

Set of Common Base Concepts in EuroWordNet-2

Version 2, Final

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Abstract	This deliverable defines the set of Base Concepts for EuroWordNet-2. The Base Concepts will be drawn from the local resources for French, German, Czech and Estonian, and will be merged with the Common Base Concepts extracted in EuroWordNet-1 for Dutch, English, Italian and Spanish. The new common set of Base Concepts will be used by the EuroWordNet-2 partners to start building their wordnets.
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Executive Summary

This deliverable describes the definition of the Base Concepts in EuroWordNet for the extension to French, German, Czech and Estonian. For each of the languages a set of Base Concepts has been selected, which play an important role. These selections have been compared among the 4 languages and also with the set of Base Concepts selected in EuroWordNet1. On the basis of this comparison, the common set of Base Concepts in EuroWordNet has been extended with 43 completely new concepts and 123 concepts that partially overlap in meaning with other selected concept. The total set now consists of 1310 synsets: 1010 nominal and 300 verbal concepts. All the Base Concepts have been classified using the EuroWordNet top-ontology.

Furthermore, we made an extension between hard concepts and soft concepts. The latter represent word meanings that can be clustered or merged into more global groups. The building of the local wordnets will then proceed by representing the hard Common Base Concepts in the local wordnets and further extending these with hyperonyms and hyponyms in each language. For the soft Common Base Concepts, it is sufficient to find a representative for a single member from a group or the group as a whole.

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1. Introduction

This document describes the result of comparing the Base Concepts selected by the builders of the French (AVI-MEM), German (TUE), Estonian (TAR) and Czech (BRN) wordnets. Base Concepts play a major role in establishing relations with other concepts. Importance is measured in terms of the number of relations and the position in the hierarchy. Concepts with many relations and high positions function as anchor points to relate other (more specific) concepts in the wordnets. The notion of Base Concepts should not be confused with the Basic Level Concepts as defined by Rosch (1977). Basic Level Concepts represent a compromise between two opposing principles: a) to predict as many features as possible, hence to be very specific, versus, b) to apply to as many concepts as possible, hence to be very general. Whereas Basic Level Concepts thus are at an intermediate level of abstraction, the Base Concepts, typically, are more general. They are only selected because they apply to as many concepts as possible, hence have many relations.

The Base Concept selections will be compared to the earlier selections made for Dutch, English, Italian and Spanish (as described in deliverable D017D034D036 of EuroWordNet-1, LE-4003). Both selections will be merged to form a single unified set of core concepts. The building of the wordnets in EWN-2 will take this set of meanings as a starting point. By specifying the relations around the Base Concepts manually a high quality of the cores of the wordnets can be guaranteed.

The Base Concepts are selected in the local resources and databases. Since the quality and nature of the local resources varies, the above principles have been made operational in different ways. For example, the German and French data actually contain explicit relations to other concepts and therefore can precisely apply the above criteria, whereas the Czech and Estonian sites only have Machine Readable Dictionaries and have to consider frequency of words in definitions.

In the next sections, each site will specify the exact selection procedure that has been applied. Section 3 contains the results of comparing the EWN-2 selections and comparing the EWN-2 and EWN-1 selection. This has resulted in a revised list of Base Concepts and their classification in terms of the EuroWordNet top ontology.

2. Local selection methods

2.1. DE

All base concepts provided by Tuebingen have been extracted from the GermaNet database which is organized quite similar to WordNet 1.5 (for a more detailed account see the specification of GermaNet in 2D002). The current size of GermaNet is:

10.652 nouns
 6.904 verbs
 1.657 adjectives
 19.213 synsets
 24.920 synonyms in synsets.

We applied soft criteria for selecting the base concepts. Concepts which express a certain level of abstraction without being top concepts or semantic features have been chosen. These criteria resulted in selecting

- concepts which dominate a lot of hyponyms or several layers w.r.t. hierarchical depth of hyponymy.
- concepts which are frequently used without necessarily accounting for a great number of hyponymic links (e.g. concepts like "lieben" (to love) and "hassen" (to hate)).

For our preliminary German subset of base concepts, the following statistics is provided:

	<i>Nouns</i>	<i>Verbs</i>
number of GermaNet synsets:	10652	6904
number of equivalence links:	506	351
number of synsets without (near) equivalent WN1.5 synset:	32	23
number of synsets with 1 equivalence link:	482	345
number of synsets with 2 equivalence links:	9	3
number of synsets with 3 equivalence links:	2	-

The concepts which could not be translated into (near)-equivalent WN 1.5 synsets are listed in Appendix I.

2.2. FR

Because MEMODATA brought to EWN a lot of dictionaries (see French resources in 2D002), Memodata with Avignon had a lot of approaches to determine the French BCs :

1. It was possible, in the same way of the German partner, to compute them from our definition dictionary,
2. We had a second way based on the comparison between the French Generic terms from "Integral dictionary" and the BCs,
3. Third, for example, it was possible to select the representative French generic terms, and propose a large set of new BCs

These approaches were eliminated for different reasons that could be summarized by :

1. they bring us very far from the goal of the project,
2. duplicate previous work
3. finally, would have generated too much work for us and for other partners.

A strong consideration that made us drop these approaches is that we are not absolutely trustful in the criteria of the choices : linguistic, ontological, logical or other. To produce terms that are very often used in the beginning of a definition is very different of other points of view.

So, since it is important for EWN project to show different organizations between each languages, to authorize synchronic study between them, we decided to (semi-automatically) translate the current BCs already validated by the 4 languages and research teams of EWN 1.

Finally, we think that it will be possible to add new BCs for French based on a new approach that we can not have a priori : determine which strong words of French will have no representations in EWN because they have no translations in WN 1.5. This work cannot be done at the beginning of the project.

Methodology of the work.

The work was divided in three parts :

- 1) First, we had to produce for the whole WN1.5 dictionary a relational format. This format was given by Lexidiom that can, now, manage all the data of WN1.5 and EWN.
- 2) Secondly, we used our "Integral Dictionary" and its links to English to compare the structure of the information and automatically suggest translations. Because of the schedule, this automatic translation did not use all the information we had (for example, we did not use the domain, the detailed part-of-speech, the syntactic information about verbs, and , the most important, the *external links of WN or EWN...*). It is possible that we will do something more powerful and general if the third task needs it in the future.
- 3) Thirdly, we validated the translations by hand.

2.3. EE

The main resource for Estonian is the Eesti kirjakeele seletussõnaraamat, EKSS (Explanatory Dictionary of Estonian). At present EKSS contains:

- 50.890 entries (the number of entries is in fact much larger, since many compound word expressions, phraseologisms etc are merged in these main entries),
- 118.442 senses (including 103.525 senses for which sense descriptions are provided).

Given the resources that we had at our disposal we applied the following procedure.

1. We made a frequency list of the words (lemmas) from the meaning descriptions (glosses) in the "Explanatory dictionary of Estonian". These list contained 488.739 word forms, 62.828 lemmas. Word forms were disambiguated morphologically, but not semantically. The latter work had to be done manually afterwards. We chose 1649 most frequent words (including 1133 nouns (F>46) and 516 verbs (F>40)) for further work.
2. We had before translated the EWN-1 BC synsets into Estonian. Now we compared the words from these Estonian translations with the frequency list described above and selected the overlapping lemmas. These were included in the prospective list of BCs. The list contained 476 words of Estonian (358 nouns and 118 verbs).
3. Because we did not have any reliable objective information about the possible position of the chosen words in a semantic hierarchy we fixed a conventional limit of words (concepts) for the candidates of BCs: about 1000 concepts, of these about 700 nouns and about 300 verbs. Thus we had to translate additionally about 350 noun and 180 verb meanings. Since many words were polysemous, we had to disambiguate them and to decide which meanings should be included to the set of BCs. In the course of this work also a number of words present in the frequency list had to be excluded as they quite apparently were too specific (e.g. such linguistic terms as *adjektiiv* 'adjective' or the names of concrete animals) or, in case of some verbs, appeared frequently only in different expressions (it means, their meaning(s) as single word is rare).

As a result, we have come to the current list of 698 noun BCs with 723 relations to ILI and 366 verb BCs with 423 relations to ILI

2.4. CZ

The Czech Base Concepts containing approximately 975 items are obtained it from the Explanatory Dictionary of Czech (EDC, in Czech SSC). We have sorted out all the entries that contain genus proximum definitions (hyperonyms). This was done with a simple parser that retrieves the definitions in EDC.

In the second step we have associated the tentative list with English equivalents - those were obtained from the Czech-English and English-Czech electronic dictionary. After checking the list of Czech Base Concepts, synsets are manually added to these items - for this we will use as a resource Dictionary of Czech Synonyms which also exists in electronic form.

3. Comparing the Base Concept Selections

The local selections have been translated to the closest WN1.5 synsets, represented by their file off-set positions and part-of-speech, e.g. "00002728-n" uniquely identifies the synset {being#1; life form#1; living thing#1; organism#1}. These selections have been loaded in the Amsterdam Lexicon System (ALS, Boersma et al 1998) and mapped to the WordNet1.5 synsets:

Table 1: Selected Synset IDs mapped to WordNet1.5 synset

<i>BCs</i>	<i>Nouns</i>	<i>Verbs</i>
	List	
FR	787	225
DE	460	321
EE	703	459
CZ	726	260

Next, we determined the intersections of these selections in ALS: first the synsets selected by all 4 sites and, secondly, the synsets selected by 2 sites. Table 2 shows the complete intersection of the above selections, the selections made for Dutch, Spanish, Italian and English in EWN1 and the overlap of the complete selections.

Table 2: Complete Intersections of Base Concept Selections

	<i>Nouns</i>	<i>Verbs</i>
Intersection All EWN1	24	6
Intersection All EWN2	70	30
Intersection All EWN12	13	2

The overlap of the EWN2 selections is higher than in EWN1. Nevertheless, as in EWN1, the intersections are still extremely low, and the total intersection by 8 languages is 15 synsets (see Appendix II for a list). As decided in EWN2 the total intersection is not a reliable set. Important concepts such as *animal*, *object*, *place*, *location* are not included. In EWN-1 we therefore selected all concepts occurring in two sets: the intersection-pairs. For EWN2, the intersection pairs are as follows:

Table 3: Intersection Pairs for German, French, Czech and Estonian

	Nouns			Verbs		
	DE	EE	CZ	DE	EE	CZ
FR	199	380	254	93	141	68
DE		158	120		108	64
EE			238			84
Union			619			258

The union of the intersection pairs is a set of 877 synsets (619 nouns and 258 verbs), which is comparable with the EWN1 union of intersection pairs: 871 synsets (694 nouns and 177 verbs). The latter set was extended to include near-intersections (close concepts that can be grouped). This resulted in the final EWN1 set of 1144 synsets: 905 nouns and 239 verbs.¹ The next two tables show how the new selections overlap with this set of common BCs in EWN1.

Table 4: Overlap of EWN2 nouns and EWN1 nouns (905 CBCs)

NOUNS	Local NBCs	Intersection with CNBC-ewn1 (905)	% of CNBC4-EWN1	% of Local BCs	NEW BCs (not in EWN1)
FR	787	787	99,24%	100,00%	0
DE	460	202	25,47%	43,91%	258
CZ	726	271	34,17%	37,33%	455
EE	703	389	49,05%	55,33%	314
Union (selected by at least 1 side)	1727	811	102,27%	46,96%	916
Union of Intersection pairs (selected by at least 2 sides)	619	516	65,07%	83,36%	105
Intersection (selected by 4 sides)	70	70	8,83%	100,00%	

Table 4: Overlap of EWN2 verbs and EWN1 verbs (239 CBCs)

VERBS	Local VBCs	Intersection with CVBC-ewn1 (239)	% of CNBC4-EWN1	% of Local BCs	New BCs (Not in EWN1)
FR	225	225	94.14%	100.00%	0
DE	321	98	41.00%	30.53%	223
EE	459	145	60.67%	31.80%	314
CZ	260	71	29.71%	27.31%	189
Union (selected by at least 1 side)	872	233	97.49%	26.72%	639
Union of Intersection pairs (selected by at least 2 sides)	258	179	74.90%	69.38%	61
Intersection (selected by 4 sides)	30	30	12.55%	100.00%	

¹ The official set of 1024 BCs was extended to 1144 BCs with synsets that have accidentally been left out. These additions involve synsets that are very close in meaning to selected BCs and therefore do not really represent new concepts.

When we look at the individual selections, we see that the French selections fully overlap with the CBCs in EWN1. This is due to the fact that they have directly translated the CBCs from EWN1 and did not make an independent selection. The other selections show overlap between 34-54% for nouns and 27-30% for verbs. If we compare the union of the intersection pairs we see a much higher overlap: 83% for nouns and 69% for verbs. These synsets are thus selected for 4 or more languages.

There are 105 nouns and 61 verbs selected by at least 2 EWN2 sides that are not part of the set of common Base Concepts selected in EWN1. These are potential extensions of the set of common Base Concepts. As in EWN1, it may be the case that some of these senses are very close to other senses of the same entries that have been selected in EWN1. This is illustrated by the next examples where "area#1" and "behavior#3" have been selected in EWN1, and "area#2" and "behavior#1" in EWN2:

```
{area 1}
  Part-of-Speech: n
  WordNet1.5 File off-set: 2075853
  WordNet1.5 Gloss: a part of a structure having some specific
                    characteristic or function; "the spacious cooking
                    area provided plenty of room for servants"
  WordNet1.5 Hyperonyms: construction#4
{area 2; expanse#2; surface area#1}
  Part-of-Speech: n
  WordNet1.5 File off-set: 3557459
  WordNet1.5 Gloss: the extent of a 2-dimensional surface enclosed
                    within a boundary; "the area of a rectangle"; "it
                    was about 500 square feet in area"
  WordNet1.5 Hyperonyms: extent#1

{behavior 1; behaviour#1; conduct#1}
  Part-of-Speech: n
  WordNet1.5 File off-set: 672428
  WordNet1.5 Gloss: manner of acting or conducting oneself
  WordNet1.5 Hyperonyms: activity#1
{behavior 3; behaviour#3; conduct#2; demeanor#1; demeanour#1; deportment#1}
  Part-of-Speech: n
  WordNet1.5 File off-set: 3433579
  WordNet1.5 Gloss:
  WordNet1.5 Hyperonyms: trait#1
```

Since these meanings of "area" and "behaviour" are very close and interconnected we cannot say that the selections do not intersect conceptually for these cases, in other words: the notion is conceptually represented by another sense. To avoid this kind of mismatches in EWN1, we inserted sense-groups in the ILI relating these concepts (see Vossen et al 1997, Peters et al 1998a and Peters et al 1998b for the criteria for making these groups). One of the methods for detecting potential sense-group is by looking for synsets across the different selections that share entries. The next table indicates how many of the new EWN2-BCs share an entry with the EWN-1 selection.

Table 5: Potential New Base Concepts Selected in EWN2

	<i>Union of Intersection Pairs</i>	<i>Share entries with CBCs in EWN1</i>	<i>Do not share an entry with CBCs in EWN1</i>
Nouns	105	41	64
Verbs	61	31	30

New synsets that do not even share an entry with EWN1 synsets represent the first set of possible new synsets. These synsets are further inspected manually. In Appendix III and V, the hyperonym chains are given for the new BCs that do not share entries with the CBCs selected in EWN1. Especially in the case of nouns we see that most of these synsets are rather specific: i.e. occur at deep levels of the hierarchy. In the case of verbs this is less salient but this is partly due to the fact that the verb hierarchy is much flatter in general. By inspecting these hierarchies, 14 nouns and 13 verbs have been selected which are not well represented by the common BCs in EWN-1. Criteria are:

1. being a top node in the hierarchy
2. occurring at a high position in the hierarchy
3. classified by a category which is under-differentiated: classifies many diverse things

In the hierarchies, we marked the common Base Concepts of EWN1 with a dark colour. A light colour has been used for new BCs that should be added to the set of common BCs. As a rule of thumb: if a new BC is a direct hyponym of an EWN1 BC and it is at a relatively deep level, then it is not selected. In Appendix IVa and VIa, we see the BCs that share entries with common BCs in EWN1. The list has been inspected to exclude synsets that also show a large overlap in meaning with another sense that has been selected in EWN1. Criteria are: similar synset members, same hyperonym, similar glosses. This resulted in a set of 15 nouns and 17 verbs (marked with light colour) that could not be grouped with another selected sense. For these we generated again the hyperonym chain as for the previous cases. These trees are shown in Appendix IVb and VIb. The same criteria have been used to select badly-represented synsets. This resulted in 6 new noun concepts and 10 new verb concepts. The total list of genuine new Base Concepts to be added to the set of common Base Concepts derived in EWN1 then consists of 20 noun synsets and 23 verb concepts.² The synsets are shown in Appendix VII and VIII with their glosses, the WN1.5 hyperonym and the EWN Top Concepts.

We can now extend the set of common Base Concepts with at least the 20 new noun synsets and 23 verb synsets. These new BCs should be represented by both the EWN1 and EWN2 partners in their local wordnets. The remainder of the new EWN2-BCs are less important because they are partially represented by other senses in the CBCs selected in EWN1, either because they can be grouped into more global sense-groups (to be added to the ILI), or because they represent relatively specific concepts at deeper hierarchical levels below hyperonyms that are already elected in EWN1. In that case, it is sufficient to find an equivalent representative for the more general group as a whole or to find an equivalent for only one of the more specific senses in that group.

Consequently, we can make a distinction between so-called **Hard** and **Soft** BCs. Hard BCs represent unique concepts, Soft BCs are members of groups of synsets. When we apply this difference to the Base Concepts both in EWN1 and EWN2 we get the division as in the next table:

Table 6: Hard and Soft Base Concepts In EWN1 and EWN2

	<i>EWN1</i>			<i>EWN2</i>			<i>EWN12</i>		
	Total	Hard	Soft	Total	Hard	Soft	Total	Hard	Soft
NOUNS	905	575	330	105	20	85	1010	595	415
VERBS	239	164	75	61	23	38	300	187	113

² The reason for the relatively large number of verbs is the fact that many of them are tops in WordNet1.5.

For each site, we can now make a division into:

- Local BCs: synsets that have been proposed
- Missing BCs: synsets in the set of common BCs but not in the local selection
- Unique BCs: synsets in the local selection but not part of the set of common BCs
- Shared BCs: synsets in both the local selection and the set of common BCs

If a Missing BC is a Soft BC (it can be grouped with other senses into a more global sense-cluster, or be represented by a hyperonym) we can check whether another sense from a sense-group is represented. If that is the case then the missing Soft BC is partial represented and it is not necessary to add it to the local selection:

- Partial Soft BCs: Missing Soft BC which is represented in the local selection by another closely-related sense.
- Missing Soft BCs: Missing Soft BC which is not represented by any sense of a sense group.

Only for the latter group it is necessary to find equivalents for either the sense-group or one of its members. Partial and Missing Soft BCs are extracted with the following procedure in ALS:

1. Let the set of Soft BCs be set A:
A = {cover 1; cover 2; go 2; go 4}
2. Let the set of Local BCs be set B:
B = {cover 1; eat 2}
3. Determine the set of Soft BCs which are not in the set of Local BCs: C = A - B.
C = {cover 2; go 2; go 4}
4. Determine the set of Soft BCs which are in the set of Local BCs: D = A & B.
D = {cover 1}
5. Collect all the senses of all the variants in D: E = all senses (all variants (D))
E = {cover 1; cover 2; cover 3 cover 4}
6. Determine the senses of E that occur in the set of Soft BCs A, which is the subset of Soft BCs related by polysemy to senses in the selection of Local BCs: F = A & E.
F = {cover 1; cover 2}
7. Determine the senses in C (not represented Soft BCs) that also occur in F, which are Soft BCs not represented in the set of Local BCs but for which there is another Soft BC sense which is represented
Partial Soft BCs G = F & C = {cover 1}
8. Determine the senses in C (not represented Soft BCs) that also do not occur in F:
Missing Soft BCs H = C - G = {go 2; go 4}

The results of this comparison are given in the next tables for nouns and verbs:

Table 7: Proposed, Missing and Selected Noun Base Concepts for EWN2

	<i>Local</i>	<i>HARD</i>	<i>SOFT</i>			<i>Unique</i>	<i>Shared</i>
	<i>BCs</i>	Missing	Total	Partial	Missing	<i>BCs</i>	<i>BCs</i>
FR	787	24	199	112	87	0	787
DE	460	427	322	97	225	199	216
EE	703	293	252	160	92	238	465
CZ	726	339	260	153	107	375	351

Table 8: Proposed, Missing and Selected Verb Base Concepts for EWN2

	<i>Total</i>	<i>HARD</i>	<i>SOFT</i>			<i>Unique</i>	<i>Intersect</i>
		Missing	Total	Partial	Missing		
FR	225	30	45	11	34	0	225
DE	321	91	70	36	34	182	139
EE	459	52	43	36	7	254	205
CZ	260	126	76	35	41	162	98

Given the set of common BCs (1310), each site can create their core wordnets independently using the following procedure:

1. extend the set of Local BCs with equivalent representatives for the Missing Hard and Missing Soft BCs.
2. create synsets for the Local BCs and the common BC (CBC) representatives.
3. encode the hyperonyms for the Local BCs and the CBC representatives (as far as they are not yet part of the selection).
4. encode the first level of hyponyms below the Local BCs and the CBC representatives
5. encode synsets related to the Local BCs and CBC representatives by non-hyponymy relations
6. encode sub-hyponyms of the Local BCs and CBC representatives

Figure 1. gives an overview of the different vocabulary sets. Step 1 through 4 result in the core wordnets that are most important. The set of common Base Concepts and their Top Concept classification represents the common starting point. Extensions from the core make it possible to apply different methodologies for building and to include language specific lexicalization patterns. The focus of the first subset in EWN-2 is on the core wordnets (as it is in EWN1). The second building phase will focus on extending this set.

Overview of EuroWordNet Core

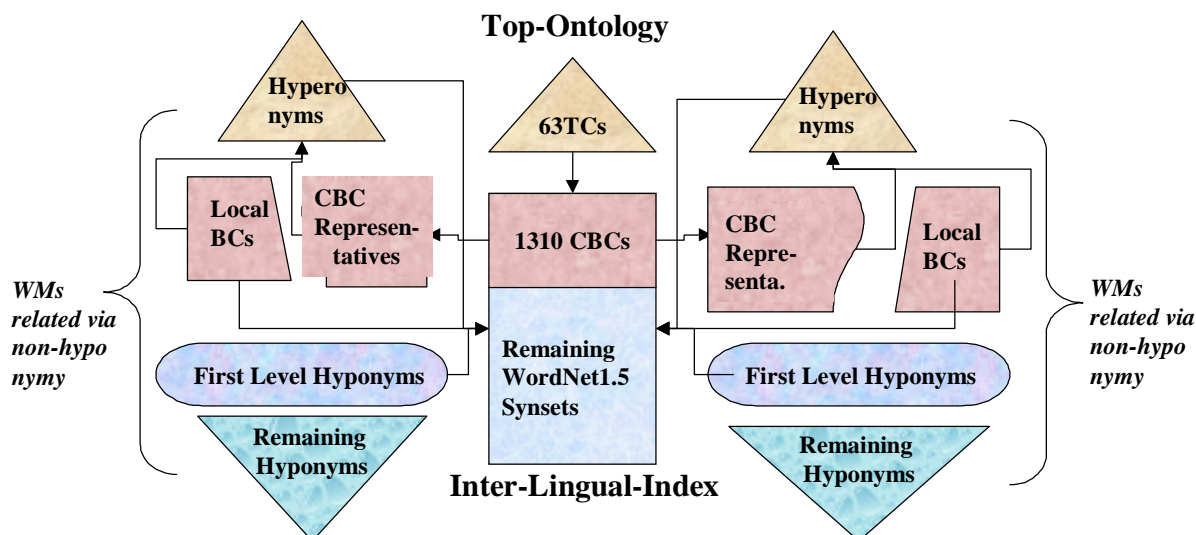


Figure 1: Overview of vocabularies in EuroWordNet

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Appendix I: German Base Concepts without direct equivalent in WN1.5

Each line contains the following pieces of information:

1. German BC: literal, sense number, lexicographer's file name
2. kind of relation encoded
3. WN 1.5 target concept: literal, sense number, file offset

Bauwerk 1 artefakt hyperonym construction 4 02034531-n
 Bauwerk 1 artefakt hyponym building 3 02207842-n
 Küchengerät 1 artefakt hyperonym kitchen_appliance 1 02683333-n
 Textilie 1 artefakt hyperonym covering 4 01991765-n
 Oberbekleidung 1 artefakt hyperonym clothes 1 02307680-n
 Arbeitsbekleidung 1 artefakt hyperonym clothes 1 02307680-n
 Elektrogerät 1 artefakt hyperonym machine 2 02743730-n
 Gebäudeteil 1 artefakt holonym building 3 02207842-n
 Schreibware 1 artefakt hyponym writing_implement 1 03278641-n
 Hygieneartikel 1 artefakt hyponym cleaner 1 02406167-n
 Ensemble 1 gruppe hyponym ensemble 3 05221691-n
 Ensemble 1 gruppe hyponym troupe 1 05220757-n
 Runde 2 gruppe hyperonym social_group 1 05119847-n
 Raummaß 1 menge hyponym cubic_measure 1 08323765-n
 ?Elektrizitätseinheit 1 menge hyperonym electromagnetic_unit 1 08324882-n
 Trieb 1 motiv hyperonym physiological_state 1 08577911-n
 Ziel 1 motiv hyponym goal 3 05402932-n
 Ziel 1 motiv hyponym purpose 3 05633898-n
 Tagungsort 1 ort hyperonym venue 2 05475296-n
 ?zwischenmenschliche_Beziehung 1 relation hyperonym relationship 4 08523811-n
 ?zwischenmenschliche_Beziehung 1 relation hyponym relationship 3 08523567-n
 Rollenbeziehung 1 relation hyperonym social_relation 1 00018392-n
 Edelstein 1 natgegenstand hyperonym gemstone 1 08828623-n
 Halbedelstein 1 natgegenstand hyperonym gemstone 1 08828623-n
 Wind 1 natphänomen hyperonym atmospheric_phenomenon 1 06472551-n
 Oberflächenbeschaffenheit 1 form hyperonym composition 4 03451500-n
 Unternehmung 1 geschehen hyperonym activity 1 00228990-n
 Bier 1 nahrung hyperonym brew 1 05078414-n
 Backware 1 nahrung hyponym bread 1 04916628-n
 Backware 1 nahrung hyponym cake 2 04879808-n
 Backware 1 nahrung hyponym pastry 2 04875625-n
 Teigware 1 nahrung meronym dough 1 05058079-n
 Genußmittel 1 substanz hyponym smoking_material 1 08839913-n
 Genußmittel 1 substanz hyponym dainty 1 04856504-n
 Fachkraft 1 mensch hyperonym employee 1 06069879-n
 Beamter 1 mensch hyponym civil_servant 1 06001026-n
 ?Charakterbeschaffener 1 mensch hyponym bad_person 1 05841132-n
 ?Charakterbeschaffener 1 mensch hyponym good_person 1 05847789-n
 ?Charakterbeschaffener 1 mensch hyponym persona_non_grata 1 05855558-n
 Futterpflanze 1 pflanze hyperonym plant 1 00008894-n
 Sporenpflanze 1 pflanze hyperonym cryptogam 1 06549951-n
 Schadstoff 1 substanz hyponym poison 2 09028514-n
 überlassen 5 besitz hyponym hand_over 1 01305002-v
 wegnehmen 1 besitz hyperonym take_away 4 01257967-v
 stehlen 2 besitz hyponym steal 5 01320466-v
 nachempfinden 1 gefuehl hyponym sympathize 3 01038573-v
 klagen 3 gefuehl hyperonym complain 1 00510349-v
 nehmen 3 ('auf sich nehmen') gefuehl hyponym bear 6 00375289-v
 begeistern 2 gefuehl hyperonym arouse 5 01003070-v

reagieren 1 gesellschaft hyponym react 3 01347552-v
reagieren 1 gesellschaft hyponym react 2 00403903-v
versammeln 1 gesellschaft hyponym gather 10 01471153-v
versammeln 1 gesellschaft hyponym gather 9 01374778-v
arbeiten 1 gesellschaft hyponym work 20 01364691-v
führen 2 gesellschaft hyponym head 28 01381333-v
fordern 2 gesellschaft hyperonym ask_for 1 00423379-v
verhindern 1 gesellschaft hyponym prevent 2 01388675-v
verhindern 1 gesellschaft hyponym prevent 1 01387332-v
zweifeln 1 kognition hyponym question 10 00486783-v
glauben 3 kognition hyperonym accept 1 00385232-v
austauschen 1 ('bilaterale Kommunikation') kommunikation hyperonym act_together 2 01346535-v
lügen 1 kommunikation hyperonym misinform 1 00468174-v
stören 1 konkurrenz hyponym disturb 4 01008411-v
mobilisieren 2 konkurrenz hyperonym gather 7 00794237-v
angreifen 4 konkurrenz hyponym attack 13 00632480-v
pflanzen 1 kontakt hyperonym plant 6 00879623-v
stechen 1 ('in etw.') kontakt hyperonym get_into 3 00699493-v
darstellen 1 schoepfung hyponym perform 1 00980842-v

Appendix II: Base Concepts selected by 8 languages

Nouns: 13

Verbs: 2

- WordNet1.5 Synset: {flora 1; plant#1; plant life#1}
 Part-of-Speech: n
 WordNet1.5 File off-set: 8894
 WordNet1.5 Gloss: a living organism lacking the power of locomotion
 WordNet1.5 Hyperonyms: being#1
 EuroWordNet Top Concepts: 03 Group Plant
- WordNet1.5 Synset: {matter 1; substance#1}
 Part-of-Speech: n
 WordNet1.5 File off-set: 10368
 WordNet1.5 Gloss: that which has mass and occupies space; "an atom is the smallest indivisible unit of matter"
 WordNet1.5 Hyperonyms: inanimate object#1
 EuroWordNet Top Concepts: 03 Substance
- WordNet1.5 Synset: {food 1; nutrient#1}
 Part-of-Speech: n
 WordNet1.5 File off-set: 11263
 WordNet1.5 Gloss: any substance that can be metabolized by an organism to give energy and build tissue
 WordNet1.5 Hyperonyms: matter#1
 EuroWordNet Top Concepts: 03 Comestible Substance
- WordNet1.5 Synset: {activity 1}
 Part-of-Speech: n
 WordNet1.5 File off-set: 228990
 WordNet1.5 Gloss: any specific activity or pursuit; "they avoided all recreational activity"
 WordNet1.5 Hyperonyms: act#1
 EuroWordNet Top Concepts: 04 Agentive Dynamic Purpose
- WordNet1.5 Synset: {create 2; make#13}
 Part-of-Speech: v
 WordNet1.5 File off-set: 926361
 WordNet1.5 Gloss: cause to be or to become; "He made a mess"; "make friends and enemies"; "create a commotion"
 WordNet1.5 Hyperonyms:
 EuroWordNet Top Concepts: 36 BoundedEvent Cause Existence Physical
- WordNet1.5 Synset: {go 14; locomote#1; move#15; travel#4}
 Part-of-Speech: v
 WordNet1.5 File off-set: 1046072
 WordNet1.5 Gloss: change location; move, travel, or proceed; "How fast does your new car go?" "We travelled from Rome to Naples by bus"; "The policemen went from door to door looking for the suspect"
 WordNet1.5 Hyperonyms:
 EuroWordNet Top Concepts: 38 Dynamic Location
- WordNet1.5 Synset: {cloth 1; fabric#1; material#1; textile#1}
 Part-of-Speech: n
 WordNet1.5 File off-set: 1965302
 WordNet1.5 Gloss: something made by weaving or felting or knitting or crocheting natural or synthetic fibers
 WordNet1.5 Hyperonyms: artefact#1
 EuroWordNet Top Concepts: 06 Artifact Covering Solid
- WordNet1.5 Synset: {construction 4; structure#1}
 Part-of-Speech: n
 WordNet1.5 File off-set: 2034531
 WordNet1.5 Gloss: a thing constructed; a complex construction or entity
 WordNet1.5 Hyperonyms: artefact#1
 EuroWordNet Top Concepts: 06 Artifact Object

WordNet1.5 Synset: {attitude 3; mental attitude#1}
 Part-of-Speech: n
 WordNet1.5 File off-set: 4111788
 WordNet1.5 Gloss: a complex mental orientation involving beliefs and feelings and values and dispositions to act in certain ways; "he had the attitude that work was fun"
 WordNet1.5 Hyperonyms: cognition#1
 EuroWordNet Top Concepts: 09 3rdOrderEntity Experience Mental

WordNet1.5 Synset: {beverage 1; drink#2; potable#1}
 Part-of-Speech: n
 WordNet1.5 File off-set: 5074818
 WordNet1.5 Gloss: any liquid suitable for drinking
 WordNet1.5 Hyperonyms: food#1 liquid#4
 EuroWordNet Top Concepts: 13 Comestible Liquid

WordNet1.5 Synset: {worker 2}
 Part-of-Speech: n
 WordNet1.5 File off-set: 5856677
 WordNet1.5 Gloss: a person who has employment
 WordNet1.5 Hyperonyms: human#1
 EuroWordNet Top Concepts: 18 Human Object Occupation

WordNet1.5 Synset: {line 26}
 Part-of-Speech: n
 WordNet1.5 File off-set: 8484352
 WordNet1.5 Gloss: a length (straight or curved) without breadth or thickness; the trace of a moving point
 WordNet1.5 Hyperonyms: form#1
 EuroWordNet Top Concepts: 25 ImageRepresentation

WordNet1.5 Synset: {material 5; stuff#7}
 Part-of-Speech: n
 WordNet1.5 File off-set: 8781633
 WordNet1.5 Gloss: the tangible substance that goes into the makeup of a physical object; "coal is a hard black material"; "wheat is the stuff they use to make bread"
 WordNet1.5 Hyperonyms: matter#1
 EuroWordNet Top Concepts: 27 Substance

WordNet1.5 Synset: {chemical element 1; element#6}
 Part-of-Speech: n
 WordNet1.5 File off-set: 8805286
 WordNet1.5 Gloss: any of the more than 100" known substances (of which 93 occur naturally) that cannot be separated into simpler substances and that singly or in combination constitute all matter
 WordNet1.5 Hyperonyms: matter#1
 EuroWordNet Top Concepts: 27 Substance

WordNet1.5 Synset: {amount of time 1; period#3; period of time#1; time period#1}
 Part-of-Speech: n
 WordNet1.5 File off-set: 9065837
 WordNet1.5 Gloss: a length of time; "government services began during the colonial period"
 WordNet1.5 Hyperonyms: amount#1
 EuroWordNet Top Concepts: 28 BoundedEvent Quantity Time

Appendix III: Hyperonym Chains for 64 new Noun Base Concepts

Selected New BCs

BCs in EWN1

_ age 1

HYPONYM property 2

HYPONYM attribute 1

HYPONYM abstraction 1 LEAF

_ age 2

HYPONYM time 5

HYPONYM amount of time 1

HYPONYM amount 1

HYPONYM abstraction 1 LEAF

_ charge 13

HYPONYM cost 3

HYPONYM disbursal 2

HYPONYM outgo 1

HYPONYM financial loss 1

HYPONYM loss 7

HYPONYM transferred possession 1

HYPONYM possession 1 LEAF

_ coat 2

HYPONYM outer garment 1

HYPONYM garment 1

HYPONYM apparel 1

HYPONYM covering 4

HYPONYM artefact 1

HYPONYM inanimate object 1

HYPONYM entity 1 LEAF

HYPONYM consumer goods 1

HYPONYM commodity 1

HYPONYM inanimate object 1

HYPONYM entity 1 LEAF

_ compensation 2

HYPONYM recompense 2

HYPONYM payment 2

HYPONYM cost 3

HYPONYM disbursal 2

HYPONYM outgo 1

HYPONYM financial loss 1

HYPONYM loss 7

HYPONYM transferred possession 1

HYPONYM possession 1 LEAF

_ contact 1

HYPONYM interaction 1

HYPONYM action 1

HYPONYM act 1 LEAF

_ culture 4

HYPONYM cognitive content 1

HYPONYM cognition 1

HYPONYM psychological feature 1 LEAF

_ data 1

HYPONYM accumulation 2

HYPONYM group 1 LEAF

_ difference 1

HYPONYM quality 1

HYPONYM attribute 1

HYPONYM abstraction 1 LEAF

_ dimension 2

HYPONYM measure 5	
	HYPONYM magnitude 1
	HYPONYM property 2
	HYPONYM attribute 1
	HYPONYM abstraction 1 LEAF
_ ensemble 3	
	HYPONYM musical group 1
HYPONYM organization 5	
	HYPONYM social group 1
	HYPONYM group 1 LEAF
_ era 2	
HYPONYM amount of time 1	
	HYPONYM amount 1
	HYPONYM abstraction 1 LEAF
_ experience 1	
	HYPONYM education 5
HYPONYM cognitive content 1	
	HYPONYM cognition 1
	HYPONYM psychological feature 1 LEAF
_ extent 1	
HYPONYM magnitude 1	
	HYPONYM property 2
	HYPONYM attribute 1
	HYPONYM abstraction 1 LEAF
_ extent 3	
HYPONYM degree 6	
	HYPONYM state 1 LEAF
_ father 1	
	HYPONYM parent 1
	HYPONYM genitor 1
	HYPONYM primogenitor 1
	HYPONYM ancestor 1
HYPONYM relation 3	
	HYPONYM human 1
	HYPONYM being 1
	HYPONYM entity 1 LEAF
	HYPONYM causal agency 1
	HYPONYM entity 1 LEAF
_ festivity 1	
HYPONYM diversion 2	
	HYPONYM activity 1
	HYPONYM act 1 LEAF
_ finger 1	
	HYPONYM dactyl 1
	HYPONYM appendage 2
	HYPONYM external body part 1
HYPONYM body part 1	
	HYPONYM part 10
	HYPONYM entity 1 LEAF
_ flower 1	
HYPONYM reproductive structure 1	
	HYPONYM plant organ 1
	HYPONYM plant part 1
	HYPONYM natural object 1
	HYPONYM inanimate object 1
	HYPONYM entity 1 LEAF
_ flowing 1	
HYPONYM change of location 2	
	HYPONYM motion 5
	HYPONYM happening 1

HYPONYM event 1 LEAF

_ fright 1

HYPONYM emotion 1

HYPONYM feeling 1

HYPONYM psychological feature 1 LEAF

_ gland 1

HYPONYM secretory organ 1

HYPONYM organ 4

HYPONYM body part 1

HYPONYM part 10

HYPONYM entity 1 LEAF

_ grain 2

HYPONYM foodstuff 2

HYPONYM food 1

HYPONYM matter 1

HYPONYM inanimate object 1

HYPONYM entity 1 LEAF

_ history 5

HYPONYM continuum 1

HYPONYM time 1

HYPONYM abstraction 1 LEAF

_ intensiveness 1

HYPONYM degree 1

HYPONYM measure 5

HYPONYM magnitude 1

HYPONYM property 2

HYPONYM attribute 1

HYPONYM abstraction 1 LEAF

_ involvement 3

HYPONYM curiosity 2

HYPONYM cognitive state 1

HYPONYM state 1 LEAF

_ joyousness 1

HYPONYM emotion 1

HYPONYM feeling 1

HYPONYM psychological feature 1 LEAF

_ leap 3

HYPONYM transition 4

HYPONYM alteration 3

HYPONYM happening 1

HYPONYM event 1 LEAF

_ limb 1

HYPONYM appendage 2

HYPONYM external body part 1

HYPONYM body part 1

HYPONYM part 10

HYPONYM entity 1 LEAF

_ look 3

HYPONYM countenance 1

HYPONYM appearance 4

HYPONYM quality 1

HYPONYM attribute 1

HYPONYM abstraction 1 LEAF

_ love 4

HYPONYM emotion 1

HYPONYM feeling 1

HYPONYM psychological feature 1 LEAF

_ member 4

HYPONYM associate 3

HYPONYM compeer 1

	HYPONYM human 1
	HYPONYM being 1
	HYPONYM entity 1 LEAF
	HYPONYM causal agency 1
	HYPONYM entity 1 LEAF
_ mother 2	
	HYPONYM parent 1
	HYPONYM genitor 1
	HYPONYM primogenitor 1
	HYPONYM ancestor 1
	HYPONYM relation 3
	HYPONYM human 1
	HYPONYM being 1
	HYPONYM entity 1 LEAF
	HYPONYM causal agency 1
	HYPONYM entity 1 LEAF
_ mountain 1	
	HYPONYM elevation 6
	HYPONYM formation 5
	HYPONYM natural object 1
	HYPONYM inanimate object 1
	HYPONYM entity 1 LEAF
_ net 1	
	HYPONYM cloth 1
	HYPONYM artefact 1
	HYPONYM inanimate object 1
	HYPONYM entity 1 LEAF
_ pain 4	
	HYPONYM symptom 2
	HYPONYM evidence 1
	HYPONYM information 1
	HYPONYM cognition 1
	HYPONYM psychological feature 1 LEAF
_ painfulness 1	
	HYPONYM feeling 1
	HYPONYM psychological feature 1 LEAF
_ possessor 1	
	HYPONYM capitalist 1
	HYPONYM human 1
	HYPONYM being 1
	HYPONYM entity 1 LEAF
	HYPONYM causal agency 1
	HYPONYM entity 1 LEAF
_ pressure 4	
	HYPONYM physical phenomenon 1
	HYPONYM natural phenomenon 1
	HYPONYM phenomenon 1 LEAF
_ resistance 1	
	HYPONYM action 1
	HYPONYM act 1 LEAF
_ reticulation 1	
	HYPONYM system 1
	HYPONYM instrumentality 1
	HYPONYM artefact 1
	HYPONYM inanimate object 1
	HYPONYM entity 1 LEAF
_ rodent 1	
	HYPONYM eutherian 1
	HYPONYM mammal 1
	HYPONYM craniate 1

HYPONYM chordate 1
 HYPONYM animal 1
 HYPONYM being 1
 HYPONYM entity 1 LEAF

_ sale 2

HYPONYM marketing 2
 HYPONYM commerce 1

HYPONYM group action 1

HYPONYM act 1 LEAF

_ sand 2

HYPONYM dirt 3

HYPONYM earth 4

HYPONYM material 5

HYPONYM matter 1

HYPONYM inanimate object 1

HYPONYM entity 1 LEAF

_ saying 1

HYPONYM language 5

HYPONYM auditory communication 1

HYPONYM communication 1

HYPONYM social relation 1

HYPONYM relation 1

HYPONYM abstraction 1 LEAF

_ schoolchild 1

HYPONYM child 1

HYPONYM juvenile 1

HYPONYM human 1

HYPONYM being 1

HYPONYM entity 1 LEAF

HYPONYM causal agency 1

HYPONYM entity 1 LEAF

_ scrutiny 1

HYPONYM investigating 1

HYPONYM work 1

HYPONYM activity 1

HYPONYM act 1 LEAF

_ smell 2

HYPONYM property 2

HYPONYM attribute 1

HYPONYM abstraction 1 LEAF

_ source 6

HYPONYM point 12

HYPONYM location 1 LEAF

_ spring 5

HYPONYM formation 5

HYPONYM natural object 1

HYPONYM inanimate object 1

HYPONYM entity 1 LEAF

_ student 2

HYPONYM enrollee 1

HYPONYM learner 2

HYPONYM unskilled person 1

HYPONYM human 1

HYPONYM being 1

HYPONYM entity 1 LEAF

HYPONYM causal agency 1

HYPONYM entity 1 LEAF

_ taste sensation 1

HYPONYM sensation 1

HYPONYM perception 2

HYPONYM basic cognitive process 1
 HYPONYM act 2
 HYPONYM cognition 1
 HYPONYM psychological feature 1 LEAF

_ taxation 2
 HYPONYM levy 2
 HYPONYM charge 14
 HYPONYM financial obligation 1
 HYPONYM possession 1 LEAF

_ team 2
 HYPONYM unit 4
 HYPONYM organization 5
 HYPONYM social group 1
 HYPONYM group 1 LEAF

_ tense 1
 HYPONYM grammatical category 1
 HYPONYM category 2
 HYPONYM accumulation 2
 HYPONYM group 1 LEAF

_ test 7
 HYPONYM communicating 1
 HYPONYM act 1 LEAF

_ timepiece 1
 HYPONYM measuring instrument 1
 HYPONYM instrument 2
 HYPONYM device 2
 HYPONYM instrumentality 1
 HYPONYM artefact 1
 HYPONYM inanimate object 1
 HYPONYM entity 1 LEAF

_ token 3
 HYPONYM symbol 2
 HYPONYM sign 3
 HYPONYM communication 1
 HYPONYM social relation 1
 HYPONYM relation 1
 HYPONYM abstraction 1 LEAF

_ vapour 2
 HYPONYM suspension 6
 HYPONYM mixture 5
 HYPONYM matter 1
 HYPONYM inanimate object 1
 HYPONYM entity 1 LEAF

_ viewpoint 1
 HYPONYM perspective 2
 HYPONYM orientation 3
 HYPONYM attitude 3
 HYPONYM cognition 1
 HYPONYM psychological feature 1 LEAF

_ wall 2
 HYPONYM divider 1
 HYPONYM construction 4
 HYPONYM artefact 1
 HYPONYM inanimate object 1
 HYPONYM entity 1 LEAF

_ wave 5
 HYPONYM motion 5
 HYPONYM happening 1
 HYPONYM event 1 LEAF

_ wheel 5

HYPONYM machine 3

HYPONYM mechanical device 1

HYPONYM mechanism 2

HYPONYM device 2

HYPONYM instrumentality 1

HYPONYM artefact 1

HYPONYM inanimate object 1

HYPONYM entity 1 LEAF

_wound 3

HYPONYM harm 3

HYPONYM health problem 1

HYPONYM physiological state 1

HYPONYM condition 5

HYPONYM state 1 LEAF

Appendix IVa: New Noun Base Concepts sharing Entries with EWN1

EWN1 BCs	EWN2 BCs (39)
<p>abode 1 HYPONYM housing 3 area 1 HYPONYM construction 4 area 5 HYPONYM region 3 arm 4 HYPONYM arms 2 behavior 3 HYPONYM trait 1 category 1 HYPONYM concept 1 chance 3 HYPONYM phenomenon 1 chief 2 HYPONYM leader 2 class 1 HYPONYM education 2 component 1 HYPONYM part 3 composition 8 HYPONYM music 4 conduct 2 HYPONYM trait 1 constitution 1 HYPONYM beginning 1 cover 7 HYPONYM natural object 1 earth 3 HYPONYM inanimate object 1 earth 4 HYPONYM material 5 effort 1 HYPONYM accomplishment 1 facility 1 HYPONYM artefact 1 family 2 HYPONYM ancestry 2 family 3 HYPONYM assemblage 4 family 6 HYPONYM relation 3 female 2 HYPONYM human 1 field 4 HYPONYM knowledge base 1 field 11 HYPONYM parcel 4 field 12 HYPONYM parcel 4 form 1 form 2 HYPONYM appearance 4 form 5 HYPONYM category 1 form 6 HYPONYM structure 4 fruit 3 HYPONYM reproductive structure 1 function 1 HYPONYM duty 1 grade 2 HYPONYM measure 5 head 19 HYPONYM leader 2</p> <p>intellect 3 HYPONYM human 1 kin 2 HYPONYM relation 3 language 3 HYPONYM communication 1 language 5 HYPONYM auditory communication 1 life 1 HYPONYM being 1 life 3 HYPONYM experience 2 life 4 HYPONYM account 3 life 5 HYPONYM motivation 1 life 6 HYPONYM human 1 life 8 HYPONYM being 2 life 13 HYPONYM amount of time 1 living 1 HYPONYM experience 2 male 2 HYPONYM human 1 mark 8 HYPONYM printed symbol 1 mass 4 HYPONYM group 1 mass 6 HYPONYM large indefinite quantity 1 molecule 1 HYPONYM material 5 month 2 HYPONYM amount of time 1 nature 2 HYPONYM quality 1 nature 3 HYPONYM natural object 1 nature 5 HYPONYM phenomenon 1 nature 6 HYPONYM state 1</p>	<p>abode 2 HYPONYM address 6 area 2 HYPONYM extent 1 area 6 HYPONYM environment 2 arm 6 HYPONYM division 9 behavior 1 HYPONYM activity 1 category 2 HYPONYM accumulation 2 chance 4 HYPONYM possibility 4 chief 1 HYPONYM supervisor 2 class 3 HYPONYM people 1 component 3 HYPONYM cause 5 composition 4 HYPONYM property 2 conduct 1 HYPONYM activity 1 constitution 2 HYPONYM property 2 cover 5 HYPONYM covering 4 earth 1 HYPONYM concern 1</p> <p>effort 3 HYPONYM activity 1 facility 5 HYPONYM skillfulness 1 family 1 HYPONYM clan 1 family 4 HYPONYM accumulation 2</p> <p>female 1 HYPONYM animal 1</p> <p>field 13 HYPONYM dry land 1 field 15 HYPONYM environment 2</p> <p>form 11 HYPONYM assemblage 4 fruit 1 HYPONYM product 2 function 2 HYPONYM utility 3 grade 5 HYPONYM assemblage 4 head 8 HYPONYM external body part 1 head 9 HYPONYM cognition 1 intellect 1 HYPONYM intelligence 2 kin 1 HYPONYM social group 1 language 1 HYPONYM faculty 1</p> <p>life 9 HYPONYM being 2</p> <p>living 4 HYPONYM being 2 male 1 HYPONYM animal 1 mark 10 HYPONYM symbol 2 mass 1 HYPONYM physical property 1</p> <p>molecule 2 HYPONYM matter 1 month 1 HYPONYM time unit 1 nature 1 HYPONYM trait 1</p>

<p>paper 6 HYPONYM material 5 particle 3 HYPONYM material 5 picture 1 HYPONYM representation 3 picture 2 HYPONYM graphic art 1 possibility 1 HYPONYM alternative 1 power 2 HYPONYM quality 1 power 3 HYPONYM cognition 1 power 7 HYPONYM causal agency 1 purpose 2 HYPONYM end 5 role 1 HYPONYM duty 1 role 4 HYPONYM acting out 1 sheet 4 HYPONYM artefact 1 sheet 5 HYPONYM paper 6 skin 1 HYPONYM body covering 1 skin 4 HYPONYM body covering 1 sound 5 HYPONYM happening 1</p> <p>speech 5 HYPONYM auditory communication 1 subdivision 3 HYPONYM writing 4 surface 1 HYPONYM artefact 1 surface 4 HYPONYM bound 2 wood 4 HYPONYM plant material 1 world 2 HYPONYM experience 2 world 3 HYPONYM group 1 world 5 HYPONYM people 1 world 7 HYPONYM natural object 1 world 8 HYPONYM planet 1</p>	<p>paper 3 HYPONYM press 8 particle 2 HYPONYM body 9 picture 5 HYPONYM show 3</p> <p>possibility 4 HYPONYM being 2 power 8 HYPONYM physical phenomenon 1</p> <p>purpose 1 HYPONYM utility 3 role 3 HYPONYM utility 3</p> <p>sheet 2 HYPONYM piece of cloth 1</p> <p>skin 5 HYPONYM tissue 1</p> <p>sound 1 HYPONYM sound property 1 sound 2 HYPONYM sensation 1 speech 1 HYPONYM faculty 1 subdivision 4 HYPONYM division 9 surface 5 HYPONYM layer 3</p> <p>wood 3 HYPONYM flora 2 world 1 HYPONYM concern 1</p>
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Appendix IVb: Hyperonym Chains for selected New Noun BCs sharing Entries with EWN1

Selected New BCs

BCs in EWN1

_ class 3

HYPONYM people 1

HYPONYM group 1 LEAF

_ composition 4

HYPONYM property 2

HYPONYM attribute 1

HYPONYM abstraction 1 LEAF

_ earth 1

HYPONYM concern 1

HYPONYM interest 4

HYPONYM curiosity 2

HYPONYM cognitive state 1

HYPONYM state 1 LEAF

_ facility 5

HYPONYM skillfulness 1

HYPONYM state 1 LEAF

_ female 1

HYPONYM animal 1

HYPONYM being 1

HYPONYM entity 1 LEAF

_ head 8

HYPONYM external body part 1

HYPONYM body part 1

HYPONYM part 10

HYPONYM entity 1 LEAF

_ head 9

HYPONYM cognition 1

HYPONYM psychological feature 1 LEAF

_ intellect 1

HYPONYM intelligence 2

HYPONYM ability 2

HYPONYM cognition 1

HYPONYM psychological feature 1 LEAF

_ life 9

HYPONYM being 2

HYPONYM state 1 LEAF

_ male 1

HYPONYM animal 1

HYPONYM being 1

HYPONYM entity 1 LEAF

_ mass 1

HYPONYM physical property 1

HYPONYM property 2

HYPONYM attribute 1

HYPONYM abstraction 1 LEAF

_ particle 2

HYPONYM body 9

HYPONYM natural object 1

HYPONYM inanimate object 1

HYPONYM entity 1 LEAF

_ purpose 1

HYPONYM utility 3

HYPONYM quality 1

```

                HYPONYM attribute 1
                    HYPONYM abstraction 1 LEAF
_ subdivision 4
  HYPONYM division 9
    HYPONYM administrative unit 1
      HYPONYM unit 4
        HYPONYM organization 5
          HYPONYM social group 1
            HYPONYM group 1 LEAF
_ wood 3
  HYPONYM flora 2
    HYPONYM accumulation 2
      HYPONYM group 1 LEAF
```

Appendix V: Hyperonym Chains for 30 new verb Base Concepts

Selected New BCs

BCs in EWN1

_ belong to 1

HYPONYM be 4 LEAF

_ cook 2

HYPONYM change integrity 1

HYPONYM change 11 LEAF

_ develop 4

HYPONYM become bigger 1

HYPONYM increase 7

HYPONYM change magnitude 1

HYPONYM change 11 LEAF

_ hear 3

HYPONYM feel 12 LEAF

_ hide 5 LEAF

_ influence 8

HYPONYM affect 3

HYPONYM alter 3 LEAF

_ laugh 3

HYPONYM express emotion 1 LEAF

_ miss 11 LEAF

_ occupy 2

HYPONYM assail 1

HYPONYM fight 5 LEAF

_ open up 4 LEAF

_ originate in 1 LEAF

_ press 17

HYPONYM touch 18 LEAF

_ raise 5

HYPONYM increase 6

HYPONYM alter 3 LEAF

_ reach 12

HYPONYM come through 3 LEAF

_ result 4

HYPONYM fall 23

HYPONYM be 4 LEAF

_ rise 11

HYPONYM become bigger 1

HYPONYM increase 7

HYPONYM change magnitude 1

HYPONYM change 11 LEAF

_ run 31

HYPONYM hurry 6

HYPONYM go 14 LEAF

_ run 36

HYPONYM change position 1 LEAF

_ stand up 3

HYPONYM be in a resting position 1

HYPONYM be 4 LEAF

_ start out 1 LEAF

_ stress 10

HYPONYM evince 1

HYPONYM convey 1

HYPONYM communicate 1

HYPONYM act together 2

HYPONYM act 12 LEAF

_ suffer emotionally 1

HYPONYM experience 6 LEAF
 _ suggest 1
 HYPONYM declare 5
 HYPONYM say 8
 HYPONYM express 5 LEAF
 _ take in liquids 1
 HYPONYM consume 2 LEAF
 _ teach 2
 HYPONYM give information 1
 HYPONYM communicate 1
 HYPONYM act together 2
 HYPONYM act 12 LEAF
 _ tend 4
 HYPONYM be 4 LEAF
 _ travel behind 1
 HYPONYM go 14 LEAF
 _ unite 4
 HYPONYM fall in 2 LEAF
 _ weep 1
 HYPONYM express emotion 1 LEAF
 _ win 5
 HYPONYM acquire 3 LEAF

Appendix VIa: New Verb Base Concepts sharing Entries with EWN1

EWN1 BCs	EWN2 BCs (30)
<p>appear 6 HYPONYM be 4 apply 4 ask 1 HYPONYM communicate 1 break up 4 HYPONYM break 20 carry 27 HYPONYM feature 4 connect 4 cover 16</p> <p>demonstrate 1 HYPONYM affirm 1 discover 2 discover 5 HYPONYM conceive 2 find 3 HYPONYM change 11 find 4 HYPONYM cease 2 find 7 find 9 HYPONYM conceive 2 find 14 fit 9 HYPONYM be 10 give 2 HYPONYM change 11 give 16 HYPONYM transfer 12 give 18 give 24 go 4 HYPONYM change state 1 go 6 HYPONYM change state 1 go 8 HYPONYM change 11 go 14 go 15 go 17 HYPONYM cause to be perceived 1 go 25 HYPONYM be 9 go away 2 go away 3 HYPONYM depart 1</p> <p>hurt 6 HYPONYM cause to feel unwell 1</p> <p>live 2 live 4</p> <p>make 12 make 13 make 15 HYPONYM create 1 make 17 HYPONYM create 2 make 29 need 5 HYPONYM be 4 need 6 order 15 part 13 HYPONYM displace 3 perform 1 HYPONYM create again 1 point 28 HYPONYM command 10 produce 3 HYPONYM create 1</p> <p>require 3 HYPONYM be 4 see 5 HYPONYM believe 3 seek 3 HYPONYM act 12 spend 3 touch 17 touch 18 touch 25 treat 2</p>	<p>appear 2 apply 1 HYPONYM ask 1 ask 2 HYPONYM communicate 1 break up 18 carry 15 HYPONYM displace 3 connect 2 HYPONYM celebrate 1 cover 12 HYPONYM broach 2 cover 18 HYPONYM airt 2 demonstrate 4 HYPONYM cause to appear 1</p> <p>discover 7 HYPONYM catch sight of 1</p> <p>find 11 HYPONYM catch sight of 1</p> <p>fit 10 HYPONYM fit 13</p> <p>give 19 HYPONYM bring 9</p> <p>go 13 go 16 go 21</p> <p>go away 1</p> <p>hurt 7 HYPONYM be 4</p> <p>live 5 live 6 HYPONYM be 9</p> <p>make 20 HYPONYM create 2</p> <p>need 8</p> <p>order 20 HYPONYM decide 1 part 17 perform 2 HYPONYM create again 1 point 24 HYPONYM give information 1 produce 4 HYPONYM cultivate 3</p> <p>require 4 see 14 HYPONYM feel 12 seek 1 spend 1 HYPONYM make a payment 1 touch 26 HYPONYM be 9</p> <p>treat 3 HYPONYM affect 3</p>

work 21	work 20
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Appendix VIb: Hyperonym Chains for selected New Verb BCs sharing Entries with EWN1

Selected New BCs

BCs in EWN1

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_ appear 2 LEAF
_ break up 18 LEAF
_ carry 15
  HYPONYM displace 3 LEAF
_ connect 2
  HYPONYM cerebrate 1 LEAF
_ cover 12
  HYPONYM broach 2
    HYPONYM discuss 2
      HYPONYM speak of 1
        HYPONYM mouth 6
          HYPONYM communicate 1
            HYPONYM act together 2
              HYPONYM act 12 LEAF
_ cover 18
  HYPONYM airt 2
    HYPONYM go 14 LEAF
_ go 13 LEAF
_ go 16 LEAF
_ go 21 LEAF
_ hurt 7
  HYPONYM be 4 LEAF
_ live 6
  HYPONYM be 9 LEAF
_ order 20
  HYPONYM decide 1 LEAF
_ point 24
  HYPONYM give information 1
    HYPONYM communicate 1
      HYPONYM act together 2
        HYPONYM act 12 LEAF
_ see 14
  HYPONYM feel 12 LEAF
_ seek 1 LEAF
_ spend 1
  HYPONYM make a payment 1
    HYPONYM give 16
      HYPONYM transfer 12 LEAF
_ treat 3
  HYPONYM affect 3
    HYPONYM alter 3 LEAF

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Appendix VII: New Noun Base Concepts (20) with glosses, EWN Top Concepts and WN1.5 hyperonyms

WordNet1.5 Synset: {contact 1}
 Part-of-Speech: n
 WordNet1.5 File off-set: 21939
 WordNet1.5 Gloss: close interaction: "they claimed that they had been in contact with extraterrestrial beings"
 WordNet1.5 Hyperonyms: interaction#1
 EuroWordNet Top Concepts: 04 Dynamic Agentive Social Communication

WordNet1.5 Synset: {sale 2}
 Part-of-Speech: n
 WordNet1.5 File off-set: 618701
 WordNet1.5 Gloss: the general activity of selling; "they tried to boost sales" or "they object to the sale of handguns" or "contraceptives were not for sale"
 WordNet1.5 Hyperonyms: marketing#2
 EuroWordNet Top Concepts: 04 Dynamic Agentive Possession Social

WordNet1.5 Synset: {age 1}
 Part-of-Speech: n
 WordNet1.5 File off-set: 3447555
 WordNet1.5 Gloss: the length of time something (or someone) has existed; "his age was 71"; "it was replaced because of its age"
 WordNet1.5 Hyperonyms: property#2
 EuroWordNet Top Concepts: 07 State Time Quantity

WordNet1.5 Synset: {composition 4; constitution#2; makeup#2}
 Part-of-Speech: n
 WordNet1.5 File off-set: 3451500
 WordNet1.5 Gloss:
 WordNet1.5 Hyperonyms: property#2
 EuroWordNet Top Concepts: 07 Property Physical

WordNet1.5 Synset: {aroma 1; odor#1; odour#1; olfactory property#1; scent#1; smell#2}
 Part-of-Speech: n
 WordNet1.5 File off-set: 3476724
 WordNet1.5 Gloss:
 WordNet1.5 Hyperonyms: property#2
 EuroWordNet Top Concepts: 07 SituationType Experience Physical

Stimulating

WordNet1.5 Synset: {physical property 1}
 Part-of-Speech: n
 WordNet1.5 File off-set: 3492364
 WordNet1.5 Gloss:
 WordNet1.5 Hyperonyms: property#2
 EuroWordNet Top Concepts: 07 Property Physical

WordNet1.5 Synset: {brain 2; head#9; mind#1; nous#1; psyche#1}
 Part-of-Speech: n
 WordNet1.5 File off-set: 3837522
 WordNet1.5 Gloss: that which is responsible for one's thoughts and feelings; the seat of the faculty of reason; "his mind wandered"; "I couldn't get his words out of my head"
 WordNet1.5 Hyperonyms: cognition#1
 EuroWordNet Top Concepts: 09 Property Mental Modal

WordNet1.5 Synset: {intellect 1; mind#2}
 Part-of-Speech: n
 WordNet1.5 File off-set: 3842682
 WordNet1.5 Gloss: knowledge and intellectual ability; "he reads to improve his mind"; "he has a keen intellect"
 WordNet1.5 Hyperonyms: intelligence#2

EuroWordNet Top Concepts: 09 Property Mental Modal
 WordNet1.5 Synset: {facility 5; proficiency#2; technique#1}
 Part-of-Speech: n
 WordNet1.5 File off-set: 3853087
 WordNet1.5 Gloss: skillfulness in the command of fundamentals deriving from practice and familiarity; "practice greatly improves proficiency"
 WordNet1.5 Hyperonyms: skillfulness#1
 EuroWordNet Top Concepts: 09 Property Modal
 WordNet1.5 Synset: {gustatory perception 1; gustatory sensation#1; taste#3; taste perception#1; taste sensation#1}
 Part-of-Speech: n
 WordNet1.5 File off-set: 3893475
 WordNet1.5 Gloss: the sensation that results when taste buds in the tongue and throat convey information about the chemical composition of a soluble stimulus; "the candy left him with a bad taste"; "the melon had a delicious taste"
 WordNet1.5 Hyperonyms: sensation#1
 EuroWordNet Top Concepts: 09 SituationType Experience Stimulating Physical
 WordNet1.5 Synset: {acculturation 3; culture#4}
 Part-of-Speech: n
 WordNet1.5 File off-set: 4031912
 WordNet1.5 Gloss: all the knowledge and values shared by a society
 WordNet1.5 Hyperonyms: cognitive content#1
 EuroWordNet Top Concepts: 09 Property Social
 WordNet1.5 Synset: {point of view 2; stand#9; standpoint#1; viewpoint#1}
 Part-of-Speech: n
 WordNet1.5 File off-set: 4121418
 WordNet1.5 Gloss: a mental position from which things are viewed; "we should consider this problem from the point of view of the Russians"
 WordNet1.5 Hyperonyms: perspective#2
 EuroWordNet Top Concepts: 09 Static Mental
 WordNet1.5 Synset: {begetter 1; father#1}
 Part-of-Speech: n
 WordNet1.5 File off-set: 6083734
 WordNet1.5 Gloss: a male parent (also used as a term of address to your father); "his father was born in Atlanta"
 WordNet1.5 Hyperonyms: parent#1
 EuroWordNet Top Concepts: 18 Human
 WordNet1.5 Synset: {member 4}
 Part-of-Speech: n
 WordNet1.5 File off-set: 6203925
 WordNet1.5 Gloss: one of the persons associated in a group
 WordNet1.5 Hyperonyms: associate#3
 EuroWordNet Top Concepts: 18 Human Part
 WordNet1.5 Synset: {female parent 1; mother#2}
 Part-of-Speech: n
 WordNet1.5 File off-set: 6216277
 WordNet1.5 Gloss: a woman who has given birth to a child (also used as a term of address to your mother); "the mother of three children"
 WordNet1.5 Hyperonyms: parent#1
 EuroWordNet Top Concepts: 18 Human
 WordNet1.5 Synset: {educatee 1; pupil#3; student#2}
 Part-of-Speech: n
 WordNet1.5 File off-set: 6378378
 WordNet1.5 Gloss: a learner who is enrolled in an educational institution
 WordNet1.5 Hyperonyms: enrollee#1
 EuroWordNet Top Concepts: 18 Human
 WordNet1.5 Synset: {revenue enhancement 1; tax#1; taxation#2}

Part-of-Speech: n
 WordNet1.5 File off-set: 8167567
 WordNet1.5 Gloss: charge against a citizen's person or property or activity for the support of government
 WordNet1.5 Hyperonyms: levy#2
 EuroWordNet Top Concepts: 21 BoundedEvent Agentive Social Possession
 WordNet1.5 Synset: {being 2; beingness#1; existence#1}
 Part-of-Speech: n
 WordNet1.5 File off-set: 8539416
 WordNet1.5 Gloss: the state or fact of existing: "a point of view gradually coming into being"; "laws in existence for centuries"
 WordNet1.5 Hyperonyms: state#1
 EuroWordNet Top Concepts: 26 Static Existence
 WordNet1.5 Synset: {age 2}
 Part-of-Speech: n
 WordNet1.5 File off-set: 9071689
 WordNet1.5 Gloss: a historic period; "the Victorian age"; "we live in a litigious age"
 WordNet1.5 Hyperonyms: time#5
 EuroWordNet Top Concepts: 28 State Time Quantity
 WordNet1.5 Synset: {history 5}
 Part-of-Speech: n
 WordNet1.5 File off-set: 9072323
 WordNet1.5 Gloss: the continuum of events occurring in succession leading from the past to the present and even into the future: "all of human history"
 WordNet1.5 Hyperonyms: continuum#1
 EuroWordNet Top Concepts: 28 State Time Quantity

Appendix VIII: New Verb Base Concepts (23) with glosses, EWN Top Concepts and WN1.5 hyperonyms

WordNet1.5 Synset: {be in pain 1; feel pain#1; hurt#7; suffer#1}
 Part-of-Speech: v
 WordNet1.5 File off-set: 40966
 WordNet1.5 Gloss:
 WordNet1.5 Hyperonyms: be#4
 EuroWordNet Top Concepts: 29 Dynamic Experience Condition

WordNet1.5 Synset: {change by heating 1; cook#2}
 Part-of-Speech: v
 WordNet1.5 File off-set: 195536
 WordNet1.5 Gloss: "These potatoes have to cook for 20 minutes"
 WordNet1.5 Hyperonyms: change integrity#1
 EuroWordNet Top Concepts: 30 Dynamic Cause Physical

WordNet1.5 Synset: {begin 1; commence#1; set about#1; set out#1; start#9; start out#1}
 Part-of-Speech: v
 WordNet1.5 File off-set: 207968
 WordNet1.5 Gloss: "We began working at dawn"; "He started his trip yesterday"
 WordNet1.5 Hyperonyms:
 EuroWordNet Top Concepts: 30 Dynamic Time

WordNet1.5 Synset: {appear 2}
 Part-of-Speech: v
 WordNet1.5 File off-set: 251107
 WordNet1.5 Gloss: come into sight or view; "He suddenly appeared at the wedding"
 WordNet1.5 Hyperonyms:
 EuroWordNet Top Concepts: 30 Dynamic Location Physical Stimulating

WordNet1.5 Synset: {process 7; treat#3}
 Part-of-Speech: v
 WordNet1.5 File off-set: 302695
 WordNet1.5 Gloss: subject to a process or treatment, often with the aim of improving or readying for some purpose; "process cheese"; "process hair"; "process water"
 WordNet1.5 Hyperonyms: affect#3
 EuroWordNet Top Concepts: 30 Dynamic Agentive

WordNet1.5 Synset: {look for 1; search#7; seek#1}
 Part-of-Speech: v
 WordNet1.5 File off-set: 754445
 WordNet1.5 Gloss: try to locate or try to establish the existence of; "The police are searching for clues"
 WordNet1.5 Hyperonyms:
 EuroWordNet Top Concepts: 35 Agentive Dynamic Experience Mental

WordNet1.5 Synset: {cause to open 1; open#8; open up#4}
 Part-of-Speech: v
 WordNet1.5 File off-set: 772933
 WordNet1.5 Gloss: "Mary opened the car door"
 WordNet1.5 Hyperonyms:
 EuroWordNet Top Concepts: 35 BoundedEvent Cause Physical Location

WordNet1.5 Synset: {function 7; go#13; operate#6; run#24; work#12}
 Part-of-Speech: v
 WordNet1.5 File off-set: 877616
 WordNet1.5 Gloss: function properly; "The washing machine won't go unless it's plugged in"
 WordNet1.5 Hyperonyms:
 EuroWordNet Top Concepts: 35 Dynamic Purpose Usage

WordNet1.5 Synset: {be standing 1; be upright#1; stand#15; stand up#3}

Part-of-Speech: v
 WordNet1.5 File off-set: 890125
 WordNet1.5 Gloss: "We had to stand for the entire performance!"
 WordNet1.5 Hyperonyms: be in a resting position#1
 EuroWordNet Top Concepts: 35 Static Location Physical
 WordNet1.5 Synset: {express emotion 1; express feelings#1}
 Part-of-Speech: v
 WordNet1.5 File off-set: 1026241
 WordNet1.5 Gloss:
 WordNet1.5 Hyperonyms:
 EuroWordNet Top Concepts: 37 Communication Dynamic
 WordNet1.5 Synset: {get going 2; go#16; start#15}
 Part-of-Speech: v
 WordNet1.5 File off-set: 1063101
 WordNet1.5 Gloss: "I start at eight in the morning"; "Ready, set,
 go!"
 WordNet1.5 Hyperonyms:
 EuroWordNet Top Concepts: 38 BoundedEvent
 WordNet1.5 Synset: {cover 18; cross#6; cut across#2; cut through#4; get
 across#2; get over#3; pass over#4; track#11; traverse#5}
 Part-of-Speech: v
 WordNet1.5 File off-set: 1089601
 WordNet1.5 Gloss: travel across
 WordNet1.5 Hyperonyms: airt#2
 EuroWordNet Top Concepts: 38 BoundedEvent Location Physical
 WordNet1.5 Synset: {conceal 1; hide#5}
 Part-of-Speech: v
 WordNet1.5 File off-set: 1224184
 WordNet1.5 Gloss: prevent from being seen or discovered
 WordNet1.5 Hyperonyms:
 EuroWordNet Top Concepts: 39 Agentive BoundedEvent Location Physical
 WordNet1.5 Synset: {be in the possession of 1; belong to#1}
 Part-of-Speech: v
 WordNet1.5 File off-set: 1309662
 WordNet1.5 Gloss:
 WordNet1.5 Hyperonyms: be#4
 EuroWordNet Top Concepts: 40 Relation Possession
 WordNet1.5 Synset: {break up 18; part#17; separate#12; split#9; split up#3}
 Part-of-Speech: v
 WordNet1.5 File off-set: 1376355
 WordNet1.5 Gloss: go different ways, as of a couple or a social group
 WordNet1.5 Hyperonyms:
 EuroWordNet Top Concepts: 41 Agentive BoundedEvent Social
 WordNet1.5 Synset: {act in concert 1; unify#4; unite#4}
 Part-of-Speech: v
 WordNet1.5 File off-set: 1398086
 WordNet1.5 Gloss: unite in a common purpose or belief, for example
 WordNet1.5 Hyperonyms: fall in#2
 EuroWordNet Top Concepts: 41 Dynamic Agentive Social
 WordNet1.5 Synset: {accomplish 2; achieve#1; attain#3; reach#12}
 Part-of-Speech: v
 WordNet1.5 File off-set: 1430579
 WordNet1.5 Gloss:
 WordNet1.5 Hyperonyms: come through#3
 EuroWordNet Top Concepts: 41 BoundedEvent Agentive
 WordNet1.5 Synset: {act upon 2; exert influence upon#1; influence#8}
 Part-of-Speech: v
 WordNet1.5 File off-set: 1436060
 WordNet1.5 Gloss: have influence or effect
 WordNet1.5 Hyperonyms: affect#3
 EuroWordNet Top Concepts: 41 BoundedEvent Cause

WordNet1.5 Synset: {endure 3; go#21; hold out#3; hold up#5; last#4; live#5; survive#2}

Part-of-Speech: v

WordNet1.5 File off-set: 1480699

WordNet1.5 Gloss: continue to live, endure or last; "We went without water and food for 3 days"

WordNet1.5 Hyperonyms:

EuroWordNet Top Concepts: 42 Dynamic Existence Condition

WordNet1.5 Synset: {be from 1; come from#2; hail from#1; originate in#1}

Part-of-Speech: v

WordNet1.5 File off-set: 1485964

WordNet1.5 Gloss:

WordNet1.5 Hyperonyms:

EuroWordNet Top Concepts: 42 Relation

WordNet1.5 Synset: {lack 3; miss#11}

Part-of-Speech: v

WordNet1.5 File off-set: 1488598

WordNet1.5 Gloss: be without; "This soup lacks salt"; "There is something missing in my jewellery box!"

WordNet1.5 Hyperonyms:

EuroWordNet Top Concepts: 42 Property

WordNet1.5 Synset: {ensue 1; result#4}

Part-of-Speech: v

WordNet1.5 File off-set: 1490118

WordNet1.5 Gloss:

WordNet1.5 Hyperonyms: fall#23

EuroWordNet Top Concepts: 42 Relation Cause Mental

WordNet1.5 Synset: {dwell 2; inhabit#1; live#6; make one's home#1; people#6; populate#1; reside#2; shack#3}

Part-of-Speech: v

WordNet1.5 File off-set: 1499405

WordNet1.5 Gloss: live in; "There are only 250,000 people in Island"

WordNet1.5 Hyperonyms: be#9

EuroWordNet Top Concepts: 42 Relation Physical Location