The Effect of Semantic Properties on Rates of Cross-linguistic Lexical Change

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1 Introduction and Research Background

The rate of lexical change and innovation does not appear to be constant for all words, but rather varies between lexical items and groups of lexical items. Several factors have been proposed for this variance, and this paper investigates the extent to which the semantic nature of a concept influences its lexical stability. This is done by semantic tagging of three different cognate databases of lexical items from the Austronesian, Indo-European (as a whole) and Germanic language families.

1.1 Are there differences in lexical stability?

The view that lexical change is constant was championed by Swadesh (1971), who compiled lists of very stable lexical items. These lists are still in wide use today, and while their items are in general considered quite stable, research has shown that there are large individual differences in stability between concepts (see Rea 1958 and Bergslund & Vogt 1952, among others).

In Dahl (2004), it is shown that the semantic concept GIRL is lexically much less stable in the Romance family than the concept THREE: each Romance language studied had deviated from the original Latin word for GIRL, but all kept a cognate of the Latin word for THREE[1].

Swadesh (1971) claimed that the core vocabulary of a language is replaced at a constant rate of 15% in one millennium - this would give these vocabulary items a half life of 4300 years, after which half the original words would, statistically, remain (Dahl 2004). Dahl attempts to establish an upper and lower boundary of the speed at which different semantic concepts change. For the semantic concept of GIRL, the retention rate is clearly less than 1/15 in 2000 years – which would give this semantic field a half-life of 500 years – clearly far less than the 4300 years predicted by Swadesh.

The reasons why certain concepts might be more stable than others could potentially be traced to cultural or environmental factors (presumably a tool that is used often could be lexically replaced at a different rate than one that is used seldom), to cognitive universals

[1] Semantic concepts are written with capital letters.

(action words or object words could be treated differently by the human mind) or to linguistic universals – or indeed, any combination of the above. While I will briefly review the literature on some of the theories, my chief interest lies in mapping semantic universals: are there semantic patterns to the rate of lexical change?

1.2 Why are certain lexical concepts more stable than others?

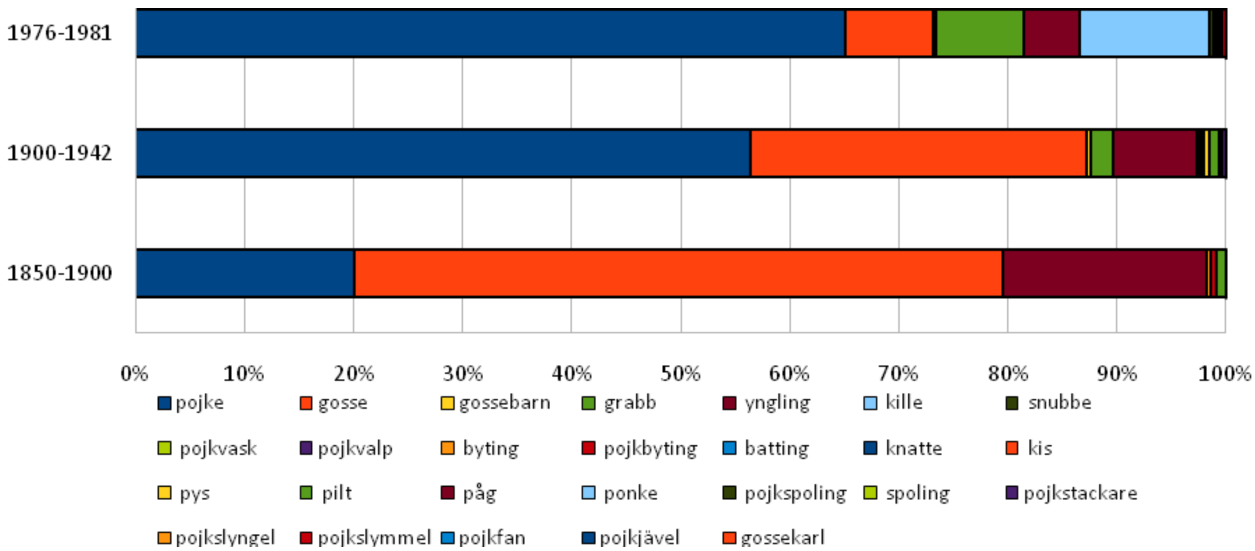
Field (2002) has found that there is some semantic regularity to which kinds of words are more easily borrowed, and Nichols (2006) shows that the lexical type of a language can affect the rate of change. We also know from the study of Pidgins and Creoles that lexical change can take place very rapidly in intense contact situations. Likewise, Nettle (1999) finds that the size of a speaker community has an effect on the rate of language change: through computer simulations, he shows that smaller communities are more likely than bigger communities to have a faster rate of language change, to borrow lexical items and to produce linguistically marked structures.

Pagel et al (2007) claim that as much as 50% of the difference in the rate of lexical change can be traced to word frequency: words that are used frequently are more likely to change than words that are used seldom – the scarce words are more likely to follow established patterns, and not face innovations. They find that the half-life of a lexical item varies from 750 years for the fastest evolving words to over 10,000 years for the slowest, and that prepositions and conjunctions change the fastest, followed by adjectives, verbs, nouns, special adverbs (*what*, *where*, *when*, *how*, *where*, *here*, *there* and *not*), pronouns and finally numbers. The authors theorize that the parts of speech that seem more important to meaning (e.g. nouns and verbs) seem to change slower than less meaning-intense lexical items such as conjunctions and prepositions. Either the frequency of word use directly affects the rate at which new lexical items form, or the rate at which forms appear is the same for all concepts, but the chance that the new lexical item will be adopted by a given population is dependent on the frequency of use.

A temporally more confined look at specific lexical items shows a much more dynamic change than is first inferred from any of the time periods mentioned above. In Vejdemo (2009) I show how the semantic concepts BOY and GIRL vary over a period of 150 years in two related languages,Swedish and Norwegian. Below is a graph of the change in Swedish for all the different lexical items in use for the concept BOY during three different time periods.

One of the more interesting things that can be gleaned from the diagram is that comebacks are rare: once a word is declining in use, it will typically continue to decline. While the time depth is too small to show the birth and death of a BOY lexical item in the speaker community, it is clear that there is a constant struggle over which parts of conceptual space a certain lexical item can cover. For concepts such as BOY, change is fast and one hundred years is a long period – some words can appear healthy and vibrant for a few decades, only to then disappear.

Figure 1: lexical items for the concept BOY in Swedish



1.3 The semantic aspect

Few studies have had a mainly semantic focus in their approach to rates of lexical change. To a certain extent, word classes can be evaluated by semantic criteria. Pagel et al (2007) suggest that the following ranking holds (">" means "more stable than"):

(1) Numbers > Pronouns > Special adverbs > Nouns > Verbs > Adjectives > Prepositions & Conjunctions

The goal of this paper is to see if there is reason to suspect that semantic properties of concepts affect their rate of lexical change – if semantically different kinds of verbs, or different kinds of nouns, show differences in behavior.

2 Data

I have worked with three different sets of comparative wordlists: the Dyen et al (1997) Indo-European data set, the Darling-Buck (1949) Germanic data set and the Austronesian Basic Vocabulary Database by Greenhill et al (2008).

2.1 The Indo-European Data

Dyen et al (1997) assembled comparative word lists for 85 languages in 95 lists. For a few languages there are several lists with data from different dialects. The word lists contain 200 concepts and are annotated with cognate information. The data was available in a tab separated values format, which after some initial cleaning could be put in a relational database. I elected to keep all the 95 language lists.

Each language list may have one or more lexical items corresponding to a certain concept. Cognate evaluations are based on the languages and not the lexical items: for a certain concept, two languages may be judged cognate or not. If two lexical items are given for a single concept, the lexical item that is most strongly related to a cognate group will determine which cognate group that concept in that language is labeled with. To quote Dyen et al (1992):

> "(...)consider meaning 073, TO HIT(...)
>
> | | |
> |---|---|
> | Afrikaans | Slaan, Raps |
> | German ST | Schlagen, Treffen |
> | Danish | Ramme, Traeffe |
>
> The first two form lines are listed as 'cognate' since SLAAN and SCHLAGEN are judged 'cognate'. The fact that RAPS and TREFFEN are 'not cognate' to one another nor to SLAAN and SCHLAGEN does not matter, since it is the highest degree of cognation (between SLAAN and SCHLAGEN) which is used. The last two form lines are also listed 'cognate' since TREFFEN and TRAEFFE are judged 'cognate'. However, the first and third form lines are listed as 'not cognate', since both SLAAN and RAPS are judged 'not cognate' with both RAMME and TRAEFFE."

This means that based on the concept TO HIT above, it is never examined whether the lexical item RAPS forms a cognate group of its own. In the other data sets, which we will discuss below, each lexical item is given a cognacy decision.

2.2 The Germanic Data

Darling-Buck's (1949) monumental work *Dictionary of Selected Synonyms in the Principal Indo-European Languages* is an etymological dictionary of 80 languages. I shall only use a subsection of that data; namely the wordlists for Gothic (East Germanic), Old Nordic, Danish, Swedish (all North Germanic), Old English, Middle English, New English, Dutch, Old High German, Middle High German and New High German (all West Germanic). They are all analyzed for cognates.[2] The comparative wordlist contains 1053 concepts – lack of data has unfortunately meant that for certain languages, certain concepts are not represented, but overall these exceptions are a rarity.

2.3 The Austronesian Data

The Austronesian Basic Vocabulary Database, ABVD, (Greenhill et al 2008) has data from more than 500 Austronesian languages on a 200-item concept list: similar to, but not identical

[2] The Darling-Buck (1949) data had been preprocessed and put into tables by Professor Östen Dahl at Stockholm University. I am very thankful to him for sharing these with me.

to, the list used by Darling-Buck (1949) and Dyen et al (1992). Some of the concepts are represented by barely 100 lexical items in the database, others by more than 700. I was unable to gain access to the raw data, but instead used a database output of the number of cognates for each concept, graciously provided to me by the ABVD research group. Each lexical item is labeled as belonging to a certain set of cognates. For instance, we see in Table 1that there are 98 lexical items associated with the concept FIFTY, and that these 98 items are distributed over 4 cognate sets (of which one only has a single member).

Table 1: The concept FIFTY

Greenhill et al (2008) - Austronesian

concept	cognate set ID	lexical items in set	total # of lexical items for the concept
Fifty	4	1	98
Fifty	2	38	98
Fifty	3	4	98
Fifty	1	55	98

3 Methods

I have placed the data from all three sources listed above into different tables in a single relational database, making it possible to run queries over all the data. An inherent problem is the different sizes and scopes of the data sources: The languages in Darling-Buck (1949) are a subset of those in Dyen et al (1992), but with more than 800 additional concepts, and possibly with different cognate decisions and lexical items entered. There is also the problem that Greenhill et al (2008) and Darling-Buck (1949) have cognate decisions for every single lexical item, whereas Dyen et al (1992) only have one cognate decision per language and concept (based on which cognate group best fits).

In addition, it is always questionable how correct the data is, when working with comparative word lists. Returning to the detailed history of lexical items for BOY in Swedish (Vejdemo 2009), we saw more than 26 lexical forms listed for the concept BOY in Swedish during the last 150 years. This can be contrasted with the two lexical items listed for Swedish in Dahl: "gosse" and "pojke". Looking for a silver lining in this, we can at least say that the bad data might hide semantic categories from us, but any recurrent patterns of semantic categories that do show up despite of this noise should be quite strong.

3.1 Cognates and concepts

While there is no published reasoning behind the cognate decisions in the three databases, the general process of cognate judgments is explained below. Table 2 shows an example from the comparative wordlists in Darling-Buck (1949). The columns represent the languages and in the second row we see the lexemes for the semantic concept girl.

Table 2: girl in Germanic

Concept	Goth	ON	Dan	Sw	OE	ME	NE	Du	OHG	MHG	NHG
girl	mawi	mǣr, stūlka	pige	flicka	mæʒden	maid, maiden, girle, lasce	girl, maid, lass	meisje	magad	maget	mädchen
cognates?	1	1, 2	3	4	1	1, 1, 5, 6	5, 1, 6	1	1	1	1

If one were to take the highest number in the third row, one could say that it represents the stability of the lexical item. For girl, the number would be 6: we have discovered 6 words that represent girl, i.e. 6 different kinds of cognate classes. Compare girl to three below:

Table 3: three in Germanic

Concept	Goth	ON	Dan	Sw	OE	ME	NE	Du	OHG	MHG	NHG
THREE	Þreis	Þrir	tre	tre	Þrī	thre	three	drie	drī	drī	drei
cognates?	1	1	1	1	1	1	1	1	1	1	1

This indicates that girl is lexically less stable than three in these languages: three has changed less often in the Germanic family.

3.2 Average number of cognates

We can compare the following figures for number of different cognates for woman and three: In all three data sources, we see that woman has more cognates than three. We could say that three > woman (">" means: is more stable than/less likely to change than). The number of cognate classes divided by the number of language varieties gives us an average number of cognates per concept.

Unfortunately, it is impossible compare the averages directly. We do not know that three (avg. 0.091) in Darling-Buck (1949) is less stable than three in Dyen et al (1997) (avg. 0.011); after all, in both cases there is a single cognate class for all languages. It is indeed more noteworthy that there would be a single cognate class among 95 language varieties (in the case of the Indo-European data) than among 11 (the Germanic family), but from this we cannot draw the conclusion that three is less stable in the earlier dataset. Any attempt to normalize the numbers between the data is going to produce problems with extreme values, where (almost) all languages have the same cognate or where (almost) all languages have a number of different cognates. What we can do is say that the stability ranking of THREE is the same in all three databases compared to the ranking of WOMAN.

Table 4: WOMAN and THREE in Germanic

Darling-Buck (1949) – Germanic			
Concept	Cognate Classes	Number of Languages	Average
WOMAN	5	11	0.460
THREE	1	11	0.091

Table 5: WOMAN and THREE in Indo-European

Dyen et al (1992) – Indo-European			
Concept	Cognate Classes	Number of Languages	Average
WOMAN	30	95	0.315
THREE	1	95	0.011

Table 6: WOMAN and THREE in Germanic

Greenhill et al (2008) – Austronesian			
Concept	Cognate Classes	Number of Languages	Average
WOMAN	100	572	0.175
THREE	10	498	0.133

In Section 4 (tables 7, 8 and 9), I will show the word classes and their average number of cognates per language. The fact that the Darling-Buck (1949) data goes from 0.3 to 0.6 whereas the others do not top 0.4 is of course due to their relative sizes; only the ranking, not the numbers, can be compared between language families. It should also be noted that is it perfectly possible for the average to exceed 1: if each language has two lexical items for a concept, and all these are non-cognates with each other, then the average would be $(2x)/x = 2$.

After consultation with experimental linguists and statisticians[3], it has become apparent that the small sample sizes and complicated nature of the query – involving comparison of averages between disparate data from different sources of different sizes – necessitates a level of statistical analysis which is not feasible given the scope and time frame of the current

[3]Thanks to Gustav Rydevik and Thomas Hörberg for invaluable assistance with this matter.

research project. This paper will only investigate the general usability of the method of using cognate decisions for large amounts of languages to gauge lexical stability, and lay the groundwork for future studies.

An inescapable problem with the datasets is the pre-selected nature of the data. The concepts were selected for inclusion in the data sources based on the fact that they were considered by Swadesh (1971) as very basic, and are thus not a representative sample of language use in general. This will not affect comparison between individual concepts (such as WOMAN and THREE above) nor groups of semantically similar concepts (such as a comparison between the lexical stability of kin-terms versus other terms for humans), but can affect comparisons between word classes. We know only that the nouns and verbs included are very stable, but nothing about which level of stability other nouns and verbs have. However, since one of the fundamental ways the data is organized is in word classes, I still include a comparison of the relative lexical stability of different word classes in the text below, though the comparisons of real interest will be the ones between semantically similar kinds of concepts, such as different types of nouns, rather than between nouns and verbs or nouns and adjectives.

3.3 Semantic Tagging – a "bootstrap" method of semantic categorization

A fundamental assumption in this study is that if semantically similar concepts behave the same when it comes to lexical stability, this is reflected in the average number of cognates they have. The reason that certain kinds of similarity (such as being of the same color, as are BLOOD and STRAWBERRY) might not show any such patterns, while other kinds (such as being reference to temporal units, like DAY and SUMMER) is on the outset treated as unknown, but if the same semantic groups rank the same in several different languages families, this fact is assumed to have meaning and not be a random event. It should reflect some underlying reason why this group of words behaves in the same way. When a collection of concepts behaves similarly in many different language families, but has no semantic similarity, the reason might be any of a number of non-semantic factors, such as word frequency of use (see Pagel et al 2008) or an underlying semantic similarity that has not been discovered yet. Likewise, concepts that would have similar rates of lexical change because of semantic similarity might have this obscured by other factors also affecting rate of lexical change.

Pagel et al (2008) have already performed statistic analysis on the individual items in Dyen et al (1992) to find their lexical change ranking. By semantically tagging the databases, I shall go further and see if it is possible to find patterns of lexical stability not just for lexical items – or for word classes – but also for semantic groups. Semantic tagging of lexical databases usually follows a semantic taxonomy. I have based mine loosely on Willners (2001). Any semantic taxonomy is a crude tool, likely to miss important semantic nuances. Therefore it is important to complement the top-down taxonomy approach with bottom-up data-based semantic categorization.

If semantic categories are important in lexical change, then semantically similar words should change according to similar patterns. Some of these patterns intuitively suggest themselves: it might be worthwhile to look for differences between words for temporal actions and words for objects and ideas. But by looking at which words actually behave similarly, rather than which "should" behave similarly (according to taxonomic ideas), new important categories can be discovered. As we shall see presently, in Indo-European there is a tendency for body parts corresponding to the five basic senses to be among the most stable body concepts, creating a subcategory motivated by the patterns in the data.

The top-down, bottom-up approach can often lead to productive groups: my decision to collapse the two semantic groups that had originally been postulated (Fauna and Flora) led to a much more consistent ranking of relative lexical stability in all data sources. However, the approach will also fail to find patterns for many sets of concepts that seem semantically related. Words connected to religion (temple, ghost, god) can certainly be seen as a semantic group, yet for the purposes of lexical stability they do not act as one, since there is no consistent similarity in the average number of cognate classes for these words. Why certain semantic groups, such as number concepts, behave similarly while other groups, such as religious concepts, do not is one of the fundamental questions of lexical semantics. This approach rests on the assumption that the number of cognates is indicative of degree of lexical stability, and on the researcher being able to find semantically similar groups of concepts that are also similar in their rate of lexical stability, and contrast these with other such groups.

4 Results

Some of the more traditional ways of distinguishing word classes are by morphosyntactic or semantic means. One of the first experiments I did with the data was to categorize the concepts into word classes. Since the concepts are written in English, it is hard not to take the morphological form into account when doing such a classification. In a language where concepts such as GREEN or HUNGRY are typically verbs, their cognates would still be labeled adjectives in all data sources. This will have to be kept in mind as we proceed.

The three main categories that emerge (a small number of concepts that I was unable to tag with a word class are omitted) are nouns, adjectives and verbs, in the ranking in (2):

(2) Noun > Adjective ? > Verb

While the same ranking holds in all three datasets, the difference between adjectives and verbs is quite slim. A clearer division can be spotted between nouns on the one hand and adjectives/verbs on the other.

Adverbs are also a large group in the Darling-Buck (1949) data, but the actual concepts in this category do not at all match the concepts in the adverb categories in the Dyen et al (1992) and Greenhill et al (2007) data. No attempt to further subdivide the adverb category led to any viable semantic classes that were distinguished from the other adverbs in terms of lexical stability. No doubt more work could be done on this.

Overall, this is in line with the data from Pagel et al (2008), regarding the relative stability of word classes. This was expected for the Indo-European database (and, by extension, also from the Darling-Buck 1949 data), since Dyen et al (1992) was the main data source for that article, but not necessarily from the Greenhill et al (2007) Austronesian data.

Table 7: Word classes in Germanic

Darling-Buck (1949) – Germanic

	Average	#
Adverb	0.6598	12
Verb	0.5232	272
Determiners	0.5115	4
Adjective	0.5096	121
Noun	0.467	726
Number	0.2888	8

Table 8: Word classes in Indo-European

Dyen et al (1992) – Indo-European

	Average	#
Conjunction	0.3509	3
Determiner	0.3368	4
Preposition	0.3333	3
Verb	0.291	56
Adjective	0.278	32
Noun	0.2378	79
Adverb	0.2342	4
Pronoun	0.1474	8
Interrogative Pronoun	0.1246	6
Number	0.02	5

Table 9: Word classes in Austronesian

Greenhill et al (2008) – Austronesian

	Average	#
Adverb	0.3383	3
Demonstrative Pronoun	0.2262	1
Verb	0.1913	61
Adjective	0.1912	33
preposition	0.1769	4
Pronoun	0.1618	12
Noun	0.1419	80
Conjunction	0.1104	1
number	0.1024	14

4.1 Abstract and Concrete Nouns

Let us now turn to more semantically defined categories. If we look at the noun group and divide it into abstract and concrete concepts – those without and with extension in the real world – we find the following in Darling-Buck (1949):

(3) Concrete > Abstract

The other databases do not have enough abstract concepts in their word list to test for differences between Abstract and Concrete Nouns.

Table 10: Abstract and Concrete Nouns in Germanic

Darling-Buck (1949) – Germanic

	Average	#
Abstract	0.5784	196
Concrete	0.4258	530

4.1.1 Abstract Nouns

For the Germanic data, five subgroups can be detected that are both semantically cohesive and act similarly when it comes to lexical stability:

(4) Spatial Concepts > Time Concepts > Abstract Objects > Emotion Concepts > Activity Concepts

The Abstract Objects are the largest group, from which the other four have been separated. Some examples of the other groups are, of Spatial Concepts SOUTH, BOTTOM and EDGE;

of Time Concepts SUNDAY, YEAR, DAWN; of Emotion Concepts DOUBT, PASSION, RAGE; of Activity Concepts THEFT, ARSON, SUPPER. The Activity group within the noun category is the one semantically closest to the verb category, thus it is not strange to find it to be one of the subcategories most likely to change.

Table 11: Abstract Nouns in Germanic

Darling-Buck (1949) – Germanic	Average	#
Spatial	0.2197	13
Time	0.3532	26
Abstract Objects	0.61	113
Emotion	0.7246	17
Activity	0.7449	23

Semantically speaking, it seems that the less clear extension a concept has in the real world, the more likely it is to change. Spatial concepts, such as south or edge are easier to define (usually by pointing to an example) than are emotion concepts: there are many kinds of doubt and rage. Likewise, it is easier to point to, and provide real world examples for, spatial concepts than for time concepts.

4.1.2 Concrete Nouns

Concrete Nouns could be further subdivided into the subgroups Natural Events, Food, Flora&Fauna, Body, Physical Objects and Humans. Any attempt to separate Flora and Fauna resulted in subgroups that behaved very differently in the three datasets, while collapsing them led to a more uniform ranking in all language families. In the Darling-Buck (1949) data, Food is a semantic tag different from Physical Object since there are more foodstuffs listed, and they are in general much more lexically stable than other physical objects, thus meriting a group of their own.

Except for Food, the other semantic tags can be shared by the three data sources. The ranking is uniform, with one exception, Body. If we remove that group, we get the following ranking:

(5) Natural Events > Flora & Fauna > Physical Objects > Humans

The group Humans includes concepts unique to human beings such as SISTER or CARPENTER. Flora & Fauna has concepts denoting animals and plants, with the exception of animal body parts usually associated with animals, such as TAIL, which instead turn out, based on similarity of lexical stability to fit better with the category Body Parts. Natural Events are situations, events and places associated with the world, such as RAIN or SKY. Especially in the Austronesian data, the difference between Body and Flora& Fauna is very small. Once Body is removed, the ranking is much clearer, and it may be that it should not be considered as a group of its own; but then again, it has interesting subgroups, as I shall presently show.

Table 12: Concrete Nouns in Germanic

Darling-Buck (1949) – Germanic

	Average	#
Natural Events	0.262	21
Food	0.31893	15
Flora& fauna	0.33288	94
Body	0.36072	57
Physical Objects	0.43932	228
Humans	0.5543	114

Table 13: Concrete Nouns in Indo-European

Dyen et al (1992) – Indo-European

	Average	#
Body	0.2149	24
Natural Events	0.2211	11
Flora& Fauna	0.2237	16
Physical Objects	0.2869	16
Human	0.3224	8

Table 14: Concrete Nouns in Austronesian

Greenhill et al (2008) – Austronesian

	Average	#
Natural Events	0.1286	11
Body	0.1311	24
Flora&Fauna	0.1311	16
Physical Object	0.1618	16
Human	0.1678	8

In Indo-European (Dyen et al 1992) TONGUE, NOSE, EYE, EAR and HAND are the most stable body parts concepts, corresponding to the five basic senses of taste, smell, sight, hearing and touch. The issue becomes less clear when looking at the Austronesian languages (Greenhill et al 2007) where the "five senses" body parts are spread out along the entire spectrum from most to least lexically stable. We shall, however, return to this in a later section, to see if there could possibly be cultural reasons behind the stability of the "sense-body parts" in Indo-European.

Another interesting semantic subgroup is Human. Within the Human subgroup, we can divide the concepts into kinship concepts and non-kinship concepts. Kinship concepts, meaning words such as BROTHER and UNCLE, but not BOY or WOMAN, are those that must be interpreted within a family structure. All the concepts depend on there being at least one other concept with which it can be contrasted: for there to be a BROTHER, there must be siblings, for there to be an UNCLE, there must be a person who has a parent who has siblings. Non-kinship human concepts in the data are, on the other hand, professions or states, such as CARPENTER or WOMAN. In Indo-European (Dyen et al 1992) there are only four Kinship concepts listed (and four other Human concepts, of which MOTHER and then FATHER are clearly the most stable, followed by HUSBAND and WIFE in declining lexical stability), and the same ranking of these four concepts can be found in the Austronesian wordlist (Greenhill et al 2007).

Table 15: Non-kinship and kinship subgroups of the Human group

Darling-Buck (1949) – Germanic

	Average	#
Non-kinship	63	0.5974
Kinship	50	0.482

If we turn only to the eleven Germanic languages, the Kinship group is larger. It shows a tendency for words genetically and culturally (in Germanic society) closer to the ego, (i.e the "I" in the kinship network) to be more stable than others. Thus, SISTER, BROTHER, SON and DAUGHTER all have the same stability, and constitute the most stable group, while STEPMOTHER, -FATHER, -DAUGHTER and -SON are slightly more likely to change, as in turn is a group consisting of the concepts MOTHER, FATHER, CHILD and WIDOW.

(6) (SISTER, BROTHER, SON, DAUGHTER) > (STEPMOTHER, STEPFATHER, STEPDAUGHTER, STEPSON) > (MOTHER, FATHER, CHILD, WIDOW) > Other Kinship Concepts.

In the ranking list above, the words within () have the same stability. Within the heading "Other Kinship Concepts" we find different kinds of uncles, aunts, cousins etc. These are all relatives who are, in Germanic society, genetically and culturally farther away than one's SISTER, STEPMOTHER or FATHER would be.

4.2 Adjectives

Adjectives have been tagged by which kinds of features they typically assign to their head noun. Due to the difference in the relative size of the three data sets, the Germanic data (Darling-Buck 1949) has many more adjective concepts than the other data sources. The four semantic groups of concepts shared by all three data sources are, in the decreasing order of lexical stability:

(7) Color > Physical Spatial Property > Physiological Sense Property > State

Examples of Color concepts are BLACK and WHITE; of Physical Spatial Property STRAIGHT and WIDE; of Physical Sense Property DULL and COLD; of State DIRTY and OLD. In a more traditional semantic taxonomy, Color would probably be a subsection of Physical Sense Property concepts, but their relative lexical stability is sufficiently different to merit this set of concepts its own category.

Darling-Buck's (1949) Germanic data also displays several "Animate" semantic groups: they have the restriction that their head noun must be animate (as in living), i.e. they attempt to bestow the feature Animate on their head noun. A marked stability difference can be seen between emotion concepts, such as PROUD and SAD, and other concepts for animate humans, such as RICH and INSANE. These concepts, which are not present in the smaller databases, are similar to the State group of adjectives in Austronesian and Indo-European. As would be expected, the "Animate, human, emotion" group is also similar to the States group when it comes to stability ranking: they all turn out to be the least stable of the ranked adjectives.

Table 16: Adjectives in Germanic

Darling-Buck (1949) – Germanic

	Average	#
Color	0.1273	6
Animate, Animal	0.25	1
Physical, Spatial	0.3242	25
Physical, Sense	0.4045	24
Animate	0.5283	18
State	0.6535	33
Animate, Human	0.7555	11
Animate, Human, Emotion	1.1517	3

Table 17: Adjectives in Indo-European

Dyen et al (1992) – Indo-European

	Average	#
Color	0.2	5
Physical, Spatial	0.2763	12
Physical, Sense	0.2895	8
State	0.3233	7

Table 18: Adjectives in Austronesian

Greenhill et al (2008) – Austronesian

	Average	#
Color	0.1704	5
Physical, Spatial	0.1824	12
Physical, Sense	0.1927	6
State	0.2112	10

4.3 Cultural Influence

As stated in the introduction, the semantic nature of a lexeme and its frequency of use is not the only thing which can affect lexical stability. Cultural importance should affect lexical stability: we know of many cultures where archaic language is part of religious practices, for instance, with the Indian religious devotion to preserving the ancient pronunciation and vocabulary of Sanskrit as a famous case in point.

When one looks at the ratings for lexical stability for specific body parts in Indo-European, it is evident that, with the exception of TOOTH, the most stable concepts are EAR, TONGUE, EYE, HAND and NOSE. These correspond neatly to the five senses of hearing, tasting, seeing, touching and smelling. This could be because of some cognitive, universal foundation for of these concepts, but when the data from the Indo-European language variants is compared with data from Austronesian language variants, we see that no such grouping of the "sense-concepts" is visible in Austronesian. Indeed, Goody (2002) discusses the universality of the senses and opines that "looking at the question more from the standpoint of social or cultural anthropology, there is little evidence that the recognition of senses as a category, in particular of a group of five senses, is a widespread conceptualization outside

Europe and Asia."

Lexical stability can thus be a tool for finding culturally important groups of words, though the fact that the lexical stability of a concept can be due to cultural influence, the influence of the semantic nature of the concept and its frequency of use (as in Pagel et al 2007) means that much care needs to be taken in trying to identify the real cause of a certain level of lexical stability.

Table 19: Stability rating for body parts concepts. The left-most number indicates ranking – thus two concepts with the same number have the same stability ranking.

Indo-European (95 language variants)		
Rank	Concept	Average # of cognate classes
1	EAR	0.0632
2	TONGUE	0.0638
3	TOOTH (FRONT)	0.0737
4	EYE	0.0842
5	HAND	0.1158
6	NOSE	0.1368
7	HEART	0.1383
8	FOOT	0.1579
9	MEAT (FLESH)	0.1684
10	BLOOD	0.1684
10	BONE	0.1684
11	LIVER	0.1935
12	HEAD	0.2
13	FEATHER (LARGE)	0.2021
14	MOUTH	0.2211
15	SKIN (OF PERSON)	0.2316
16	WING	0.266
16	NECK	0.266
17	HAIR	0.2737
18	LEG	0.2947
19	TAIL	0.3085
20	BELLY	0.3298
21	BACK	0.3372
22	GUTS	0.4222

Austronesian (around 400 language variants)		
Rank	Concept	Average # of cognate classes
1	EYE	0.0316
2	LIVER	0.0483
3	BLOOD	0.0624
4	BREAST	0.0639
5	HAND	0.0802
6	HAIR	0.0875
7	TAIL	0.0981
8	FEATHER	0.1076
9	HEAD	0.1153
10	SKIN	0.1181
11	MOUTH	0.1277
12	BELLY	0.1348
13	WING	0.142
14	MEAT/FLESH	0.1438
15	BONE	0.1573
16	TONGUE	0.1578
17	EAR	0.1634
18	BACK	0.1736
19	NOSE	0.1768
20	TOOTH	0.1788
21	LEG/FOOT	0.2204
22	INTESTINES	0.2395
23	NECK	0.2435

5 Discussion

The goal of this paper was to see if there is reason to suspect that semantic properties of concepts affect their rate of lexical change – if semantically different kinds of verbs, or different kinds of nouns, show differences in behavior.

The patterns seen in this study cannot be wholly attributed to cultural factors, judging by the cultural differences between the Austronesian and Indo-European language areas. Cultural effects on word stability does occur though, as seen in the case of the "sense body-parts" in Indo- European. It appears that the patterns of lexical change are at least partly semantic: this can be seen in some overarching trends in the data. However, the degree of influence that cultural factors, semantic factors or discourse factors (frequency of use) wield is not known.

Within the Noun group, Concrete Nouns are lexically less likely to change than Abstract Nouns:

(8) Concrete Noun > Abstract Noun

And within the Abstract Noun group, words corresponding to Activities seem to change far more often than the other kinds of words, followed shortly by Emotion concepts.

(9) Other Abstract Nouns > Emotions > Activities

I have not investigated the verb group for subdivisions so far, though hopefully this can be done in future research. Even so, it seems as if we are moving along a spectrum of degree of extension in the world. Since extension is often considered a binary quality, a better term might be degree of presence in the universe of discourse. The more presence a concept has, the more lexically stable it seems to be, and the less extension it has, the more it is likely to change. Concepts with less presence could be argued to be harder to "pin down" by speakers: they are more complex, and thus have fewer nuances worth describing, which might account for their readiness to change. For these concepts, while there might be one core concept, (e.g. BOY), there are also others that are very similar: different kinds of synonyms (e.g. TEENAGE-BOY, NICE-AND-POLITE-BOY, MISCHEVIOUS-BOY). When there are several lexemes overlapping over a semantic space, it is easy for their meanings to change. Less complex concepts with less presence have fewer synonyms; for instance THREE. While THREE and other numbers might be a conceptually quite complex phenomenon, involving accepting that there are natural numbers and so forth, for most language users it is very easy to say whether an object has the property THREE or if it doesn't: unless one receives instruction in counting, THREE typically remains a visible characteristic, while choosing the appropriate word for a young male might be harder.

Within the adjective group also, colors are the most stable while states are the least stable. Theoretically, the color of an object is a highly complex thing, but in practice, there are still arguably fewer ways to describe a color (it can be pointed to more easily) than states such as DULL.

(10) Color > Physical Spatial Concept > Physical Sense Concept > State

This is not an attempt to suggest that the semantic patterns in lexical change alone can account for the differences in rates of change. Further research should aim to uncover how these semantic effects are linked to the word frequency effects found by Pagel et al (2007). It is possible that the concepts making up, e.g. the subgroup *state*, are simply more talked about than *physical sense* concepts, which in turn are more talked about than *physical spatial* concepts. But it could also be the case that accounting for semantic groupings would explain some of the 50% of diachronic lexical change that Pagel et al (2007) do not account for.

Future studies should also investigate the effect that semantic attitudes have on lexical stability: it seems that certain concepts have a stronger tendency to have many slang terms (such as concepts related to sex, drugs or ill-favored groups of people), which undoubtedly lowers their lexical stability. One of the reasons for looking closer into this is the search for, to borrow biology terms, phenetic and typological concepts. A phenetic concept would be a data point that is unique – finding it in two different sets suggests that the sets are linked. A typological concept (in the biological sense) would be a data point that can be found in many different sets, not necessarily because of a link between them. If the inherent lexical stability of a certain mental concept, or group of mental concepts, is known, this would be important to any attempt to use lexical stability in the search for links between languages and between language families. More stable concept would make much better candidates for producing phetentic data points.

Lexical stability can also be a measurement of cultural importance attached to concepts, especially when a certain set of words behave as a group in one language or family, but no such patterns can be seen in another. This has been exemplified by the different rankings of body parts in the Indo-European and Austronesian language families, and could undoubtedly be applied to many other groups of concepts. Apart from the many unexplored areas of the current data – such as verbs – future research could, and in fact must, find firmer statistical methods to validate the ranking.

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