

TOWARD AN ANCIENT GREEK WORDNET

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Workshop on WordNet and SketchEngine

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Pavia

LANGUAGE-SPECIFIC WORDNET

EuroWordNet

independent
language-specific WN
in correspondence

MultiWordNet

language-specific WN
based on PWN
semantic relations

MULTIWORDNET

Pros

- Possibility to use automatic procedures
- Princeton WordNet semantic relations

Cons

- Excessive dependency on one language

REPRESENTING IDIOSYNCRASIES BETWEEN THE TWO LANGUAGES:

- Lexical gaps:

a language expresses through a lexical unit what the other language expresses with a free combination of words .



empty node label

- Denotation differences:

the translation equivalent of a source language exists but it is more general or more specific.



one or more nearest relations

THEORETHICAL ASSUMPTION

“the database (sc. MWN) is based on the idea that there is a set of data which are common to all languages, and other data which are specific for each language. We take for granted that semantic relations are common, whereas lexical relations are language specific.”

(Pianta et al. 2002)

ASSIGN PROCEDURE (PIANTA ET AL. 2002)

ENG-ANC.GRE.

ANC.GRE.-ENG

ANC.GRE.-ITA

Ancient Greek word:

- Sense 1 EngTE
- Sense 2 EngTE
- Sense 3 EngTE
- ...
- Sense n

Princeton WordNet:

Synset [EngTE, s1,
s2...sn]

METHODOLOGY: INSTRUMENTS

- xml tagged version of Liddell-Scott-Jones of Ancient Greek Lexicon (LSJ)
- MultiWordNet's sense table (Pianta 2002)
- Thesaurus Linguae Graecae (TLG) lemmas in order of frequency (via infomap)

Lexical entry “δῶρον” in the Liddell-Scott-Jones:

⊛ δῶρον, τό, (δίδωμι) *gift, present, gift of honour*, ἀγλαὰ δ. Il.1.213, etc.; *volunt gift or offering to a god*, φέρε δῶρον Ἀθήνη 6.293, cf. Lxx Ge.4.4, Ev. Marc.7.11; βωμοὶ δῶροισι φλέγονται A. Ag.91; ποῦ μοι τὰ . . δ. κάκροθίνια; Id. Fr.184; δῶρά τινος *the gifts of*, i. e. *given by*, him, θεῶν ἐρικυδέα δ. Il.20.265, cf. Od.18.142; δῶρ' Ἀφροδίτης, i. e. *personal charms*, Il.3.54,64; δ. Κύπριδος E. Hel.363 (lyr.); δ. τῶν Μουσῶν καὶ Ἀπόλλωνος, of μουσική, Pl. Lg.796e: c. gen. rei, ὕπνου δ. *the blessing of sleep*, Il.7.482; δῶρα *presents given as tribute*, 17.225; δῶρον τοῦ ποταμοῦ, of the land of Egypt, Hdt.2.5. 2. δῶρα *presents*, as retaining fees or bribes, D.18.109, Jusj. ib.24.150, Arist. Ath.55.5, SIG953.7 (Calymna), etc. (the usual sense of the word in Att. Oratt.): hence in Att. law, δῶρων γραφή an indictment *for being bribed*, Aeschin.3.232, etc., cf. Harp.; δῶρων κριθῆναι to be tried *for taking bribes*, Lys.27.3; δῶρων ἐλεῖν τινα to convict him *of taking bribes*, Ar. Nu.591; δ. ὀφλεῖν to be found guilty *of taking bribes*, And.1.74; δῶρων δίωξις Plu. Per.32. 3. in pl., *good qualities, talents*, τὰ βασιλέως δ. Lib. Ep.19. II. *front part of palm*, Poll.2.144. 2. *hand's breadth, palm*, as a measure of length, Nic. Th.398, Vitruv.2.3.3, Milet. 7.57 (Didyma); cf. δεκάδωρος.

Lexical entry “δῶρον” (betacode: dw=ron) in the xml tagged LSJ:

```
<entryFree id="n29828" key="dw=ron" type="main" opt="n"><orth  
extent="full" lang="greek" opt="n">dw=ron</orth>, <gen lang="greek"  
opt="n">to</gen>, (<etym lang="greek" opt="n">di/dwmi</etym>) <sense  
id="n29828.0" n="A" level="1" opt="n"><tr opt="n">gift, present, gift of  
honour</tr>, <cit><quote lang="greek">a)glaa \ d.</quote> <bibl  
n="Perseus:abo:tlg,0012,001:1:213" default="NO"  
valid="yes"><author>Il.</author><biblScope>1.213</biblScope></bibl></cit  
>, etc.; <tr opt="n">votive gift</tr> or <tr opt="n">offering</tr> to a god,  
<cit><quote lang="greek">fe/re dw=ron *)aqh/nh |</quote> <bibl  
n="Perseus:abo:tlg,0012,001:6:293" default="NO"  
valid="yes"><biblScope>6.293</biblScope></bibl></cit>, cf. <bibl  
n="Perseus:abo:tlg,0527,001:4:4" default="NO"  
valid="yes"><author>LXX</author>
```

METHODOLOGY: INSTRUMENTS

- xml tagged version of Liddell-Scott-Jones of Ancient Greek Lexicon (LSJ)
- MultiWordNet's sense table (Pianta 2002)
- Thesaurus Linguae Graecae (TLG) lemmas in order of frequency (via infomap)

MWN'S SENSE TABLE

<*entry>

<homograph Number>

<entry type>

<*entry extension>

<original PoS>

<*Wordnet PoS>

<sense identifier>

<original domain gloss> <+WordNet Domain>

<+context gloss> <grammar gloss>

<*translation group>

Sense table of the Italian lexical entry “rosa”:

<*entry>>	<homograph Number>	<entry type>	<*entry extension>	<orig inal PoS>	<*Wordnet PoS>	<sens e identif ier>	<origin al domain gloss>	<+WordNet Domain>	<+context gloss>	<grammar gloss>	<*translation group>
rosa	1	trans	[]	agg inv	a	1.a.1	[]	[]	colore	[]	pink
rosa	1	trans	[]	agg inv	a	1.a.2	[]	[]	sentimentale: letteratura romanzo	[]	romantic
rosa	1	phras e	vedere_tutto_rosa	[]	v	1.a.3	[]	[]		[]	to_see_everything_through_rose-coloured_spectacles
rosa	1	trans	[]	sf n	n	2.a.1	Bot	Botan y		[]	rose
rosa	1	phras e	non_sono_tutte_rose_e_fiori	[]	[]	2.a.2	[]	[]	fig	[]	it's_not_all_a_bed_of_roses
rosa	1	phras e	se_non_sono_rose_fioriranno	[]	[]	2.a.3	[]	[]	fig	[]	the_proof_of_the_pudding_is_in_the_eating
rosa	1	phras e	non_c'è_rose_senza_spine	[]	[]	2.a.4	[]	[]	Proverbio	[]	there's_no_rose_without_a_thorn
rosa	1	colloc	rosa_canina	[]	n	2.a.5	[]	[]		[]	dog_rose

The lexical entry “rosa” from Collins Italian-English Dictionary :

rosa ['r%za] 1. agg inv (colore) pink; (sentimentale: letteratura, romanzo) romantic; vedere tutto rosa, to see everything through rose-coloured spectacles 2. sf a. (Bot) rose; non sono tutte rose e fiori, (fig) it's not all a bed of roses; se son rose fioriranno, (fig) the proof of the pudding is in the eating; non c'è rosa senza spine, (Proverbio) there's no rose without a thorn · rosa canina dog rose · rosa di Natale Christmas rose b. (fig: gruppo) rosa dei candidati, list of candidates c. rosa dei venti, wind rose 3. sm inv (colore) pink .

(example by Pianta)

Sense table of “δῶρον”:

<*entry>	<homograph Number>	<entry type>	<*entry extension>	<original PoS>	<*Wordnet PoS>	<sense identifier>	<original domain gloss>	<+WordNet Domain>	<+context gloss>	<grammar gloss>	<*translation group>
dw=ron	n29828	trans		noun	n	n29828.0				gen. to / etym. di/dwmi	gift, present, gift of honour votive gift, offering to a god
dw=ron	n29828	trans		noun	n	n29828.0					the gifts of, i. e. given by
dw=ron	n29828	phrase	dw=ra/ tinos	noun	n	n29828.0					personal charms
dw=ron	n29828	phrase	dw=r' *)afrodi/th	noun	n	n29828.0					the blessing of sleep
dw=ron	n29828	phrase	u(/pnou d.	noun	n	n29828.0			c. gen. rei		presents given as tribute
dw=ron	n29828	trans		noun	n	n29828.0					presents, as retained fees or bribes
dw=ron	n29828	phrase	dw=ra	noun	n	n29828.1					an indictment for being
dw=ron	n29828	phrase	dw/rwn grafh/	noun	n	n29828.1					bribe
dw=ron	n29828	phrase	dw/rwn kriqh=nai	noun	n	n29828.1					to be tried for taking
dw=ron	n29828	phrase	dw/rwn e(lei=n tina	noun	n	n29828.1					bribes
dw=ron	n29828	phrase	d. o)flei=n	noun	n	n29828.1					to convict him of taking
dw=ron	n29828	trans		noun	n	n29828.2					bribes
dw=ron	n29828	trans		noun	n	n29828.3				in pl.	good qualities, talents
dw=ron	n29828	trans		noun	n	n29828.4					front part of palm
dw=ron	n29828	trans		noun	n	n29828.4					hand's breadth, palm, as a measure of length

FIRST STEP OF THE WORK

- Study how to extract annotated and non-annotated lexical structures in the LSJ, through semi-automatic procedures:



Some information can be easily extracted



Some information needs more complex hypotheses

HYPOTHESES OF PATHS FOR THE AUTOMATIC EXTRACTION OF LEXICAL INFORMATION FROM THE TAGGED LSJ

<*entry>	→	xpath: /dict/entryFree/@key
<homograph Number>	→	xpath: /dict/entryFree/@id
<sense identifier>	→	xpath: /dict/entryFree/sense/@id
<grammar gloss>	→	xpath: /dict/entryFree/itype
	→	xpath: dict/entryFree/foreign
<*translation group>	→	xpath:/dict/entryFree/sense/tr
<*entry extension>	→	xpath: dict/entryFree/sense/foreign
<original Domain gloss>	→	xpath:dict/entryFree/sense
<+context gloss>	→	xpath: dict/entryFree/sense/cit/quote

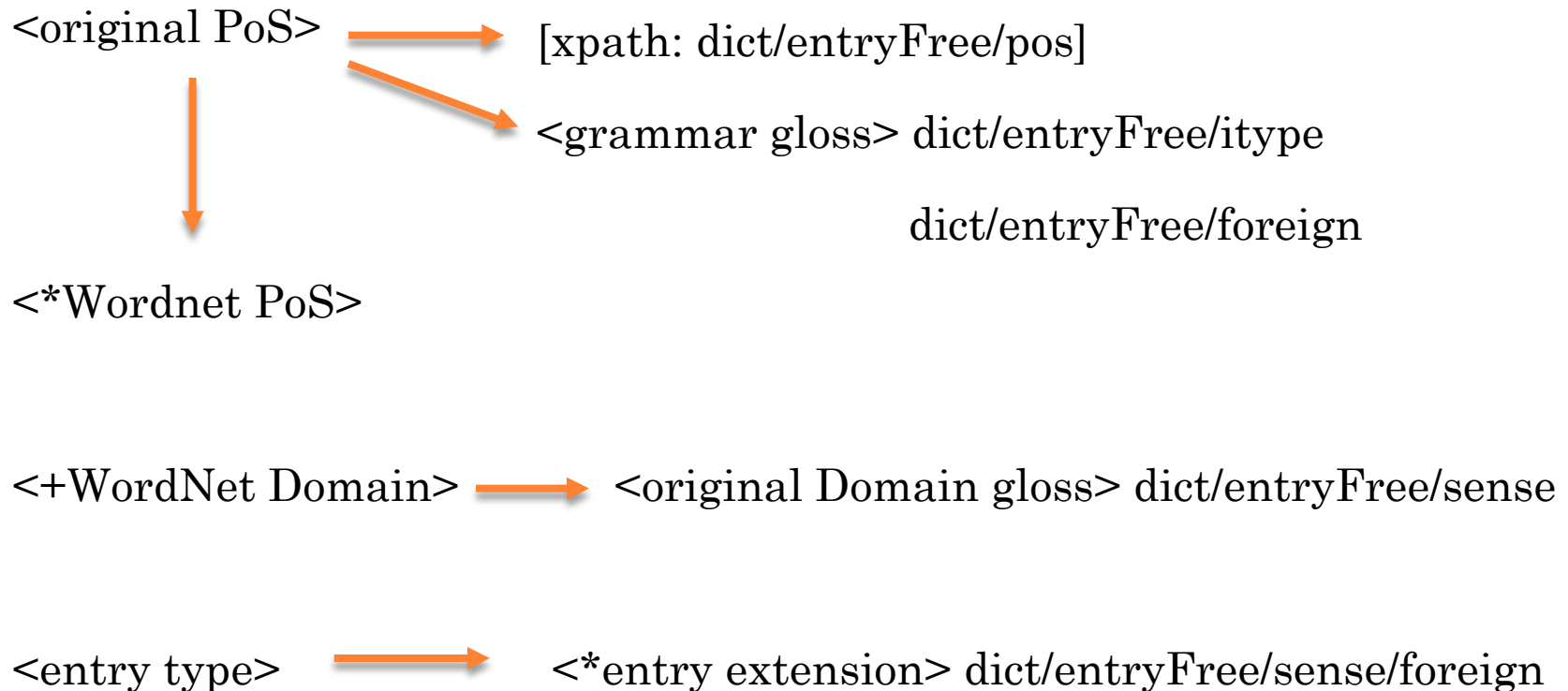
Lexical entry “γλυκύς” (betacode: “glu^ku/s”) in the xml tagged LSJ:

<dict

<entryFree id="n22389" key="glu^ku/s" type="main" opt="n"><orth extent="full" lang="greek" opt="n">glu^ku/s</orth>, <foreign lang="greek">ei=a </foreign> (<sense id="n22389.0" n="A" level="1" opt="n"><cit><quote lang="greek">-h=a</quote> <bibl n="Perseus:abo:tlg,0650,001:4:2" default="NO"><author>Herod.</author><biblScope>4.2</biblScope></bibl></cit>), <foreign lang="greek">u/ </foreign> (<cit><quote lang="greek">-u/n</quote> <bibl default="NO"><title>IG</title><biblScope>14.1890</biblScope></bibl></cit>), <tr opt="n">sweet to the taste</tr> or <tr opt="n">smell</tr>, <cit><quote lang="greek">ne/ktar</quote> <bibl n="Perseus:abo:tlg,0012,001:1:598" default="NO" valid="yes"><author>Il.</author><biblScope>1.598</biblScope></bibl></cit>; <cit><quote lang="greek">oi)=nos</quote> <bibl n="Perseus:abo:tlg,0521,001:124" default="NO"><author>Epich.</author><biblScope>124</biblScope></bibl></cit>, etc.; <cit><quote lang="greek">gluku\ o)/zein</quote> <bibl n="Perseus:abo:tlg,0435,001:1" default="NO"><author>Cratin.Jun.</author> <biblScope>1</biblScope></bibl></cit>, prob. in <bibl n="Perseus:abo:tlg,0433,001:2" default="NO"><author>Crates Com.</author><biblScope>2</biblScope></bibl>; opp. <foreign lang="greek">o)cu/s</foreign>, <bibl n="Perseus:abo:tlg,0627,031:2:55" default="NO"><author>Hp.</author><title>Vict.</title><biblScope>2.55</biblScope></bibl>; opp. <foreign lang="greek">drimu/s</foreign>, <bibl default="NO"><author>Plu.</author> <biblScope>2.708e</biblScope></bibl>: mostly metaph., even in <bibl default="NO"><author>Hom.</author></bibl>, <tr opt="n">pleasant, delightful</tr>, <foreign lang="greek">i(/meros, u(/pnos</foreign>, <bibl n="Perseus:abo:tlg,0012,001:3:139" default="NO"

/dict>

HYPOTHESES ON HOW TO EXTRACT OTHER INFORMATION NOT EXPLICITLY TAGGED



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THESAURUS LINGUAE GRECAE: LEMMAS IN ORDER OF FREQUENCY

- 999 words explored:
- 333 high-frequency words (HFW)
- 333 medium-frequency words (MFW)
- 333 low-frequency words (LFW)

- 9 words selected:
- 3 HFW: σῶμα, ψυχή, λέγω
- 3 MFW: κιθάρα, χορθάζω, τρυφερός
- 3 LFW: λοπός, μεσεύω, σμυγερός

Three medium-frequency words: κιθάρα, χορθάζω, τρυφερός


<*entry>	<homograph Number>	<entry type>	<*entry extension>	<original PoS>	<*Wordnet PoS>	<sense identifier>	<original domain gloss>	<+WordNet Domain>	<+context gloss>	<grammar gloss>	<*translation group>
ki^qa/r-a	n57340	trans		noun		n57340.0			dialect. Ionic	gen. h	lyre
ki^qa/r-a	n57340	trans		noun		n57340.1					thorax
ki^qa/r-a	n57340	trans		noun		n57340.1				in pl.	ribs of the horse
xorta/zw	n114476	trans		verb		n114476.0			prop. of cattle		feed, fatten
xorta/zw	n114476	trans		verb		n114476.0				pass.	eat their fill, of cattle
xorta/zw	n114476	trans		verb		n114476.1			of person		feed
xorta/zw	n114476	trans		verb		n114476.1				c. gen.	fill full of
xorta/zw	n114476	trans		verb		n114476.1					feast
tru^fero/s	n105746	trans		adj		n105746.0					delicate, dainty
tru^fero/s	n105746	trans		adj		n105746.0					of a soft material
tru^fero/s	n105746	trans		adj		n105746.0					of fish, soft-fleshed
tru^fero/s	n105746	trans		adj		n105746.1			of persons, their life, their habits		effeminate, luxurious, voluptuous
tru^fero/s	n105746	phrase	to\ t.	adj		n105746.1					effeminacy
tru^fero/s	n105746	phrase	trufero/n ti diasalakw /nison	adv.		n105746.1					voluptuously
tru^fero/s	n105746	phrase	t kale/ein	adv		n105746.1					softly call

Hierarchy of hyponyms of the lexical entry “Lyre” in MWN:


1. lyre -- (Music) a harp used by ancient Greeks for accompaniment

-> harp -- (Music) a stringed musical instrument that has a triangular frame consisting of a sounding board and a pillar and a curved neck; the strings stretched between the neck and the soundbox are plucked with the fingers

-> chordophone -- (Music) a stringed instrument of the group including harps, lutes, lyres, and zithers

 -> stringed_instrument -- (Music) a musical instrument in which taut strings provide the source of sound


 -> musical_instrument -- (Music) an instrument used to produce music

 -> instrument -- (Factotum) a device that requires skill for proper use

-> device -- (Factotum) an instrumentality invented for a particular purpose; "the device is small enough to wear on your wrist"; "a device intended to conserve water"

-> instrumentality, instrumentation -- (Factotum) an artifact (or system of artifacts) that is instrumental in accomplishing some end

 artifact, artefact -- (Factotum) a man-made object

 object, physical_object -- (Factotum) a physical (tangible and visible) entity; "it was full of rackets, balls and other objects"

-> entity, something -- (Factotum) anything having existence (living or nonliving)

The word "rib" has 5 senses:

Noun

1. rib

(Aviation, Nautical) something resembling the rib of an animal

2. rib, costa

(Anatomy, Animals) any of 24 curved arches of bone extending from the spine to or toward the sternum in man and a similar bone in most vertebrates

3. rib

(Gastronomy) cut of meat including one or more ribs

4. rib

(Anatomy) a riblike supporting or strengthening part of an animal or plant

5. rib



English WordNet created by [Princeton University \(USA\)](#)

Three low-frequency words: λοπός, μεσεύω, σμυγερός

<*entry>	<homograph Number>	<entry type>	<*entry extension>	<original PoS>	<*Wordnet PoS>	<sense identifier>	<original domain gloss>	<+WordNet Domain>	<+context gloss>	<grammatical gloss>	<*translation group>
lopo/s	n63895	trans		noun	n	n63895.0				gen of le/pw	peel
lopo/s	n63895	trans		noun	n	n63895.1			of a hide		the outer part of a split piece of leather
lopo/s	n63895	trans		noun	n	n63895.2					peeling of the skin after illness
meseu/w	n66387	trans		verb	v	n66387.0				c. gen	keep the middle or mean between two stand
meseu/w	n66387	trans		verb	v	n66387.1				abs.	midway
meseu/w	n66387	trans		verb	v	n66387.2					to be neutral
smu^gero/s	n.95532	trans		adj	a	n95532.0					with pain, painful

Μεσεύω:

- Keep the middle → be neutral
- Lexical gaps
- Missing the metaphorical derivation of the meanings.

Three high frequency words: σῶμα, ψυχή, λέγω

Σῶμα has 11 senses:

sense 0: body of man or beast, dead body, corpse

sense 1: the living body save, to be in a bad, a good state of bodily health

sense 2: body opp. spirit, soul

sense 3: bodily labours, bodily punishments

sense 4: animal body, opp. plants

sense 5: civic right, as for lat. “caput”

sense 6: (in NT) of the sacramental body of Christ's Church

sense 7: (gener.) a person, human being

sense 8: a body, any corporeal substance

sense 9: (Math.) figure of three dimensions, solid, a surface

sense 10: the body or the whole of a thing, especially of complete parts of the body, the whole body or frame of a thing, arguments

sense 11: logs

In MWN “substance” has 6 senses:

1. substance, matter (Physics) that which has mass and occupies space; "an atom is the smallest indivisible unit of matter"
2. kernel, substance, core, center, essence, gist, heart, inwardness, marrow, meat, nub, pith, sum, nitty-gritty (Factotum) the choicest or most essential or most vital part of some idea or experience: "the gist of the prosecutor's argument"; "the nub of the story"
3. meaning, sense, substance (Factotum) the idea that is intended; "What is the sense of this proverb?"
4. substance (Factotum) the stuff of which an object consists
5. means, substance (Economy) considerable capital (wealth or income); "he is a man of means"
6. message, content, subject_matter, substance (Factotum) what a communication that is about something is about

Λέγω has 21 senses:

sense 1: pick up

sense 2: choose, pick up

sense 3: count, tell

sense 4: recount, tell over

→ sense 5: say, speak

sense 6: speak, indicate

sense 7: say that

sense 8: say something of another

sense 9: call

→ sense 10: tell, command

sense 11: say, mean

sense 13: mean, intend

sense 14: use the term

sense 15: it is said

sense 16: speak emphatically

sense 17: tell of, sing of

sense 18: recite

sense 19: send words

sense 20: maintain

sense 21: nominate

Λέγω & say, speak and tell

- “Say” in MWN belongs to 11 synsets
- “Speak” in MWN belongs to 5 synsets

But there is no intersection synset between “say” and “speak”

On the other hand, “tell” and “say” are in the same synset , but they correspond to two different senses of the word

λέγω



Sense 5: say, speak

Sense 10: tell, command

Ψυχή has 16 senses:

sense 1: life

sense 2: metaph. life of things

sense 3: in Hom. departed spirit, ghost

sense 4: the immaterial and immortal soul

sense 5: the conscious self, personality as the centre of emotion, desires

sense 6: of various aspects of the self

sense 7: of the emotional self

sense 8: of the moral and intellectual self

sense 9: of animals

sense 10: of the inanimate things

sense 11: of the spirit of an author

sense 12: (philosophy) in the early physicists, of the primary substance, the source of life and consciousness

sense 13: the spirit of the universe

sense 14: the immaterial principle of movement and life

sense 15: butterfly

sense 16: moth

Hierarchies of hypernyms of the lexical entry “soul” in MWN:

1. **soul**, psyche -- (**Religion**) the immaterial part of a person; the actuating cause of an individual life
 - > **_ spirit** -- (**Religion**) the vital principle or animating force within living things
 - > **_ vital_principle**, **life_principle** -- (**Biology**) a hypothetical force to which the functions and qualities peculiar to living things are sometimes ascribed
 - > **_ causal_agent**, **cause**, **causal_agency** -- (**Factotum**) any entity that causes events to happen
 - > **_ entity**, **something** -- (**Factotum**) anything having existence (living or nonliving)
- _ 2. person**, individual, someone, somebody, mortal, human, **soul** -- (**Person**) a human being; "there was too much for one person to do"
 - > **_ life_form**, **organism**, **being**, **living_thing** -- (**Biology**) any living entity
 - > **_ entity**, **something** -- (**Factotum**) anything having existence (living or nonliving)
 - > **_ causal_agent**, **cause**, **causal_agency** -- (**Factotum**) any entity that causes events to happen
 - > **_ entity**, **something** -- (**Factotum**) anything having existence (living or nonliving)
- _ 3. soul**, **soulfulness** -- (**Psychological_Features**) deep feeling or emotion
 - > **_ feeling** -- (**Psychological_Features**) the psychological feature of experiencing affective and emotional states; "he had a feeling of euphoria"
 - > **_ psychological_feature** -- (**Psychology**) a feature of the mental life of a living organism
- _ 4. soul** -- (**Factotum**) the human embodiment of something; "the soul of honor"
 - > **_ embodiment** -- (**Factotum**) giving concrete form to an abstract concept
 - > **_ objectification** -- (**Factotum**) representing as an object
 - > **_ realization**, **realisation**, **actualization**, **actualisation** -- (**Factotum**) making real or giving the appearance of reality
 - > **_ creating_by_mental_acts** -- (**Psychology**) the act of creating something by thinking
 - > **_ creation** -- (**Factotum**) the human act of creating
 - > **_ activity** -- (**Factotum**) any specific activity or pursuit; "they avoided all recreational activity"
 - > **_ act**, **human_action**, **human_activity** -- (**Factotum**) something that people do or cause to happen

Hierarchies of hypernyms of the lexical entry “butterfly” in MWN:

1. **butterfly** -- (Biology, Entomology) diurnal insect typically having a slender body with knobbed antennae and broad colorful wings
 - > **_lepidopterous_insect**, lepidopteron, lepidopteran -- (Biology, Entomology) insect that in the adult state has four wings more or less covered with tiny scales
 - > **_insect** -- (Biology, Entomology) small air-breathing arthropod
 - > **_arthropod** -- (Biology, Entomology) invertebrate having jointed limbs and a segmented body with an exoskeleton made of chitin
 - > **_invertebrate** -- (Animals, Biology) any animal lacking a backbone or notochord; the term is not used as a scientific classification
 - > **_animal**, animate_being, beast, brute, creature, fauna -- (Animals, Biology) a living organism characterized by voluntary movement
 - > **_life_form**, organism, being, living_thing -- (Biology) any living entity
 - > **_entity**, something -- (Factotum) anything having existence (living or nonliving)
- _2. butterfly, butterfly_stroke** -- (Swimming) a swimming stroke in which the arms are thrown forward together out of the water while the feet kick up and down
 - > **_swimming_stroke** -- (Swimming) a method of moving the arms and legs to push against the water and propel the swimmer forward
 - > **_stroke** -- (Swimming) any one of the repeated movements of the limbs and body used for locomotion in swimming or rowing
 - > **_locomotion**, travel -- (Factotum) self-propelled movement
 - > **_motion**, movement, move -- (Factotum) the act of changing your location from one place to another; "police controlled the motion of the crowd"; "the movement of people from the farms to the cities"; "his move put him directly in my path"
 - > **_change** -- (Factotum) the act of changing something; "the change of government had no impact on the economy"; "his change on abortion cost him the election"
 - > **_action** -- (Factotum) something done (usually as opposed to something said); "there were stories of murders and other unnatural actions"
 - > **_act**, human_action, human_activity -- (Factotum) something that people do or cause to happen

SUMMARIZING

MY PROGRAMMATIC STEPS:

- Work on the parser of LSJ, providing a significant number of sense tables
- Solve some problems through gloss matching and synset intersection
- Study how to solve problems when the correspondence obtained between synsets is not satisfying
- Correct manually the results obtained

REFERENCES

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