something *requires* something else iff something else must be present before the something can either be present or effect.

*Def* Something *satisfies* a requirement iff the presence of something supplies that which is required, i.e. that which must be present.

*Def* Something *complies* with a force iff a) the something is contained in the domain of the force and is affected so that it produces the effect that satisfies the force's standard direction, or b) it is not contained in the domain of the force.



### FORCE EXAMPLE

The standard for to mix is given by a direction from: separate stuff in the bowl, to: stuff joined together uniformly.

To pour might be defined by the direction from: liquid in a container, to: liquid being transferred out of the container in a steady stream.

We can distinguish the difference between to mix and to pour.



### STUFF EXAMPLE

The standard for the stuff that we call the sun should provide the means to determine the presence of the sun versus its absence. The standard should provide the means to distinguish between the sun and all that is not the sun.

### CANNOT SEE/DETERMINE BOUNDARIES

Where does one thing begin and another end? The identity of distinct things is ambiguous.



smog-covered cityscape

