

Garden of Knowledge

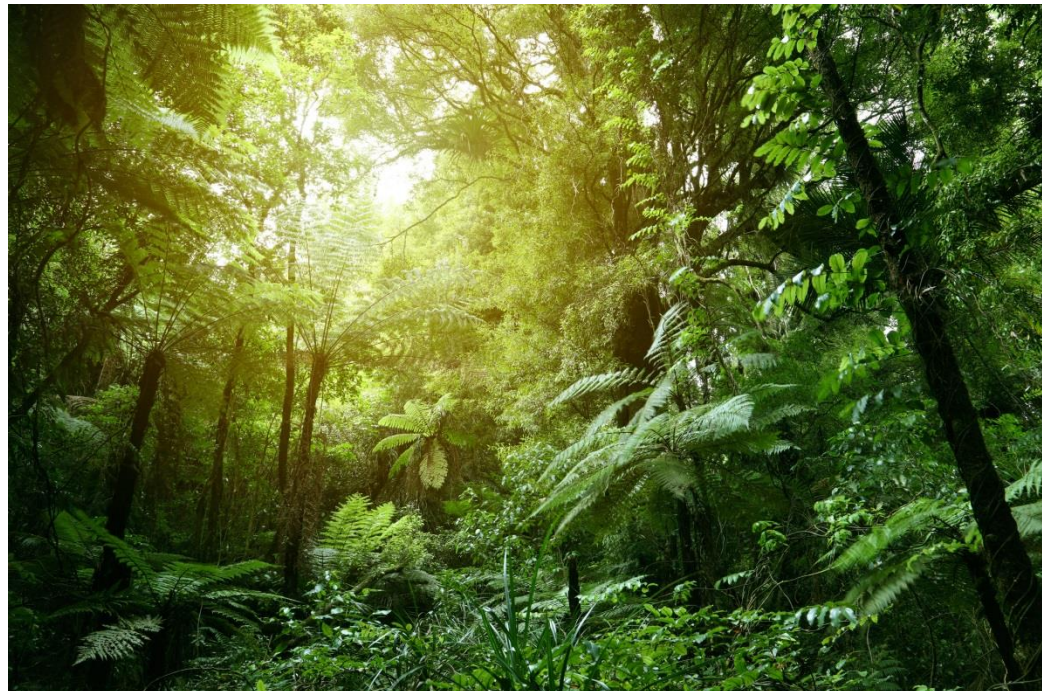


Its a Jungle In There



Formal, species grouped, manicured to within an inch of its life – a nice picture, but probably not an accurate analogy of your knowledge structure

Undisciplined, mixture of old growth slowly rotting , and riotous new growth – probably more accurate, but you are still maintaining it using the operations of gardening – planting out, pruning, grafting, trellising – so we'll call it a garden



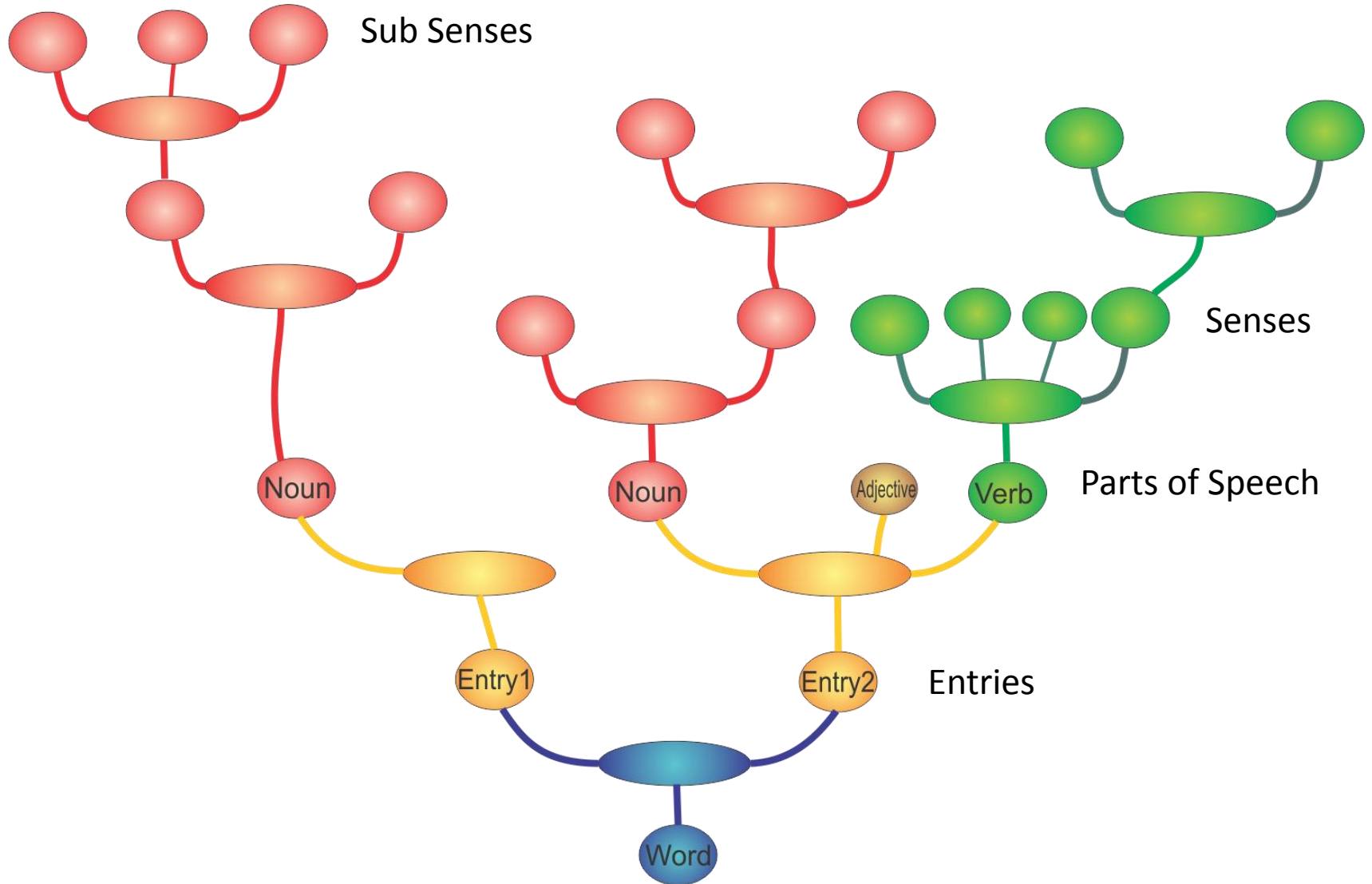
How Does Your Garden Grow?

The current research effort is to use a dictionary to allow a blind, deaf system to find its way in the world.

That means it needs to understand how a dictionary works – the implied context, when a meta-instruction is offered instead, and the limitations on any human-curated system.



A Word as a Bush



One Word – Many Parts of Speech

| Word | Adjective | Adverb | Conjunction | Noun | Preposition | Pronoun | Verb Base Form | Present Participle | Present Tense | Past Participle | Past Tense | POS Count |
|----------|-----------|--------|-------------|------|-------------|---------|----------------|--------------------|---------------|-----------------|------------|-----------|
| Like | X | X | X | X | X | | X | | X | | | 7 |
| Down | X | X | | X | X | | X | | X | | | 6 |
| double | X | X | | X | | X | X | | X | | | 6 |
| back | X | X | | X | | | X | | X | | | 5 |
| bet | | | | X | | | X | | X | X | X | 5 |
| bound | X | | | X | | | X | | X | X | X | 5 |
| beat | X | | | X | | | X | | X | | X | 5 |
| Near | X | X | | | X | | X | | X | | | 5 |
| shut | X | | | | | | X | | X | X | X | 5 |
| Till | | | X | X | X | | X | | X | | | 5 |
| abstract | X | | | X | | | X | | X | | | 4 |
| better | X | X | | | | | X | | X | | | 4 |

About 65 different groupings,
with membership ranging from 10,000 down to 1

One Word – Many Meanings

| Word | Meaning Count |
|-------|---------------|
| Level | 29 |
| Raise | 29 |
| Drag | 30 |
| Front | 30 |
| Hit | 30 |
| Shoot | 30 |
| Sound | 30 |
| Good | 32 |
| Range | 33 |
| Tag | 33 |
| Press | 35 |
| Rise | 41 |
| Run | 74 |

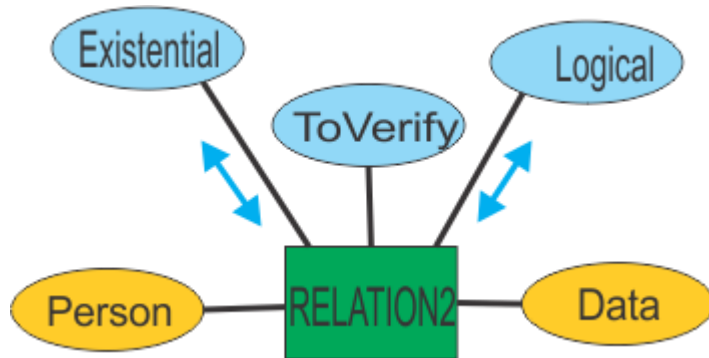


Integration and Compression

A dictionary provides a separate definition for each word and each part of speech, and the user is expected to integrate them, so a noun, a verb, an adjective, an adverb which are essentially describing aspects of the same thing share knowledge structure as much as possible.

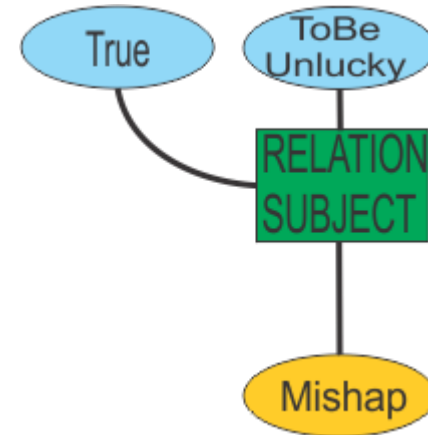
We are using about half a million words for definitions, so compression by sharing structure is also essential

Cutdown Relations



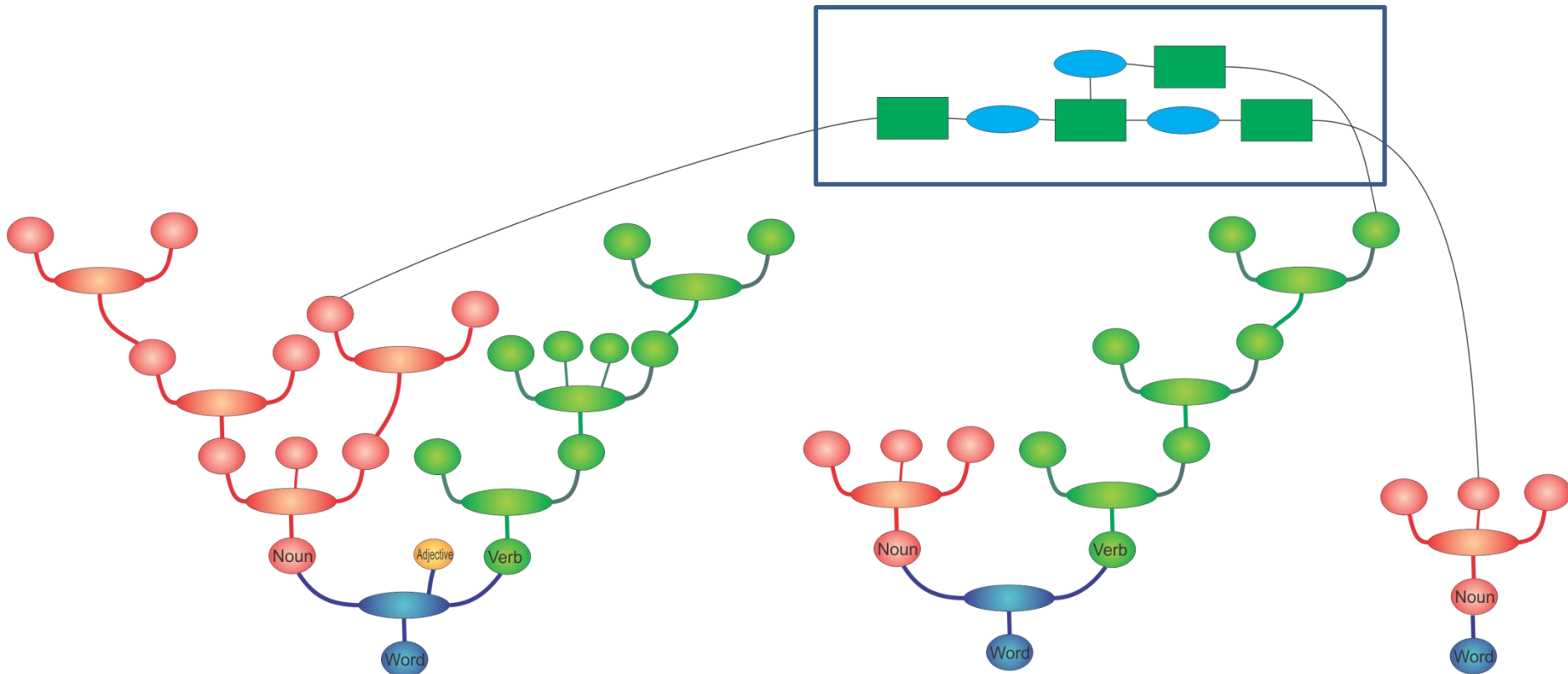
A relation in its full finery,
with logical and existential
connections allowing for
search or assertion

(not quite -
there is a fancier version for
“he wants to know”)



Almost all dictionary
definitions are
unconditional
- A relation stripped
to the minimum

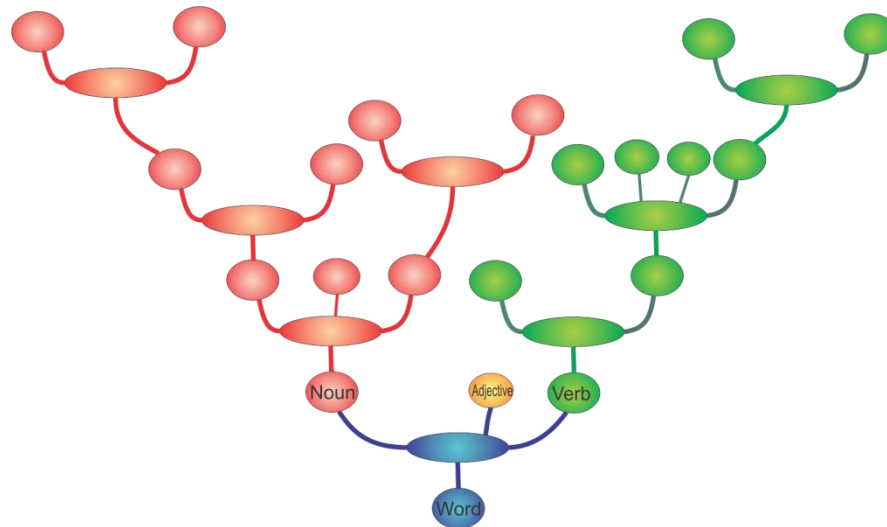
Forming a Relation



A new knowledge structure is formed
by connecting it to specific meanings of words

Chicken and Egg

Most words have multiple meanings – how are the definition structures for words created if words on average have three definitions, and some have more than seventy definitions?



It's an interesting problem,
but we can't allow 20 years for the structure to form

A Larger Egg

A bootstrap approach can be used, starting with words having a single definition, then including words that have multiple definitions, but only one per part of speech.

Words made up of morphemes (un|event|ful|ness) and compound words (wave|length) can also be included in the starter set.

| Type | Count |
|---|-------|
| Single definition | 15% |
| Single definition per POS | 7% |
| Pointer words (“of or relating to ...”) | 6% |
| Morpheme/Compound word | 20% |
| Total | 48% |

Pointer Words

Synonyms – Word points to Word

Synonym with Modifier

Pointer Pairs

Morphemes

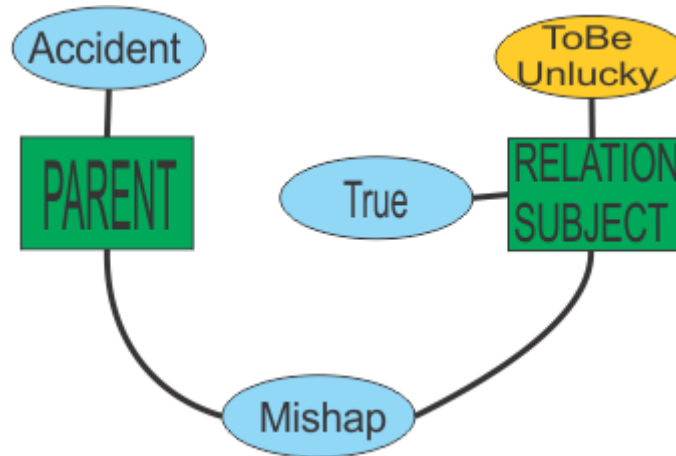
Mapping

Word to Structure

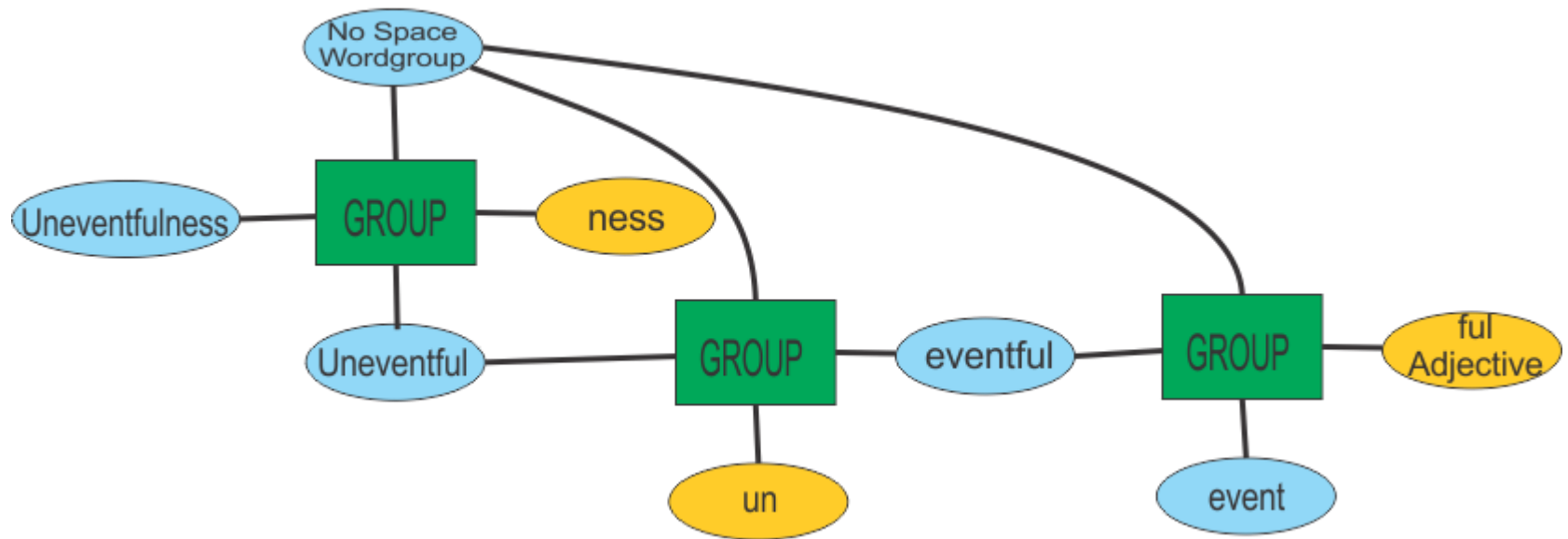
Synonym with Modifier

Mishap

Definition: unlucky accident



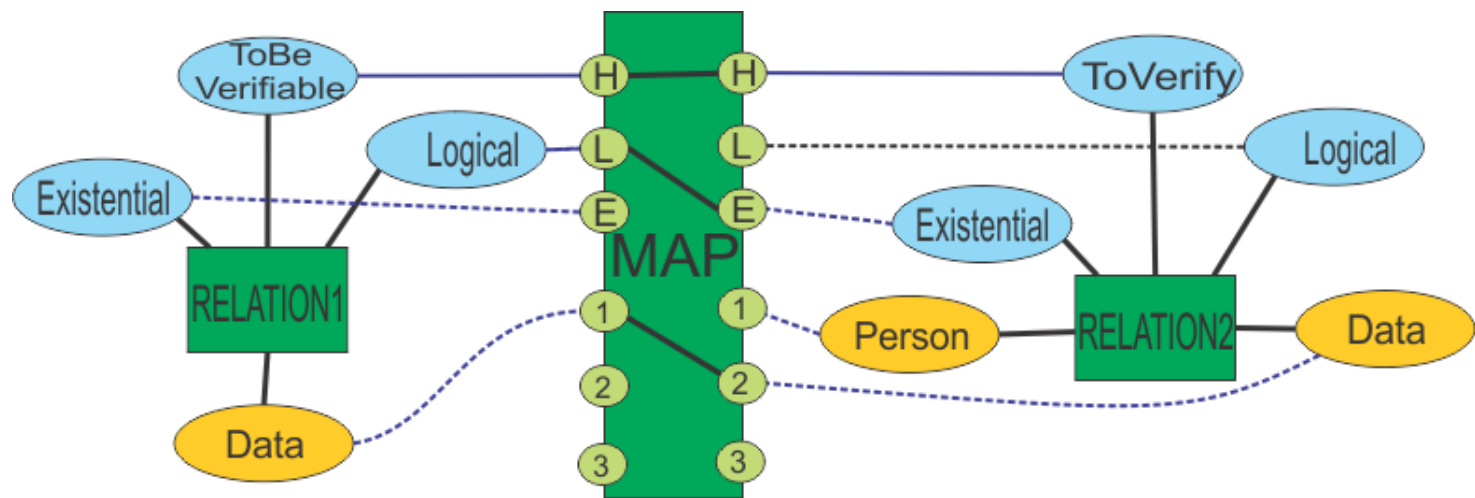
Morphemes



Doesn't always work – a negated form may have picked up an additional meaning,
or the positive form has died – “unkempt”

Mapping

A map can single out or rotate the parameters of a relation and link from logical to existential



Sometimes it doesn't work – ToBeFashionable \neq ToFashion

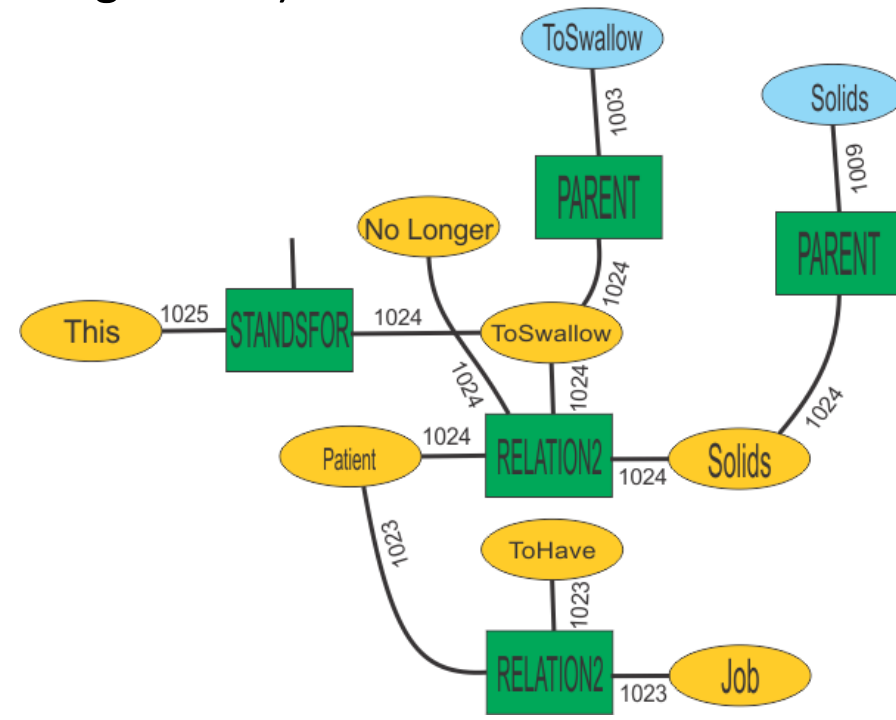
A Word Pointing to Structure

This is a more difficult case – the structure is part of a much larger structure, and needs to be bounded.

Links in the structure have an origin – the statement that built that part. We can use this origin to link a word to a structure.

This has the right sort of associative “cloud” feeling about it, with a clear boundary (if the link origin isn’t 1024, you can’t go there).

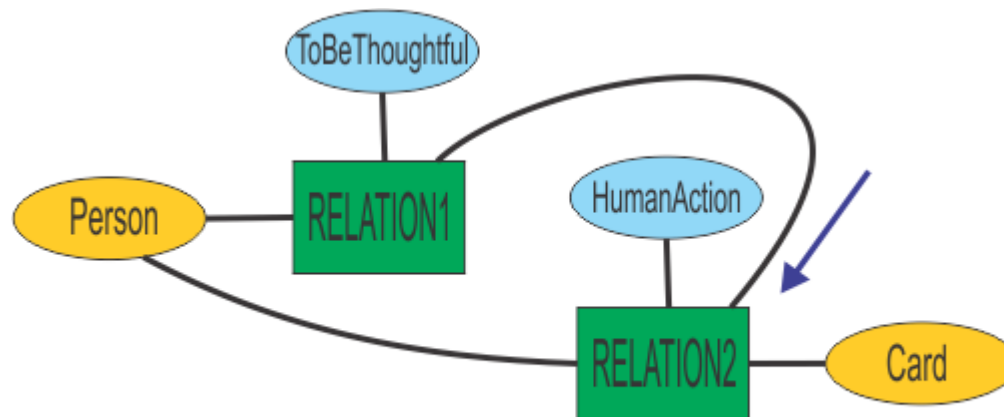
| Statement | Origin |
|---|--------|
| The patient has a job in marketing. | 1023 |
| The patient can no longer swallow solids. | 1024 |
| This is causing him some discomfort. | 1025 |



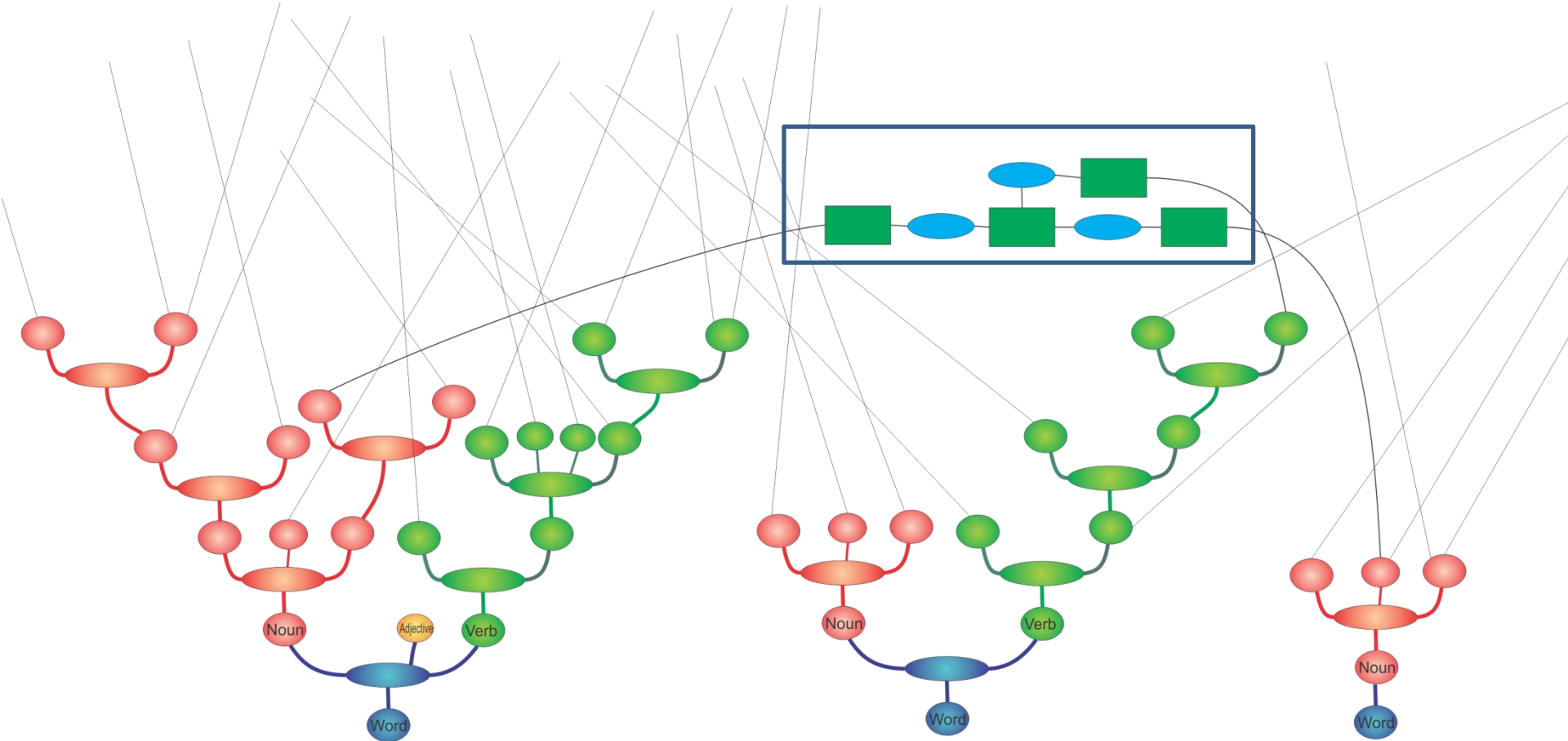
The Card Was Thoughtful

A card can't be thoughtful, so we have to assume there was human action involved, such as buying it, writing in it or sending it, which was thoughtful.

We can't always take subject and object of a relation literally – we need to assume other agency. This is going to be a problem when determining a meaning among many meanings – “run” with its 74 meanings, for example.



Words Used in Knowledge



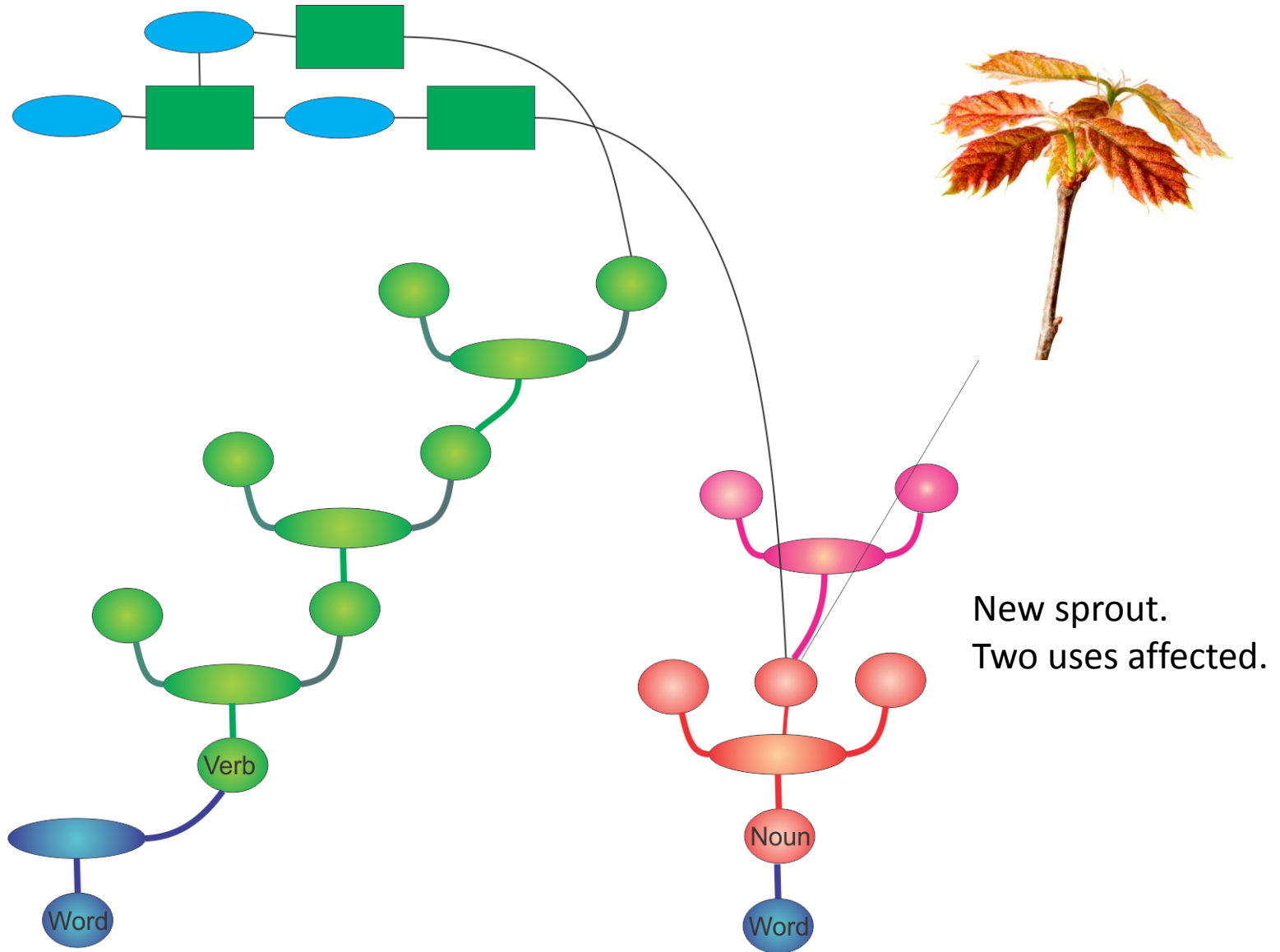
Thousands of relations linking words

A Neverending Stream of New Words

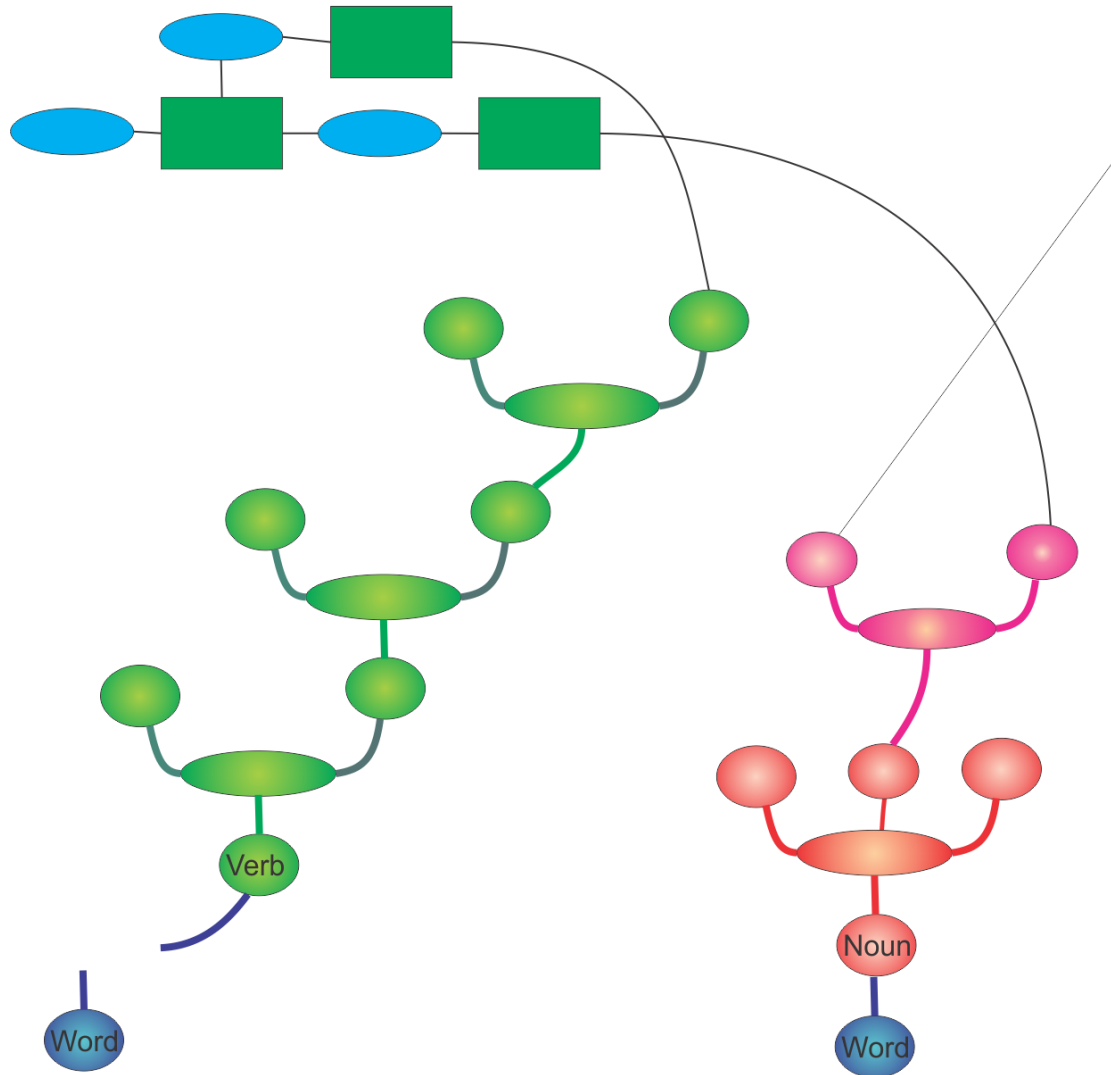
Ebola
Whataboutery
Adulthood
#MeToo
Fake news
Denuclearisation
Zika
EV
Lithium Ion
Tesla
MSM
Rare earth
LED Bulb
Standpattism
CRYPTOCURRENCY
JOMO
WOKE

Many newly encountered words can be understood using only internal resources – whataboutery, standpattism – the Word Foundry is in constant use

New Meanings



Making Adjustments



Uses adjusted to new meanings.
Looks easy for two,
not easy for thousands of uses.

The Constant Gardener

We are talking about a huge, constant cognitive load
– for either human or machine –
to prevent the knowledge structure falling into ruin
or outdatedness

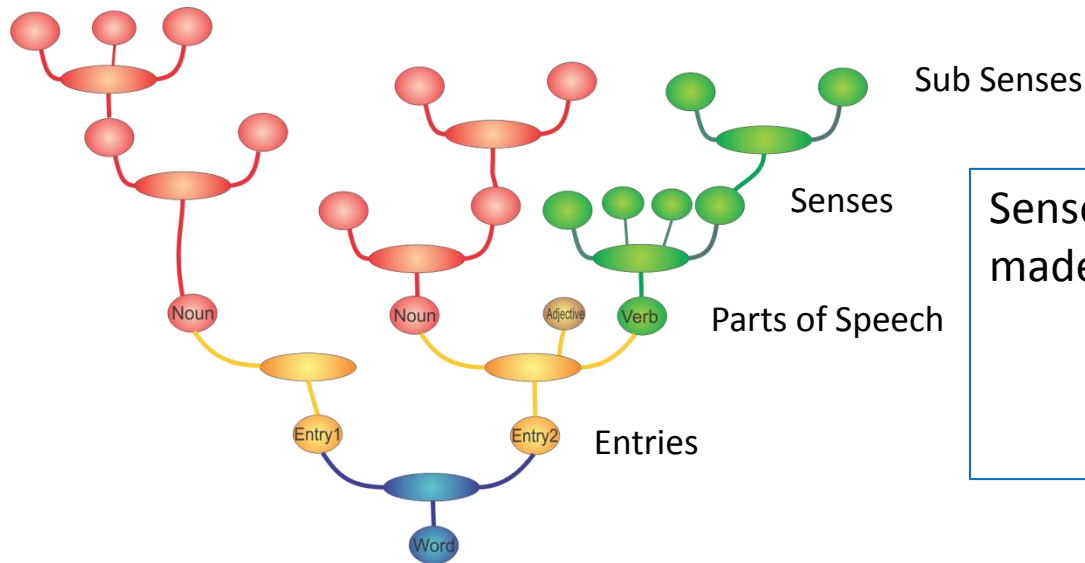


Updates



The dictionary staff are part
of its resources to tend to its
garden of knowledge

Not as Easy as It Looks



Sense: a long, narrow incision in the skin made by something sharp.

Subsense: a long, narrow opening or incision made in a surface

The subsense is more general

When describing the senses and subsenses, the impression may have given that they are ordered. In the dictionary, they are not ordered - a sense may fail, but a subsense of it succeed in matching a use.

This would be extremely wasteful, as the whole structure would need to be searched. We are hoping that the structure can become active and order itself, rather than a human do it.

Not Too Flash

Description: cut

Category: Verb

Definition: make an opening, incision, or wound in (something) with a sharp-edged tool or object

Example 1: he cut MacKay's face with a stick

Example 2: he cut his big toe on a sharp stone

He didn't make a cut, the sharp stone made the cut – the meaning is reversed – needs a separate definition for non-human agency cuts

A person wouldn't make the mistake about the cut on the toe – probably too much to ask for the machine to fix it up (but the person using the dictionary has to)

Nouns and Verbs

A dictionary orders things into nouns and verbs, then provides separate definitions for them. It is most unlikely the subconscious does the same – it is very good at unifying things.

We should expect to have an underlying relation which is exposed in various way, but provides unification across all its uses.

If we want to use a dictionary, we have to expect to transform its entries, just as a person does.