

Associative Semantics, Inc.
Relational Dictionaries and
Semantic Ontologies

The **Simple Dictionary™** is an online **Relational Dictionary-Thesaurus** designed for use by readers of all ages.

Inspired by the design of the **Periodic Table of Elements**, and the need for consistently clear, simple **definitions**, the dictionary uses a **restricted set defining language** to define the 100,000 most frequently used word senses in English. Within each definition the most important **genus** and **key words** are **highlighted** and **combined** to communicate an immediate understanding of the meaning of the word, while implicitly **classifying and relating** all of the words in the dictionary to one another so they can be understood in context.

The **Simple Dictionary™** uses highlighted **keywords** to:

- Shorten definitions to their most **basic elements**, using those words that are the easiest-to-understand to define all other words
- **Differentiate, classify** and **contextualize** words that have more than one meaning (i.e. *ball*: a **round object** vs. *ball*: a **dance**) and words that have similar definitions (i.e. *decide* vs. *choose* (see definitions below).
- Eliminate **circularity**

Unlike other dictionaries where *exist* is defined by *be*, and *be* by *exist*, in Simple™ *be* (1) **describes** someone or something, or (2) tells someone how to **behave**, while *exist* tells us we (1) **can find** someone or something in the world.

- Show **keyword** relations (other words defined by same **keyword**) with a single click

In addition, the dictionary:

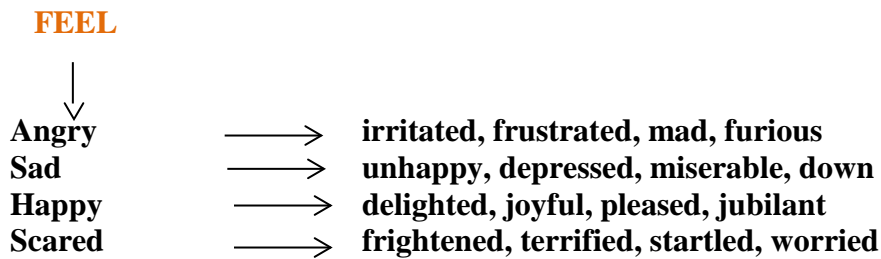
- **Reduces** the number of word **senses** (definitions) to those most frequently used, so that users can understand the meaning of each word quickly and easily, without having to read through long lists of similar-sounding definitions.
- **Uniformly relates** each word to the **keywords** in its **definition**
- Offers different **relational structures**, including **word trees**, so machines can understand both the **semantic relations** and the **grammatical usage** of each word that is processed
- Provides a **picture** for each concrete noun, action verb and adjective that can be physically sensed to enable universal picture based, human-machine communication
- Provides a **recording** of the **pronunciations** for each word to enable **speech to text** and **text to speech generation**, and to enable **speech and text to image generation**

The Definitions

In **The Simple Dictionary™**, each definition contains a highlighted **genus** and/or **keyword** combination (see **angry** example below) that enables both humans and machines to immediately understand the meaning of each word based on its **class** and **relation** to other words in similar and related classes in the ontology.

For example, the adjectives *angry*, *sad*, *happy* and *scared* are all defined in terms of how someone **feels**, and as such belong to the **feel** group in the **Simple Ontology™**. These adjectives in turn are used to define the words *irritated*, *depressed*, *joyful* and *startled* respectively, creating a **three-level hierarchy** which can be viewed by the user as a word tree.

Word Tree Example



Sample Sets

Words meaning **angry**:

angry *adjective* how you **feel** when you **want to yell** at someone: *He is angry at her because she lied to him. | Students are angry about plans to close their school.*

annoyed *adjective* a **little angry** about something that is **not** very **important**: *Someone interrupted her, and she looked annoyed. | I sometimes get annoyed with her when she criticizes me.*

irritated *adjective* a **little angry**, because something **keeps happening**: *I was starting to feel irritated by her constant complaining.*

frustrated *adjective* **angry** because you **cannot do** something, even though you have tried to do it many times: *Sam got frustrated because he couldn't hit the baseball.*

furious *adjective* **very angry**: *I was furious with my parents for not letting me go to the concert.*

livid *adjective* **extremely angry**: *She was livid when she found out what had happened.*

outraged *adjective* **extremely angry** because you **strongly disagree** with something that **has happened**: *Thousands of outraged people gathered in the square to protest. | Congressman Wylie was outraged by the decision.*

disgusted *adjective* **very shocked** and **angry**: *She told me she was disgusted at her daughter's bad behavior.*

resentful *adjective* **angry** because you **think** something is **not fair**: *He was always resentful of kids who thought school was easy.*

mad *adjective* an informal way to say **angry**: *I got really mad at my little sister. | You make me so mad sometimes!*

Words meaning **sad**:

sad *adjective* how you **feel** when you **want** to **cry**: *She was very sad after her grandmother died. | He had a sad expression on his face. | I was sad to hear they were moving away.*

ANTONYM: **happy**

unhappy *adjective* **sad**, often for a **long time**: *Isaac was deeply unhappy for years after his wife left. | She had a very unhappy childhood.*

upset *adjective* **sad** because something has **happened** that you did **not want** to **happen**: *She got upset when she saw how low her grade was.*

miserable *adjective* **extremely sad**: *He's miserable because Tara broke up with him.*

depressed *adjective* 1. **very sad** for a long time, especially because of a medical condition: *If you think you may be depressed, it is important to seek help from a doctor.* 2. **sad** because you **feel** you **can't change** a situation: *I always get depressed when I look in the mirror.*

down *adjective* **sad**, especially for a **few days** or **weeks**: *It was the middle of a long, cold winter, and I was feeling a little down.*

Improving Fluency with Co-Located Words and Grammatical Patterns

In much the same way that students make grammatical mistakes when learning English, machines reliant on corpora as source data have a tendency to repeat and magnify these mistakes. For example, corpora contain the following text:

*He was **angry on** his son for some reason.*

*I was **very furious** when I listened to your voicemail last night.*

*The staff are rude and the front desk receptionist always has an **upset** face like she hates her job.*

In the first example, the student knows **angry**. What they don't realize is that you say **angry at** someone, not **angry on** someone. In the second example, the student is more advanced: he or she knows that you say **furious** when someone is very angry, but they don't realize is that native speakers don't say "very furious," (or "very wonderful" or "very amazing" for that matter).

In the final example, the ending of the sentence doesn't ring true. **Upset** is usually used predicatively – we say that **someone is upset**, not she has an **upset face**.

Accordingly, machines need to be taught to process this information correctly.

The Simple Dictionary™ provides example sentences for the meanings of each word and as well as proper grammatical use and collocation information:

angry *adjective* how you **feel** when you **want** to **yell** at someone: *He is angry at her because she lied to him. | Students are angry about plans to close their school.*

▶ GRAMMAR AND USAGE

You are **angry at** someone

You are **angry about** something

You are **angry (that)** something has happened

You **get angry**

Something **makes** someone **angry**

furious *adjective* **extremely angry**: *I was furious with my parents for not letting me go to the concert.*

▶ GRAMMAR AND USAGE

You are **furious with** someone

You are **furious about** something

You are **furious (that)** something has happened

You are **absolutely furious** [*very* is not used with **furious**]

Defining the most basic verbs in English

In order to understand the **relationships between semantic** classes in English (i.e. between **people, actions, places, objects, substance, places**, etc), we must first understand the meaning of the simple verbs that relate these classes - verbs such as **decide, know**, and **think**. Dictionaries, however, struggle when it comes to defining these words: In the *Oxford Advanced Learners Dictionary* alone for example, there are 10 senses of **think**, and dozens of examples of the verb's usage. This makes it difficult to determine the meaning of a word. In the Simple Dictionary™ the number of redundant word senses is reduced to those senses that are **frequently used**, facilitating **keyword combination-based word sense disambiguation**, regardless of the complexity of the verb, phrasal verb or verbal idiom being processed. For example, **let someone know** is defined simply as “to **tell** someone about something” and the **genus** word “**tell**” is related to other words such as **inform** and **notify**.

The following are examples of entries for these basic verbs in the Simple Dictionary™:

think *verb*

1. to **use** your **mind**: *I've been thinking about what you said. | Think carefully before you answer the question.*

2. to **have** the **idea** that something is **true**: *Some people think that the Earth goes around the sun.* | “*Is he married?*” “*I think so.*” [= I think it is probably true] | “*Is it expensive?*” “*I don’t think so.*” [=I think it is probably not true]

3. you say **I think...** when **telling** other people what you **want to do**: “*What are you going to have?*” “*I think I’ll have the fish.*”

PHRASAL VERBS with **think**:

be thinking of doing something

to be **planning** to **do** something: *I was thinking of going to San Francisco next week.*

think something **over**

to **think** about something **carefully before** you **decide** to **do** it: *Can you give me some time to think it over?* | *Go home and think things over.* -- SYNONYM **consider**

think up something/**think** something **up**

to think of an **idea** or a **reason** for something: *I didn’t want to go the meeting and decided to think up an excuse.* – SYNONYM **invent**

know verb

1. to **have information** about something in your **mind**: *Do you know how to use a microscope?* | “*What’s the plant’s name?*” “*I don’t know.*” | *Everybody knows what the capital of Russia is.* | *He knows a lot about business.*

2. if you **know** a person, you have **met** them **before**, and you have an idea about what kind of person they are: *Do you two know each other?* | *I know David well.* *We were friends in college.*

3. if you know a place, you have **visited** it **before**, and you can find your way around it:

She knows the city well.

PHRASES with **know**:

be known as something

to have a **name** or title: *He was known as “Bullet Bob,” because he could throw the ball like a bullet.*

be known for something

to be **famous** for something: *New York is known for its tall buildings.*

let someone know

to **tell** someone about something: *If I hear any news, I’ll let you know.*

see verb

1. to **notice** something with your **eyes**: *I can see the ocean. | It was getting too dark to see anything.*
2. to **understand** something: *Do you see what I mean?*
3. to **meet** someone: *We see each other every day. | You need to see a doctor.*
4. to **think** that someone or something is a **particular kind** of person or thing: *She sees him as a friend.* -- SYNONYM consider
5. to **experience** something: *The city has seen a lot of changes in recent years.*

PHRASES with **see**:

let me see

you say this when you are **thinking** about something: *"How much did the ticket cost?" "Let me see. I think it was about \$200."*

see you later

you say this when you are saying **goodbye** to someone: *Bye, Alex. See you later!*

decide verb

1. to **think** you **will definitely do** something, or that something definitely happened:

I decided to become an engineer. | The jury decided that the man was innocent. | She decided against taking part in the competition. (=decided not to take part)

2. to **make** something **end** in a **particular result**:

*His goal decided the game. | Money was **the deciding factor**.*

PHRASAL VERBS with **decide**:

decide on something

to **decide** what something will be, or what you will do, after thinking carefully about it:

Have you decided on a name for the baby? | They decided on a bold course of action.

choose verb

1. to **take one** thing or person from a group: *I chose the cheapest thing on the menu. | There are hundreds of cars to choose from. | We think we have chosen the best person for the job.*

2. to **do** one thing **instead** of doing other things: *Many families are **choosing to** move out of the city.*

A-Z Text Sample

A short sample of A-Z text follows below.

option *noun* **1.** something you can **choose** to **do** or **have**: *You have two options: you can either pay now or pay later. | They gave me **the option of** a free plane ticket if I agreed to take a later flight.* **2.** in business, the legal **right** to buy something: *a stock option*

PHRASES with **option**:

keep/leave your options open

to **wait** until a later time to **decide** what to **do** about something: *They don't need an answer yet, so I'm keeping my options open until I have more information.*

(option *verb* to buy or sell the legal right to something)

optional *adjective* if something is **optional**, you can **choose** to **have** it or **not**: *The nuts are optional in this recipe.* | **optional extra** = something you can choose to buy when you buy a product: *Optional extras include leather seats and a sun roof.*

optometrist *noun* a **doctor** who checks your **eyes** and **decide** whether you **need glasses**

optometry *noun* the **job** of a **doctor** who **checks** your **eyes** to **decide** whether you **need glasses**

opt-out *noun* the right to **choose not** to **do** something that is part of an **agreement**: *The states were given an opt-out when the national law came into effect.*

opulent *adjective* if something is opulent, it **looks expensive** and **has** a lot of **decoration**: *the palace's opulent ballroom*

opulence *noun* the **way** something **looks** when it is **expensive** and **has** a lot of **decoration**: *the opulence of the architecture*

opus *noun* an important piece of **music, literature, or art**:

[in classical music] *Beethoven's Sonata in E Major, Opus 109* | *The book was his **magnum opus**.* (= his great work)

or conjunction you use **or** between two **possibilities**, and before the last in a series of possibilities: *Yes or no? | Which flavor would you like? Banana, strawberry, or vanilla? | I think I'll paint the room **either** red **or** blue. | Hurry, or we'll be late.*

PHRASES with **or**:

or else

you use **or else** to **warn** someone that something **bad could happen if** he or she does **not do** something: *He has to work for 100 hours in the community, or else he goes to jail.*

or so

you use **or so** to say that a number or **amount** is **not exact**: *I will be back in an hour or so.*

(oracle)

oracle 1. a **person** in ancient Greece who people **believed could see** what **would happen** in the future: *the oracle of Apollo at Delphi* **2. someone** who **people listen** to and **respect** because of their great **knowledge** or skill in a particular area: *In the Democratic party, he is considered the oracle.*

Bilingual versions of the Simple Dictionary™

The Simple Dictionary will be developed in English with a Chinese bilingual translation dictionary and Japanese, Korean, German and French translations to follow. These versions retain the English definitions, so that developers can program in English and their native language. Once these initial modules are complete, additional languages will be added. In order to produce this text, translators are provided with a detailed description of the way in which each headword behaves, with information about grammar, collocation, and register/formality, so that exact translations can be produced.

Commercial Applications

The dictionary-thesaurus, ontology and foreign language translation dictionaries will be made available free of charge to all consumers, and license to to the search, advertising, media and natural language processing industries.