

# Paronyms, Co-Hyponyms and Antonyms: Representing Semantic Fields with Lexical Semantic Relations

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## Abstract

In this paper, we propose a new primary lexical semantic relation—paronymy, to explain a relation for concept classification that has not yet been dealt with in WordNet. We observe the relations among the same set of coordinate terms and find out that the concept of antonymy often appears among those coordinate terms. However, antonymy and other relations, such as near-synonymy, are inadequate to account for their conceptual classification or entailed knowledge. In order to give a more precise and richer representation of lexical conceptual structure and ontology, we proposed a new relation of paronymy. Our proposal is based on careful examination of data from Chinese Wordnet and WordNe. Our attempt in a way incorporates semantic fields within a wordnet structure. We further distinguish three types of paronymy: complementary, contrary and overlapping. This classification is further elaborated further a defining paradigm based on perception or convention.

## 1 Introduction

A linguistic ontology must include both the syntagmatic description of how concepts are hierarchically arranged and the paradigmatic description of how concepts cluster. WordNet (WN), as the most popular current framework of linguistic ontology, is comprehensive in paradigmatic information and yet has only synonymy for syntagmatic information (Fellbaum

1998). Since absolute synonymy does not exist, the synset architecture leaves the relation among members of this conceptual cluster underspecified. Furthermore, the relation among the coordinate terms<sup>1</sup>, of terms which share the same hypernym, is not explicated. The only exception is perhaps their treatment as part of antonymy (e.g., Saeed 1997) when the taxonomic relation is not dealt with. In contrast, earlier works on the theory of semantic field (e.g. Grandy 1992 and Lehrer 1992) provided clearly explication of how lexical concepts cluster without actually laying out a comprehensive conceptual hierarchy. In this paper, we attempt to integrate the semantic field concept into a wordnet structure by proposing a new primary lexical semantic relation — paronymy (類義詞).

In terms of Knowledge Representation and Human Language Technology, how concepts are clustered often holds the key to ontology building and text understanding respectively. For instance, one can infer that when A is to the south of B, then B is to the north of A. But such inference does not exist between south and east. Similarly, whether a tomato is a fruit or a vegetable depends on the classificatory criterion.

In what follows, the need to introduce paronymy as a new relation is motivated in section 2. The definition and criterion of paronymy is given in section 3, where we account for three types of

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<sup>1</sup> Here the definition of *coordinate terms* is referred to the Glossary of Wordnet terms as “Coordinate terms are words that have the same hypernym.”

paronymy that can be elaborated by perceptual or conventional paradigms. These are followed by a summary and a conclusion, in sections 4 and 5 respectively. Please also note that Chinese Wordnet (CWN) and WN are the sources of our data as well as our main references in this paper.

## 2 Motivation

We observed that not all coordinate terms are equal when we detailed lexical analysis of a set of coordinate terms sharing the same hypernym for CWN. For example, when people talk about seasons, the first intuition of the concept will be four seasons— spring, summer, fall (or autumn), and winter. Other terms for seasons, such as dry season and rainy season, are not thought of intuitively as parallel as the four seasons although all of them share the same super-ordinate concept, seasons in a year.” The same situation happens in the North vs. Southeast contrast. North and Southeast are both hyponyms of geographic direction; however, when we talk about the concept of geographic direction, only the four main directions, namely East/West/South/North, would come up intuitively as a set of hyponyms. Neither the North/Southeast pair nor the South/Northeast pair may be viewed as the four main directions at an equivalent level.

In addition, conceptual dependencies entail collocations, which are very useful linguistic information. For instance, the concept of the North vs. South contrast or East vs. West contrast will be revealed in various collocations formed by the North/South pair (or the East/West pair) and other lexical items. Such collocations are fairly productive, while other combinations, such as South/East, will be rare. In terms of conceptual structure and knowledge representation, we need to further specify the direction contrast pairs of North/South and East/West among the four directions.

The relations among the same set of coordinated terms may be situated in different conceptual systems. Take the Up/Down contrast as an example. Up/Down contrast may be vertical, for instance, riverine (up or down stream), or societal (up or down town). These may co-exist in one language or one of them may be dominant in one language. For instance, Sun (2007) recently reported the riverine orientation in a Qiangic

language. Therefore, to build a complete conceptual system/ontology, we need to characterize the criteria of how concepts are clustered. Paronymy allows us to describe the clustering as the necessary step towards capturing the conceptual system behind.

## 3 Definition and criterion of Paronymy

Paronymy is used to indicate a relation between any two lexical items belonging to the same semantic classification. There are two basic requirements for paronymy. First of all, paronyms are a type of coordinate terms since they share the same hypernym (also called “super-ordinate” in WN). Secondly, paronyms have to share the same classificatory criteria. The second requirement is especially critical because the same conceptual space/semantic field can be partitioned differently by different criteria. In example (1), (1a) and (1b) are both possible exhaustive enumerations of the concept “seasons in a year.” People who live in a certain area, such as Southeast Asia, they may prefer to use (1b) to describe their “seasons in a year”; however, to other people in the world, the four seasons of (1a) is the default<sup>2</sup>.

(1) Two sets of paronyms of the main concept—“seasons in a year”

a. chun1/xia4/qiu1/dong1  
“spring/summer/fall(autumn)/winter”

b. gan1 ji4/you3 ji4  
“dry season/ rainy season”

In addition, paronymy captures how these concepts cluster by stipulating their shared the same criterion for conceptual classification. As shown in above (1), (1a) and (1b) are partitioned by two different criteria for conceptual classification, so any element of these two different criteria, such as xia4(summer) in (1a) and gan1 ji4(dry season) in (1b), do not stand in direct contrast against each other although they are coordinate terms of the same concept “seasons in a year”. That is, (1a) and (1b) do not belong to the

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<sup>2</sup> Please note that we are making a distinction between ‘rainy season (i.e. monsoon season)’ as a primary classification of seasons from the secondary classification of seasons, such as winter and spring are rainy seasons in Taiwan.

same semantic field, which are defined by minimal semantic contrasts (Grandy 1992).

Using paronymy is also able to explain such important relation among different clusters of coordinate terms, and differentiate them from terms from unrelated clusters.

Example (2) below has further indicated that the idea of paronymy may be necessary for us to analyze, more explicitly, the relation among the members that are immediately dominated by a super-ordinate, and that share the same criterion for conceptual classification. It is also shown that antonymy or taxonymy in Cruse's (1986) sense is inadequate in dealing with such a case.

(2) Four geographic directions: dong1/xi1/nan2/bei3 “East/West/South/North”

In (2), among the geographic directions, normally, East/West and North/South are treated as the typical antonym pairs because the members in each pair occupy two opposite poles on one of the two axes listed on a map, respectively. However, it would be counter-intuitive to classify South vs. East as antonyms. All these four terms are equally privileged under a super-ordinate concept, geographic directions. It seems that antonymy is not sufficient enough to explain such relation and this indicates that it is essential to have paronymy to precisely describe these contrasts among contrasts.

There are three types of paronymy derived from the extensive data of CWN. Each type can be further elaborated by how the classification is defined, either by a paradigm of human perception or cultural/ social convention. Here, perception is cognition-based that indicates measurement is based on the perception or senses of human beings. For example, fast and slow are coordinate terms and share the same super-ordinate concept, which is clustered according to the same classificatory criterion, speed. However, whether the speed is fast or slow all depends on people's perception that may be different from one to another. Convention has an event-based paradigm that is based on cultural or social convention. Take the division of the concept “seasons in a year” again. As show in the following Fig. 1, dry season, rainy season, spring, summer, fall and winter are all coordinate terms of a hypernym, season. They can be subdivided into two intermediate super-ordinates,

tropical climate and general climate. The tropical climate is gan1ji4‘dry season’, yu3ji4‘rainy season’; while the general climate is chun1‘spring’, xia4‘spring’, qiu1‘fall’, and dong1 ‘winter’.

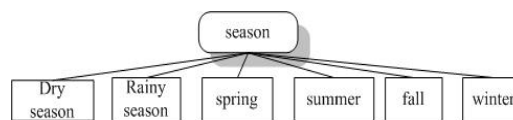


Figure 1. Seasons in a Year

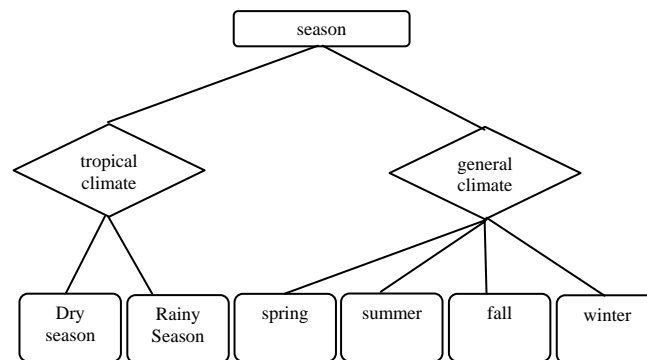


Figure 2. Seasons in a Year (Concepts Re-clustered)

### 3.1 Complementary

The first type is called complementary paronymy, where only exists a binary pairs. The criterion of this type is “either A or B.” More specifically, under a concept, there are only two possible nodes, A or B and these two nodes are contradictory. Therefore, either A or B will appear. Complementary paronymy infers that the positive of one term necessarily implies the negative of the other. The examples of complementary paronymy are shown in (3).

(3)  
 State of life: si3/huo2 “dead/alive”  
 Taoism: yin1/yang2  
 Amount: dan1/fu4 “singular/plural”  
 Animal gender:xiong2/ci2 “male/female”

### 3.2 Contrary

As we mentioned earlier, Paronymy refers a type of coordinate terms and shares the same hypernym under the same classificatory criteria. Contrary paronymy does not only meet the above two requirements contrary but also conform a condition that each of a set of terms is related to all the others by the relation of incompatibility (Cruse, 2004), illustrating that the positive of one term does not

necessarily imply the negative of the other. This type of paronymy includes the so-called gradable antonyms, such as long/short and fast/slow, and the cases whose senses are contrary. The contrary paronyms can be further divided and explicated by perceptual and conventional paradigms.

Contrary paronyms, which have the feature of gradation, allow intermediate terms, so it is possible to have something that may be neither A nor B, for instance, if something is neither cold nor hot, it may be warm. Besides, contrary paronyms are usually relative. For instance, *a thick pencil* is likely to be thinner than *a thin girl*. In addition, in some pairs one term is more basic and common. Take the pair, long/short, as an example. If we would like to know the length of an object, it is more natural to ask *How long is it?* rather than *How short is it?* (Saeed, 1997) Those paronyms displaying gradation are perception based. The other cases, such as the season example we have mentioned previously and what we present in the following figures, are convention-based.

Fig. 3 shows various ways of addressing parents. Not all of the coordinate terms dominated by the hypernym—parent addressing are grouped as the same set of hyponyms intuitively. Similar to the season example, the same semantic field in this case is actually partitioned in different ways and by different criteria, as illustrated in Fig. 4. After re-clustering the concepts, we get three sub-classes under the super-ordinate, parent addressing. The three sub-classes are the pair of fu4 qin1 and mu3 qin1 in formal (somewhat honorific) register, the pair of die1 and niang2 in written or literary register, and the pair of ba4 ba5 and ma1 ma5 in colloquial register. The re-clustered classification fit in with our conceptual structures better.

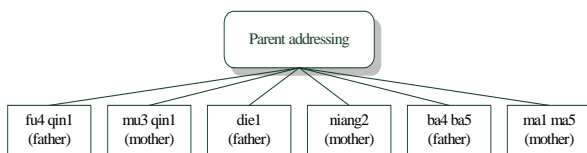


Figure 3. Parents Addressing

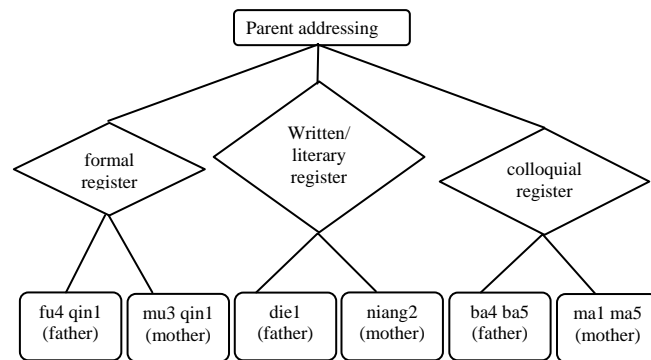


Figure 4. Parents Addressing (Concepts Re-clustered)

Similarly, the coordinate color terms, as partly given in Fig. 5, can be re-clustered by two classificatory criteria, say, warm-hue set and cool-color set. Fig. 6 is the presentation after the coordinate terms are re-clustered.

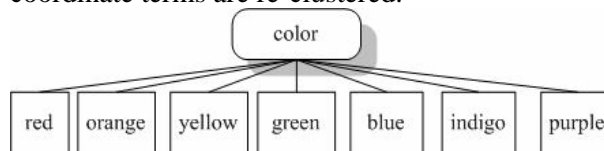


Figure 5. Colors

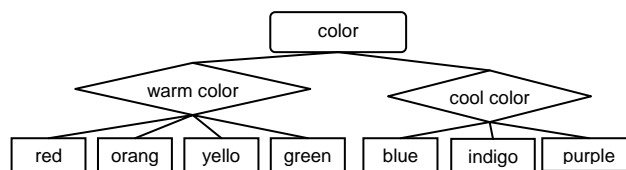


Figure 6. Colors (Concepts Re-clustered)

By the relation of paronymy, we can give a more precise account for the coordinate terms or hyponyms, especially ones in the contrary type. A process of re-clustering hyponyms can be formulated, as given in Fig. 7, and therefore, it can be applied to the WN deficiency of concept classification.

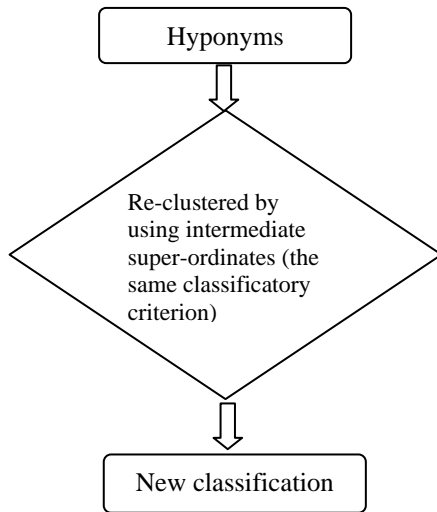


Figure 7. Process of Hyponyms Re-clustered

### 3.3 Overlapping

The third classification is overlapping paronymy. Overlapping paronymy, as its name suggests, is defined as the case containing a paradigmatic relation of inclusion and that of exclusion in linear structures. In other words, two paronyms belonging to this type have some features in common, and meanwhile, comprise other distinct features. Overlapping paronyms may include some cases illustrating the relation of incompatibility and oppositeness,<sup>3</sup> in which the contrastive part is more predominant than the overlap, and also contain near-synonyms, where the features they share are considerable and more salient than those different (e.g., Cruse, 2004; 陳, 1994). As illustrated in Cruse (2004), the pair, pretty vs. handsome, normally can be viewed as synonymous with the meaning “good-looking” if their differences are backgrounded (in certain contexts), whereas they are no longer synonymous when the gender distinction is foregrounded. Similarly, contrasts can be observed in the WordNet 3.0 synset containing strange and unusual. They are shown to be (near-)synonyms in Figure 1. There are, however, definite semantic differences between

<sup>3</sup> Please note that our overlapping paronyms are different from Cruse's (1986) overlapping antonyms. Cruse's overlapping antonyms, such as good/bad, are antonyms which have evaluative polarity as part of their meaning and hence can overlap with each in the evaluative range.

these two terms. For instance, the former term denotes unfamiliarity, while the latter lays stress on low frequency of occurrence, though the difference may not be as salient as their features in common (cf. Cruse, 2004).

#### Adjective

- **S: (adj) strange, unusual** (being definitely out of the ordinary and unexpected; slightly odd or even a bit weird) *"a strange exaltation that was indefinable"; "a strange fantastical mind"; "what a strange sense of humor she has"*
- **S: (adj) strange, unknown** (not known before) *"used many strange words"; "saw many strange faces in the crowd"; "don't let anyone unknown into the house"*
- **S: (adj) foreign, strange** (relating to or originating in or characteristic of another place or part of the world) *"foreign nations"; "a foreign accent"; "on business in a foreign city"*

Figure 7. The Senses of “Strange”.

As overlapping paronyms, the relations between *pretty* and *handsome*, and between *strange* and *unusual* are elaborated on the basis of conventions, which are consistently shared by a language community and conform to their experience. The contexts in which the contrast in each pair is foregrounded or not, as well as how their semantics overlaps, depends on discursal conventions. The same point can be further explicated by the following examples extracted from CWN.

Both *xiang1 zi5* and *he2 zi5* can be used to refer to “box”, but when we see a container for a diamond ring, we may call it *he2 zi5* rather than *xiang1 zi5*. Conversely, we may call a container for a TV set *xiang1 zi5* rather than *he2 zi5*. The paradigm of convention, which is in accord with the experience that people in the Chinese-speaking community have, determines the overlap and the distinctions in the semantics of both terms. Likewise, the pair of *you4 zhi4 yuan2/tuo1 er2 suo3* represents two preschool systems, which are similar in some aspects and different in others, as shown below in Fig. 7. The functional distinction between these two preschool systems is made by conventional paradigm.



Figure 8. You4 Zhi4 Yuan2 vs. Tuo1 Er2 Suo3

#### 4 Summary

We showed in this paper that the paronym relations enable a wordnet to capture how concepts cluster without changing its basic architecture. This proposal also sheds light on how concepts are organized in the lexicon. Important generalizations derived from this account include: that paronymy can be established by either perceptual or conventional paradigms; that the prototypical antonymy, termed complementary in our classification, is necessarily perception based; and that overlapping paronymy is necessary convention based. The classification and illustration of paronymy is shown in the following Table 1.

Types	Paradigm	Representative examples
Complementary	By Perception	si3/huo2 'dead/alive', yin1/yang2 (Taoism), dan1/fu4 'singular/plural'
Contrary	By Perception	leng3/re4 'cold/hot', kuai4/man4 'fast/slow', pang4/sou4 'fat/slim'

	By Convention	gan1/ji4/you3/ji4 'dry/rainy season', chun1/xia4/qiu1/dong1 'spring/summer/fall/winter'
Overlapping	By Convention	jiang1/he2 'river/river', xiang1/zi5/he2/zi5 'box/box', ling2/chen2/qing1/chen2 'before dawn/dawn', ru4/xuei2/zai4/xuei2/bi4/ye4 'enroll/study/graduate', you4/zhi4/yuan2/ tuō1/er2/suo3 'kindergarten/nursery school'

Table 1. Classification and Illustration of Paronymy in Mandarin Chinese.

#### 5 Conclusion

Our proposal of adding paronymy to wordnet structure is a small step to enrich its knowledge structure. We believe that the semantic contrasts assumed in the theory semantic field underlines the need to capture the conceptual underpinning of meaning clustering. The addition of paronymy as a lexical semantic relation has several important implications. Linguistically, paronymy should predict collocation better than coordinated terms, and it poses an interesting question for the nature of lexical semantic relations. In terms of knowledge representation, it offers the possibility of explicitly representing the logic and conceptual motivation behind each class. In terms of HLT, this richer conceptual structure will give crucial clues for entailment and inferences, which were only directly available from a formal ontology. All these implications will be explored in our future studies.

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#### References

Cruse, Alan D. 1986. *Lexical Semantics*. Cambridge University Press, Cambridge.

Cruse, Alan D. 2004. *Meaning in Language: An Introduction to Semantics and Pragmatics*, Second Edition. Oxford University Press, New York.

Chinese WordNet. <http://cwn.ling.sinica.edu.tw/>

Fellbaum, Christiane (ed). 1998. *WordNet: An Electronic Lexical Database*. MIT Press, Cambridge, MA.

Grandy, Richar E. 1992. Semantic Fields, Prototypes, and the Lexicon. In Lehrer and Kittay (1992), 103-122.

Lehrer, Adrienne. 1992. Names and Naming: Why We Need Fields and Frames. In Adrienne Lehrer and Eva Feder Kittay (eds.) (1992). *Frames, Fields, and Contrasts: New Essays in Semantic and Lexical Organization*, 123-142. Lawrence Erlbaum Associates, Hillsdale, NJ.

Saeed, John I. 1997. *Semantics*. Blackwell Publishers Ltd, Oxford.

WordNet. <http://wordnet.princeton.edu/>

陳滿華. 1994. 詞義之間的關係與同義詞、反義詞的構成—兼與石毓智先生商榷. *漢語學習* 1994 年第 2 期.

黃居仁, 蔡柏生, 朱梅欣, 何婉如, 黃麗婉, 蔡宜妮. 2003. 詞義與義面: 中文詞彙意義的區辨與操作原則 [Sense and Meaning Facet: Criteria and Operational Guidelines for Chinese Sense Distinction]. Presented at the Fourth Chinese Lexical Semantics Workshops. June 23-25 Hong Kong, Hong Kong City University.

孫天心. 2007. 因位變韻。2007 中央研究院語言學研究所成果發表會。[Sun, Jackson T.S. 2007. Position-dependent Phonology. Presented at the 2007 Research Result Symposium of the Institute of Linguistics, Academia Sinica.]