

ITB Journal



Issue Number 18, December 2009

Contents

Adjectival Nuclear Junctures in Persian: A Role & Reference Grammar Analysis.....	5
Zari Saeedi Talab. Trinity College Dublin	
The Sociolinguistic Phenomenon of Modern Greek Diglossia	27
Olga-Maria Gkaragkouni. Trinity College Dublin	
Development of an Enhanced Generic Data Mining Life Cycle (DMLC)...	50
Markus Hofmann. Institute of Technology Blanchardstown	
Brendan Tierney. Dublin Institute of Technology	
Creating access to education with progression pathways via blended learning of Deaf Studies at third level in Ireland: Open innovation with digital assets.....	72
Brian Nolan. Institute of Technology Blanchardstown	
Lorraine Leeson. Trinity College Dublin	
The Schematic Organisation of Irish Prepositions	84
Molly Manning. Trinity College Dublin	
Polysemy and homonymy and their importance for the study of word meaning.....	107
Amanda McCaughren. Trinity College Dublin	

The academic journal of the Institute of Technology Blanchardstown

<http://www.itb.ie/ResearchatITB/itbjournal.html>



<http://www.itb.ie/ResearchatITB/itbjournal.html>

Views expressed in articles are the writers only and do not necessarily represent those of the ITB Journal Editorial Board.

ITB Journal reserves the right to edit manuscripts, as it deems necessary.

All articles are copyright © individual authors 2009.

Papers for submission to the next ITB Journal should be sent to the editor at the address below. Alternatively, papers can be submitted in MS-Word format via email to brian.nolan@itb.ie

Dr. Brian Nolan

Editor

ITB Journal

Institute of Technology Blanchardstown

Blanchardstown Road North

Blanchardstown

Dublin 15

Editorial

I am delighted to introduce the **18th edition of the ITB Journal**, the academic journal of the Institute of Technology Blanchardstown.

The first paper on ‘Adjectival Nuclear Junctures in Persian: A Role & Reference Grammar Analysis’ by Zari Saeedi Talab of the School of Linguistic, Speech and Communication Sciences in Trinity College Dublin, discusses the formation of light verbs in Persian, and the complex nature of these verbal predicates. She treats in her account, issues such as the status of multiple and complex predicates (CP) or nuclear junctures (NJ) in a single clause that are of much interest in linguistic theories dealing with predication since in these constructions. Nouns, adverbs, or adjectives can also play a predicating role in combination with the verbal elements referred to as ‘light verbs’.

The second paper, by Olga-Maria Gkaragkouni of the School of Linguistic, Speech and Communication Sciences in Trinity College Dublin, presents an interesting discussion on the ‘Sociolinguistic Phenomenon of Modern Greek Diglossia’ examines elements of the sociolinguistic phenomenon of diglossia as it was depicted within the 19th and 20th century Greek linguistic community (1830-1976). More specifically, this study explores the social context in general and the political-religious-ideological context in particular within which Modern Greek Diglossia (MGD for short) first presented and developed, and how it eventually declined.

Markus Hofmann, Department of Informatics, at the Institute of Technology Blanchardstown, and Brendan Tierney of the School of Computing at Dublin Institute of Technology, jointly within the third paper ‘Development of an Enhanced Generic Data Mining Life Cycle (DMLC)’ look at data mining projects are complex and the factors that yield high failure rates. They claim that in order to improve project management and success rates of such projects a life cycle is vital to the overall success of the project. Their paper reports on a research project that was concerned with the life cycle development for large-scale data mining project, and also usefully provides a detailed view of the design and development of a generic data mining life cycle called DMLC.

The fourth paper reports on a Strategic Innovation Fund (cycle-2) projects and on the progress made through 2009 on this. The paper is called ‘Creating access to education with progression pathways via blended learning of Deaf Studies at third level in Ireland: Open innovation with digital assets’ and it is by Brian Nolan of the Institute of Technology, Blanchardstown, and Lorraine Leeson of the Centre for Deaf Studies, Trinity College Dublin (University of Dublin). Many people do not know that, in fact, Irish Sign Language (ISL) is an indigenous language of Ireland and is recognized by the EU as a natural language. It is a language separate from the other languages used in Ireland, including Irish, English and, in Northern Ireland, British Sign Language. Some 6,500 Deaf people use ISL on the island of Ireland. Additionally, most people are not at all aware of the distressing fact that Deaf people are the most under-represented of all disadvantaged groups at third level, posing two challenges: (1) getting Deaf people into third level and (2) presenting education in an accessible form. This paper, then, introduces the Irish Deaf community and their language; the educational context that

leads to disadvantage and negative outcomes in employment and our work to date in developing accessible elearning with progression pathways for Deaf Studies programmes at TCD.

The fifth paper, by Molly Manning of the School of Linguistic, Speech and Communication Sciences in Trinity College Dublin is concerned with 'The Schematic Organisation of Irish Prepositions. The paper employs current thinking within Cognitive Linguistics in the motivation of this account. In particular, within Cognitive Linguistics the image schema model proposes that basic sensory-motor concepts are the prelinguistic building blocks upon which more abstract concepts are grown. This paper demonstrates the usefulness of an image schema approach to the analysis of Irish prepositions, illustrating how the radial structure organisation of polysemous meaning senses schematically links basic perceptual concepts with non-perceptual abstract concepts. The author argues that the image schema model illustrates the fundamental grounding of language in sensory-motor concepts, and how our understanding of abstract concepts is possible only as a result of the embodied nature of the human mind.

The sixth and final paper in this issue of the ITB Journal is by Amanda McCaughren of the Centre for Language and Communication Studies in Trinity College Dublin. In her paper, McCaughren provides an interesting discussion on 'Polysemy and homonymy and their importance for the study of word meaning'. While polysemy and homonymy are huge areas of research in language studies, the author concentrates on an examination of the concepts of polysemy and homonymy, and the problems to be found with these. She provides a broad overview of the topic with an initial focus on the treatment of examples found in dictionaries while indicating how listing problems can arise. An interesting account is provided of polysemy and homonymy in Chinese - a language rich in ambiguous words full of connotations and associations and she looks too at some of the ensuing problems facing Chinese dictionary writers and suggest a user friendly model for ambiguous lexical entries. Interestingly, the author also appeals to the use of image schemata within Cognitive Linguistics to explain polysemy in some English words.

Happy reading. We hope that you enjoy the papers in this issue of the ITB Journal.

Dr. Brian Nolan

Editor

ITB Journal

Institute of Technology Blanchardstown

Blanchardstown Road North

Blanchardstown

Dublin 15

Email: brian.nolan@itb.ie

Adjectival Nuclear Junctures in Persian: A Role & Reference Grammar Analysis

Zari Saeedi Talab

School of Linguistic, Speech and Communication Sciences
Trinity College Dublin

Abstract

The issue of predication is the central theme of all linguistic theories i.e. all the languages of the world have predicating elements through which communication and related propositions form. What these languages differ in is the way different elements or classes of words are used to predicate a sentence or a clause. Verbs are the most frequent and widely known predicating elements and as a matter of fact, and as Napoli (1989) maintains, developments in modern linguistics have recently allowed questions regarding the deeper levels of the nature of predication. Issues such as the status of multiple and complex predicates (CP) or nuclear junctures (NJ) in a single clause are of much interest in linguistic theories dealing with predication since in these constructions nouns, adverbs, or adjectives can also play a predicating role in combination with the verbal elements which are sometimes referred to as 'light verbs'.

1. Adjectival Light Verb Constructions in Persian

In general, CPs or NJs have been analysed crosslinguistically from different perspectives and are of great theoretical importance because their analysis raises important points about inter-relationship of morphology, syntax, and lexicon. Cattell (1984) who is one of the first scholars that characterizes these constructions in English, discusses structures such as the complex predicate 'make an offer' compared with the full/heavy verb/predicate 'offer'. In constructions like 'make an offer' the verbal element 'make' is not the only predicating element rather the combination of 'make' and 'an offer' forms a CP in which the verb 'make' is in fact a light verb i.e. it has a light predicating role. As referred before, these light verbal elements can also join adjectives to form NJs, which are called 'adjectival light verbal constructions' and are the main focus of the present study. Indeed, the aim here is to investigate these structures in Modern Persian as one of the Indo-European languages, with one of the oldest written traditions in this family, of more than 2500 years¹ The theoretical framework adopted is Role and Reference Grammar which is believed to be capable of capturing the double nature of Persian complex predicates in general and light verb constructions in particular. According to Payne (1997), 'if a language has a morphosyntactically distinct class of adjectives, this group of words is typically used to express the following properties':

¹ Khanlari, P. N. 1979. A History of the Persian Language. vol. 1. Translated by N. H. Ansari. Idarah-I Adabiyat-I Delli, 2009, Qasimjan st., Dehli.

AGE (young, old, etc.)	
DIMENSION (big, little, tall, short, long, etc.)	
VALUE (good, bad)	
COLOR (black, white, red, etc.)	
PHYSICAL CHARACTERISTICS (hard, heavy, smooth, etc.)	
SHAPE (round, square, etc.)	
HUMAN PROPERTY (jealous, happy, clever, wary, etc.)	
SPEED (fast, slow, quick, etc.)	(cf. Payne 1997, p. 63)

As indicated by Thompson (1988) in his empirical study, there is typically a distinction between the predicating function of adjectives and their function of introducing new referents. Payne (1997) views the former function of adjectives as the prototypical function of verbs as predicators and the latter as the prototypical function of nouns as words that refer to entities. Napoli (1989) highlights the same distinction: claiming that adjectives can play two types of roles in the context they appear; they can act as a modifier or predicator.

Referring to Williams's (1980) ideas about the possibility of multiple predicates, Napoli (1989) maintains that multiple predicates are possible in a single clause. Following this line of approach, this study claims that adjectives in Persian function with regard to two crucial parameters: modification and predication. In Persian, the former role of adjectives is achieved when nouns follow them with an intervening *Ezafe* (as 'of' in English) as in (1) below i.e. adjectives in Persian follow the nouns they are modifying². The latter predicating role is fulfilled when adjectives are followed by verbs and complete the meaning of the verb and, as a matter of fact, and as mentioned above, form an adjectival NJ. In Persian, the verbs which accompany and co-occur with adjectives (in predicative role) are the copula *budæn* 'be' as in (2), the causative light verb *kærdæn* 'to make' as in (3), and the inchoative light verb *šodæn* 'become' as in (4) below. Of these the copula *budæn* 'be' is the only verb whose combination with the predicative adjective in Persian is not capable of forming a NJ. Thus we claim that adjectival CPs (in Persian) are formed with the combination of an adjective with the light verbs *šodæn* 'become' and *kærdæn* 'make' as shown later in this study.

(1) *pesær-e šad*
 boy-Ez (of) glad
 'the glad boy'

(2) *Ali šad bud*
 Ali glad be-Past.3rd.Sg.
 'Ali was glad.'

(3) *Ali šad šod.*
 Ali glad become-Past.3rd.Sg.
 'Ali became glad.'

(4) *Ali dust-æš-ra šad kærd.*
 Ali friend-his-DOM glad become-Past.3rd.Sg.
 'Ali made his friend glad.'

² Except superlative adjectives which precede nouns and in some literary styles where attributive adjectives may precede nouns as in *šad pesæri didæm* 'Happy boy I saw'.

In (1) above, the (human property) adjective *šad* ‘glad’ follows and modifies the noun *pesær* ‘boy’. The intervening morpheme ‘e’ represent the *ezafe* ‘of’ construction which conjoins the noun *pesær* ‘boy’ to its adjective *šad* ‘glad’. Therefore, the adjective in (1) is the modifier of the noun and has no predicating role. In (2), (3), and (4), however, the predicating role of the adjective is fulfilled in different degrees. In (2), the adjective *šad* ‘glad’ is followed by the copula *bud* ‘was’ which is the inflected form of the verb *budæn* ‘be’ and is semantically empty, indicating that the whole semantic predicating role is carried by the adjective in the sentence.

Following Emonds (1985) and Napoli (1989), this study claims that in adjective/copula constructions (as in (2) above) the adjective and not the adjective + copula combination is the predicate of the sentence since the copula is a grammatical word and, unlike the semantically full lexical items, does not contribute to the semantic interpretation of the sentence it appears in. RRG, too, postulates that in adjective/copula combinations or nuclear junctures (NJ) the predicating role is fulfilled by the adjective and not the adjective/copula combination. Therefore, in RRG this construction is not viewed as a nuclear juncture or complex predicate since the adjective in these forms is the only predicating element. In other words, the copula appears in the construction for the nucleus (NUC) formation without performing a predicating function (Van Valin 2005). That is, the NUC node in the layered structure of the clause is not followed by PRED node, rather the adjective is the element identified by PRED node as presented below (the example (2) is repeated here as (5)).

- (5) Ali *šad* *bud*.
 Ali glad be-Past.3rd.Sg.
 ‘Ali was glad.’

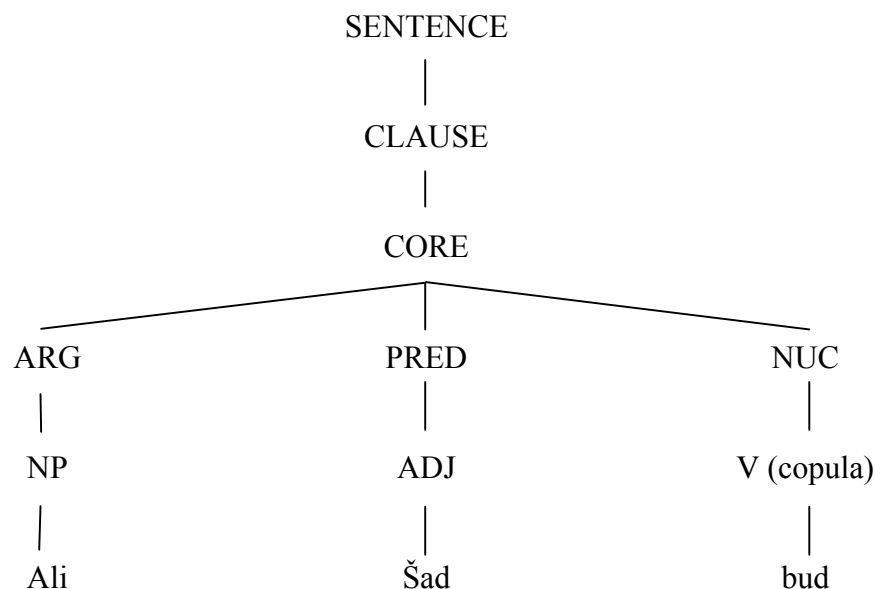


Figure 1 LSC of the adjective/copula combination in Persian

As clear from the above layered structure of the clause for sentence (4), the predicative adjective *šad* ‘glad’ is dominated by the PRED node and the copula *bud* ‘was’ is not identified with PRED, to indicate that it does not have a predicating role and is instead

functioning as a grammatical nucleus (NUC). The logical structure of the sentence is **be'** (x, [**predicate'**]) with the copula *bud* 'was' as **be'**, 'Ali' as the (x), and the adjective *šad* 'glad' as **predicate'**. The copula *bud* is a single-argument stative nucleus in the sentence where the S-intransitivity coincides with its M-intransitivity. Also, on the basis of the thematic relations argued in the previous chapter, we can conclude that the only argument in the above sentence is the PATIENT of the whole proposition.

2. Persian Adjectival Light Verbs

Persian adjectival light verb constructions have not received much attention in the literature: most analyses have been confined to a very brief description of adjective/light verb combinations and provide a few examples of these structures (Lambton 1967, Rastorgueva 1964, Tabaian 1979, Ghomeshi & Massam 1994, Dabir-Moghaddam 1997). There are a number of questions which are fundamental to our study and need to be dealt with in a more comprehensive analysis of the adjectival light verb constructions in Persian. These questions can basically be categorized into two. The first involves the nature and type of light verbs capable of combining with adjectives i.e. what kinds of light verbs fit into these constructions. The second question corresponds to the nature and type of the adjectives that can form these structures with light verbs.

The light verbs, in general, and in the constructions presented in the above section as in (3) and (4), in particular, are not as full as heavy/full verbs in terms of semantic interpretation i.e. if the adjective *šad* 'glad' is omitted from (3), as an example, as shown in (3'), the sentence will not be fully meaningful. As a matter of fact, in the light verbal/adjectival structures illustrated in the examples (3) and (4) the predicating role is shared between the light verb and the adjective i.e. we have two nuclei, the light verb and the adjective, which are followed by the PRED node in the layered structure of the clause shown in Figures (2) for the example (3) and Figure (3) for the example (4). The reason for (3') not to be fully meaningful is the fact that the light verb *šod* 'became' is not a semantically full lexical predicate thus it is not capable of forming a predicate to complete a proposition. We will argue later in this study that it is not semantically completely empty or bleached, as some Persian analysts, such as Vahedi-Langrudi (1996), have claimed.

The following Figures (illustrating the layered structure of the clause, semantic representation and their linking algorithm for the two examples mentioned before (3) and (4)) are the way these light verbal/adjectival nuclear junctures are analysed and schematized in RRG.

(3') *Ali šod.
Ali became.

Both the adjective and the verb in these constructions (as presented in Figures 2 and 3 above) act as the nucleus or predicate (as the term 'nuclear juncture' implies) i.e. in the case of our examples in (3) and (4) the adjective *šad* 'glad' along with the light verbal elements *šod* 'became' (in (3)) and *kærd* 'made' (in (4)) predicates the whole sentence. The point worth paying attention here is that by replacing the light verb *šod* 'became' in (3) by the light verb *kærd* 'made' in (4) the logical structure of the whole (nuclear) juncture changes completely.

That is in (3) with *šod* ‘became’ there is one argument or macrorole i.e. ‘Ali’ is the undergoer and the S-intransitivity of the verb is the same as its M-intransitivity. The sentence in (4) with *kærd* ‘made’, on the other hand, has two macroroles i.e. an actor (Ali) and an undergoer (*dust-æš*) and there is a causative relationship between the two arguments with the equal number of S-transitivity and M-transitivity arguments.

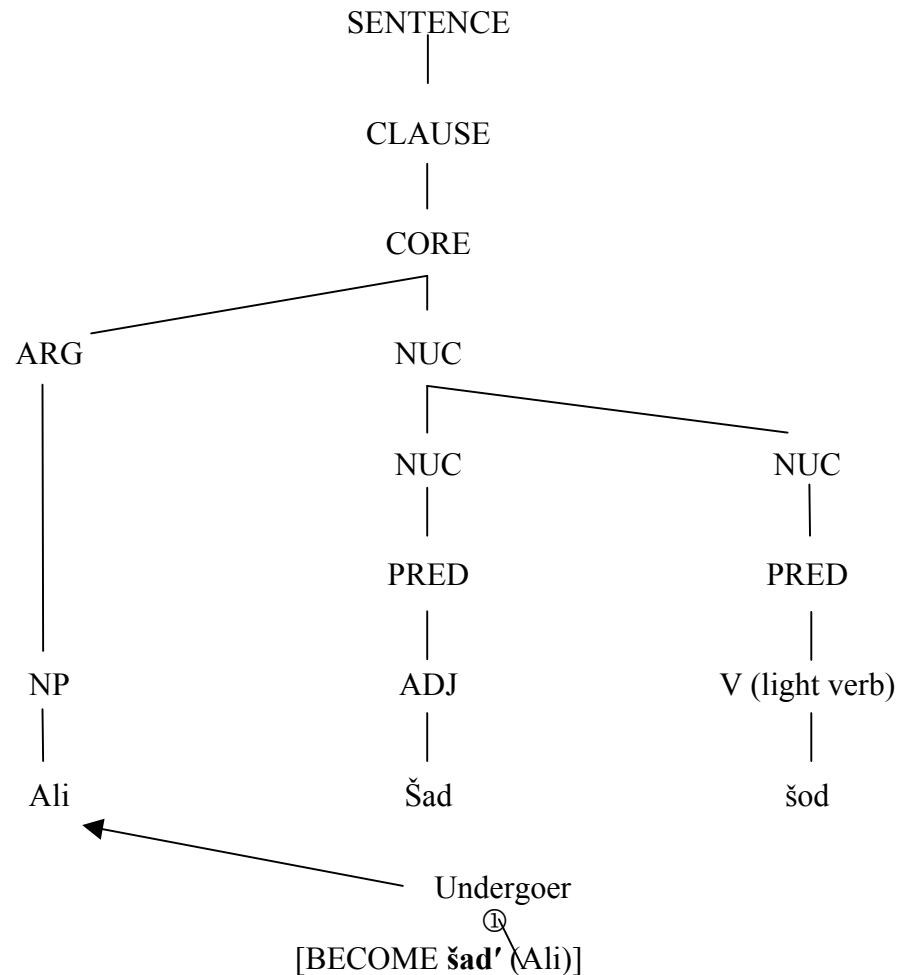


Figure 2 LSC for adjectival/light verbal (inchoative) nuclear juncture and the linking from semantics to syntax

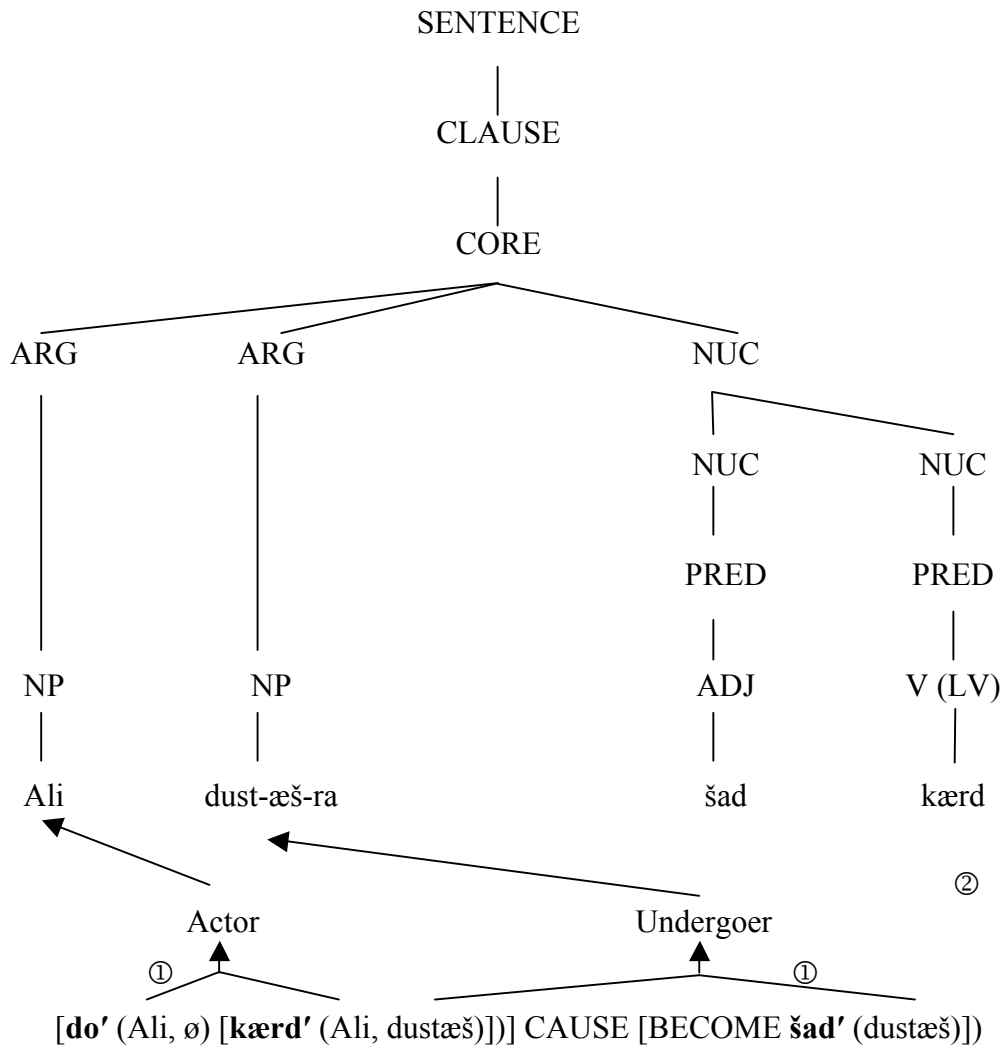


Figure 3 LSC for the adjectival/light verbal (causative) nuclear juncture and the semantic representation along with the linking algorithm

Consider the example in (6) for causative light verb *kærd* ‘made’ in combination with the predicative adjective *narahæt* ‘annoyed’ along with the following diagram which represents the Layered Structure of the Clause (LSC) (in RRG terms) of this construction:

- (6) ali dust-æš-ra narahæt kærd.
 Ali friend-his-DOM annoyed make-past-3rd.Sg.
 ‘Ali annoyed his friend.’

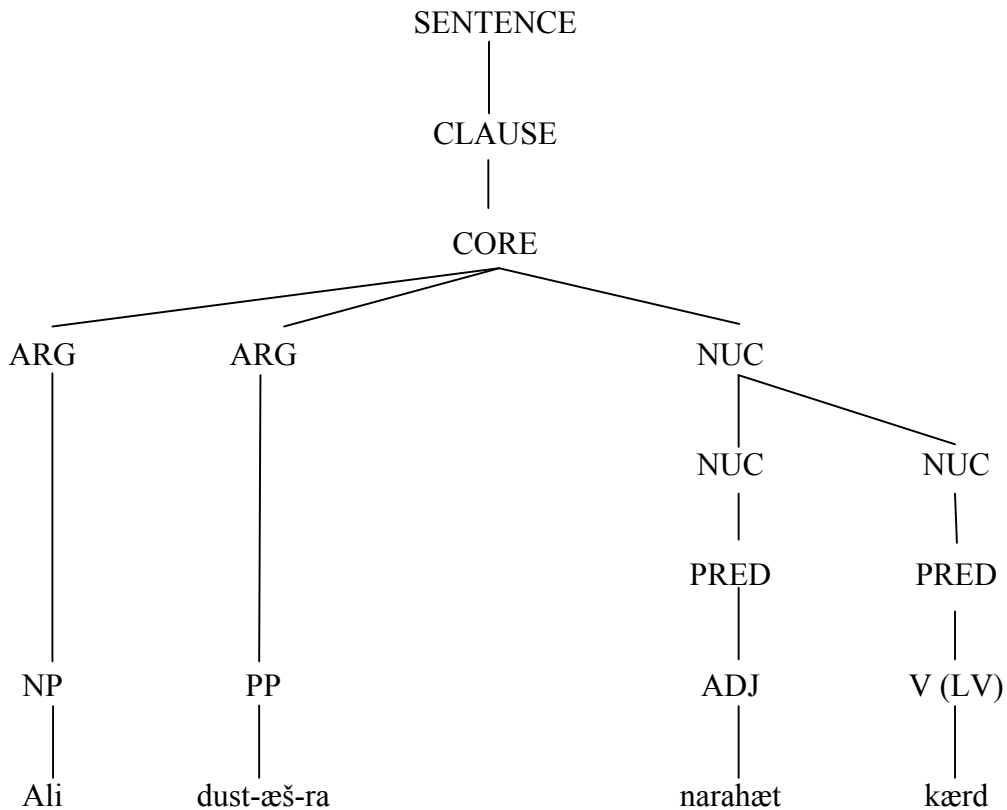


Figure 4 LSC of the adjectival/light verbal (causative) nuclear juncture

The sentence in (6) is an example of nuclear juncture in which the first nucleus or predicate is an adjective followed by a light verbal element. The whole complex predicate *narahæt kærd* ‘annoyed or made annoyed’ bears transition aspectual information i.e. the light verb *kærd* ‘did/made’ (using *dær yek saæt* ‘in an hour’ expression) has a bounded reading. This is clear from the grammaticality of (6a) below, where the predicate occurs with the point adverbial phrase *dær yek saæt* ‘in an hour’, compared to the ill-formed and unacceptable (6b) where it occurs with a durative adverbial phrase *bæraye yek saæt* ‘for an hour’. We can show that it is in particular the preverbal element i.e. the adjective *narahæt* ‘annoyed’ in (6) that is the determining factor in the telicity of the whole structure by replacing the preverbal element *-narahæt* ‘annoyed’- with another adjective *-negæran* ‘worried’- which is represented in (6c), the sentence can be interpreted as atelic or unbounded.

- (6a) ali dust-æš-ra dær yek saæt na rahæt kærd.
 Ali friend-his-DOM in an hour annoyed make-past-3rd.sg.
 ‘Ali annoyed his friend in an hour.’
- (6b) *ali dust-æš-ra bæraye yek saæt narahæt kærd.
 Ali friend-his-DOM for an hour annoyed make-past-3rd.Sg.
 ‘Ali annoyed his friend for an hour.’
- (6c) ali dust-æš-ra bæraye yek saæt negæran kærd.
 Ali friend-his-DOM for an hour worried make-Past-3rd.Sg.
 ‘Ali made his friend worried for an hour.’

A fundamental characteristic of these complex predicates with light verbs is that semantic load of the predicate is carried by the preverbal adjective *narahæt* ‘annoyed’ in (6a) and (6c). In order to determine the role of the light verb in the above nuclear junctures we replace the verbal element *kærd* ‘did/made’ with the inchoative counterpart *šod* ‘became’ as shown in (6d) below. We can also add the expression *dær yek saæt* ‘in an hour’ to test whether there would be a change in the transition telicity of the nuclear juncture of (6a) i.e. whether the change of the verbal element from *kærd* ‘did/made’ in (6a) to *šod* ‘became’ in (6d) has any effect on the bounded/unbounded reading of the construction.

- (6d) dust-e ali dær yek saæt narahæt šod.
 friend-Ez Ali in an hour annoyed become-Past.3rd.Sg.
 ‘Ali’s friend became annoyed in an hour.’

As clear from (6d) above, there is no change in the telicity interpretation of the nuclear juncture i.e. the sentence in (6d) is quite well-formed and grammatical with the expression *dær yek saæt* ‘in an hour’. Contrary to Megerdooian’s (2001) claim, it is not always the light verb which contributes the aspectual information to the light verb construction and as is observed in the nuclear junctures in (6a) and (6d) the light verbal construction *narahæt šod* ‘became annoyed’ in (6d) has a telic interpretation like the construction in (6a) which implies that the change of the light verb had no effect on the transition/initiatory reading of the junctures. We can note though that the change in the light verbal element from *kærd* ‘did/made’ to *šod* ‘became’ does affect the argument structure of the complex predicate. The nuclear junctures in (6a) is a transitive/causative construction while (6d) has an unaccusative/inchoative predicate status. This supports Megerdooian’s (2001) claim that the light verb denotes its valency in the complex predicate construction.

Another important point regarding the adjectival/light verbal constructions is the fact that there is no agreement on adjectives. The following examples (6e-6g) which are different forms of the same sentence in (6) illustrate this characteristic of adjectives in Persian.

- (6e) ali dust-an-æš-ra narahæt kærd.
 Ali friends-Pl-his-DOM annoyed make-Past.3rd.Sg.
 ‘Ali annoyed his friends.’
 (6f) ali bærader-æš-ra narahæt kærd.
 Ali brother-his-DOM annoyed make-Past.3rd.Sg.
 ‘Ali annoyed his brother.’
 (6g) ali xahær-æš-ra narahæt kærd.
 Ali sister-his-DOM annoyed make-Past.3rd.Sg.
 ‘Ali annoyed his sister.’

In (6e), the word *dust* ‘friend’ has been replaced with the plural form *dustan* ‘friends’ in order to determine if there is any type of gender agreement between the adjective *narahæt* ‘annoyed’ and the noun *dust* ‘friend’ in (6), this nominal element has been replaced with *bærader* ‘brother’ in (6f) and *xahær* ‘sister’ in (6g). Again, no gender agreement is observed between the nominal and adjectival elements i.e. for both male *bærader* ‘brother’ in (6f) and female *xahær* ‘sister’ in (6g) words, the adjective *narahæt* ‘annoyed’ is the same.

Unlike the light verbs *kærdæn* ‘to do/make’ and *šodæn* ‘to become’ discussed above, the copula verb *budæn* ‘to be’ when used with adjectives does not affect the transitivity/intransitivity status, does not contribute to the argument structure of the sentence, and has no role in assigning aspectual information. As the following example (7) represents, the copula verb *bud* ‘was’ used with adjective is a stative verb that attributes the adjective *æsæbani* ‘angry’ to Ali. While *šod* ‘became’ in (8) indicates an inchoative/unaccusative status for the construction.

- (7) Ali æsæbani bud.
 Ali angry be-Past.3rd.Sg.
 ‘Ali was angry.’
 (8) Ali æsæbani šod.
 Ali angry become-Past.3rd.Sg.
 ‘Ali became angry.’

In (7), *bud* ‘was’ is a copula since it has no predicating role on its own; it actually functions as a linking device between ‘Ali’ and the adjective *æsæbani* ‘angry’ i.e. it attributes the adjective (*æsæbani* ‘angry’) to ‘Ali’. As a matter of fact, the adjective *æsæbani* ‘angry’ is the predicating element of the sentence regarding the distinction Napoli (1989) makes between modifying and predicating adjectives. The copula verb *bud* ‘was’, unlike the light verb *šod* ‘became’ in (8), bears no semantic load and is a grammatical word which carries the tense and indicates the person and number. In other words, light verbs contribute to valency but not Aktionsart (aspect) while copulas are not capable of contributing to any of these parameters. This can be tested by dropping the copula from the sentence in (7’) below.

- (7’) *Ali æsæbani
 Ali angry
 ‘Ali angry.’

Even though the copula *bud* ‘was’ is omitted in (7’) (the omission of copula in sentences such as (7’) makes the sentence ungrammatical), there is no difference in substantive meaning of the two sentences in (7) and (7’) i.e. the omission of the copula verb has no effect on the meaning of the sentence. By comparison, the light verb *šod* ‘became’ contributes to the accusative inchoative aspect of the constructions. In other words, it assigns ‘Ali’ an internal argument role indicating that something made ‘Ali’ angry. This, also, suggests that *šodæn* ‘to become’ in Persian is not an auxiliary but a light verb since auxiliaries are not capable of assigning a particular type of argument. It is not a copula either since copulas are semantically empty while light verbs such as *šodæn* ‘to become’ do contribute to the aspectual and event information and are not semantically bleached constituents. Therefore, contrary to Mahootian’s (1997) claim, the verbal element *šod* ‘became’ is not a copula since it is not empty from the semantic point of view; rather it is a light verbal element (Karimi-Doostan 1997, Megerdooomian 2002).

Like *šodæn* ‘to become’, discussed above, the causative light verb *kærdæn* ‘to do/make’, when combined with adjective, cannot be an auxiliary. In (9) below, *kærdæn* ‘to do/make’ assigns an external argument role to ‘Ali’ meaning that ‘Ali’ is the subject of the complex predicate *æsæbani kærð* ‘made angry’ while (contrary to

Dabir-Moghaddam (1997) who refers to *kærdæn* ‘to make’ combined with adjectives as auxiliary verb) auxiliaries are not capable of this operation i.e. *kærdæn* cannot be an auxiliary.

- (9) ali dust-æš-ra æsæbani kærd.
 Ali friend-his-DOM angry make-Past.3rd.Sg.
 ‘Ali made his friend angry.’

As is clear from the sentence in (9), *kærd* ‘made’ is a causative verb. This light verb, as mentioned earlier, is capable of assigning an external argument role to ‘Ali’ highlighting him as the subject of the whole sentence. It should be noted that in Persian the use of light verbs is one of a number of strategies to form causative constructions. In fact, *kærdæn* ‘to do/make’ can be used in both transitive causative (as in (9) where *kærdæn* means ‘to make’) and intransitive forms (as in (10) below where *kærdæn* means ‘to do’). The following illustrates the latter form of *kærdæn* ‘to do’ in Persian. The example in (10) represents the intransitive usage of the verb *kærdæn* with the meaning of ‘to do’ i.e. ‘the bird does the flying’. But the important point to mention here is that the preverbal constituent in (10) is not an adjective but a noun. In order to examine whether adjectives, too, can be used with the intransitive usage of the light verb *kærdæn* ‘to do’, the Persian data was investigated. As a result of this examination, it became clear that only one of the eight groups of adjectives mentioned earlier, the VALUE adjectives can be used with the intransitive form of the verb *kærdæn* with the meaning ‘to do’. The following example (11) shows the intransitive usage of this verb with the ‘value’ adjective ‘bad’.

- (10) pærænde pærvaz kærd.
 bird flying do-Past.3rd.Sg.
 ‘The bird flew.’
- (11) Ali be dust-æš bæd kærd.
 Ali to friend-his bad do-Past.3rd.Sg.
 ‘Ali did wrong/bad to his friend.’

Unlike (9) in which *kærd* has the meaning of ‘made’ and acts as an transitive/causative verb, in (11) the light verb *kærd* means ‘did’ and is an unaccusative intransitive verb, the noun *dust* ‘friend’ is an oblique argument, and ‘Ali’ is the subject of the sentence. The value adjective ‘bad’ along with the light verb *kærd* in (11) make an adjectival nuclear juncture or complex predicate which is not a causative construction i.e. *kærd* means ‘did’ (and not ‘made’) which operates as an intransitive verb rather than a transitive one. So far, we have discussed the two light verbs that can combine with adjectives to form adjectival light verb constructions, namely, *kærdæn* ‘to make/do’ and *šodæn* ‘to become’. Now we move to the next section which discusses the types of adjective used in adjectival light verb constructions.

3. Persian Adjectives in Adjectival NJ

At the beginning of the above section, two questions regarding the adjectival/light verbal constructions or NJs were posed. In fact, this section aimed at providing an answer to the first question on the nature and type of the light verbs which are capable of combining with adjective. The focus of the present section is on answering the

second question regarding the nature and type of the adjectives that fit into the adjectival/light verbal constructions. Vahedi-Langrudi (1996), citing Milsark (1977), points out that individual level adjectives do not enter the realm of CP constructions with causative light verbal elements because changing an individual's permanent trait is not possible under normal circumstances (Vahedi-Langrudi 1996). However, Vahedi-Langrudi (1996) claims that such individual level adjectives as *aqel* 'wise' can be acceptable in Persian when combined with the unaccusative light verb *šodæn* 'to become/turn' as shown in (12) below while not acceptable with the causative light verb *kærdæn* 'to make/do' as in (13).

(12) *aqel šodæn*
wise become
'to become wise'

(13) **aqel kærdæn*
wise make
'to make wise'

(cf. Vahedi-Langrudi 1996, p.10)

In general, adjectives are of three major types i.e. in terms of the number of elements involved in adjectival forms they include three groups: simple, compound, and participle adjectives. Examples from each of these groups are presented below:

(14) *ræftar-e an bačče madær-æš-ra negaran kærd.*
behaviour-Ez that child mother-his/her-DOM worried make-Past.3rd.Sg.
'That child's behaviour made his/her mother worried.'

(15) *ræftar-e an bæčče madær-æš-ra del-negæran kærd.*
behaviour-Ez that child mother-his/her-DOM heart-worried make-Past.3rd.Sg.
'That child's behaviour made his/her mother worried.'

(16) *ræfta-e an bæčče madær-æš-ra ašofte kærd.*
behaviour-Ez that child mother-his/her-DOM agitated make-Past.3rd.Sg.
'That child's behaviour made his/her mother agitated.'

In (14) above, the adjective *negæran* 'worried' is a plain adjective which is not derived from other classes of words and is a one-word adjective. In (15), on the other hand, the adjective *del-negæran* 'Lit.: heart-worried' is a compound adjective comprising two words *del* 'heart' and *negæran* 'worried'. Unlike the adjectives in (14) and (15), the adjective *ašofte* 'agitated' in (16) is derived from another word i.e. the verb *ašoftæn* 'to make agitated/upset' in Persian. As a matter of fact, the deverbal adjective *ašofte* 'agitated' is the past participle of the verb *ašoftæn* 'to upset/make upset or agitated'. All the sentences in (14), (15), and (16), as is clear from *kærd* 'made' are causative/transitive constructions in which all the adjectives are predicate adjectives that is they denote an event or action. The simple, compound, and past participle or derived adjectives can also combine with the inchoative/unaccusative light verb *šodæn* 'to become' to form adjectival nuclear junctures. The inchoative/intransitive forms of the examples in (14-16) can be illustrated as (14'-16') below.

In the sentences (14-16, 14'-16') the light verbs *kærdæn* 'to make' and *šodæn* 'to become/turn' represent their capability to make nuclear junctures with all types of adjectives mentioned above, namely, simple, compound, and past participle forms. The important point to be taken into consideration here regarding the compound adjectives exemplified in (15) is that the element with which adjectives is combined with (like

del-negæran ‘Lit: heart-worried’ in (15, 15’) can precede or follow it as in *ašofte-xater* ‘disturb-minded’ given in (17) below.

- (14’) madær negæran šod.
mother worried become-Past.3rd.Sg.
‘The mother became worried.’
- (15’) madær del-negæran šod.
mother heart-worried become-Past.3rd.Sg.
‘The mother became worried.’
- (16’) madær ašofte šod.
mother agitated became.
‘The mother became agitated/upset.’
- (17) ræftar-e an bæčče madær-æš-ra ašofte-xater kærd.
behaviour-Ez that child mother-his/her-DOM disturb-minded made.
‘That child’s behaviour made his mother disturb-minded/agitated his mother.’

As mentioned before there are eight major categories of adjectives distinguished by Payne (1997, p.63). In Persian, almost all the adjectives of these eight categories can combine with both *kærdæn* ‘to make/do’ and *šodæn* ‘to become/turn’. The following examples (*kærdæn*: 18-25, *šodæn*: 18’-25’) illustrate adjectival categories of AGE, DIMENSION, VALUE, COLOR, PHYSICAL CHARACTERISTICS, SHAPE, HUMAN PROPERTY, SPEED:

AGE Adjective:

- (18) an hadese u-ra pir kærd.
that accident him/her old make-Past.3rd.Sg.
‘That accident made him/her old.’
- (18’) u be xatere an hadese pir šod.
He/She to because that accident old become-Past.3rd.Sg.
‘He became old because of that accident.’

DIMENSION Adjective:

- (19) Mina qesse-æš-ra kutah kærd.
Mina story-her-DOM short make-Past.3rd.Sg.
‘Mina made her story short/shortened her story.’
- (19’) qesse-ye Mina kutah šod.
story-Ez Mina short become-Past.3rd.Sg.
‘Mina’s story became short.’

VALUE Adjective:

- (20) Ali be xod-æš bæd kærd.
Ali to self-his bad do-Past.3rd.Sg.
‘Ali did wrong/bad (things) to himself.’
- (20’) nætije-ye kar-e Ali bæd šod.
result-Ez (of) action-Ez Ali bad became-Past.3rd.Sg.
‘The result of Ali’s action became bad.’

COLOR Adjective:

- (21) an-ha xane-ešan-ra abi kærd-ænd.
that-Pl. house-their-DOM blue make.Past.3rd.-Pl.

- ‘They made their house blue.’
 (21’) xane an-ha abi šod.
 house that-Pl. blue become-Past.3rd.Sg.
 ‘Their house became blue.’

PHYSICAL CHARACTERISTICS Adjective:

- (22) lebas-ha čæmedan-ra sængin kærd.
 clothes-Pl. suitcase-DOM heavy make-Past.3rd.Pl.
 ‘The clothes made the suitcase heavy.’
 (22’) čæmedan sængin šod.
 suitcase heavy become-Past.3rd.Sg.
 ‘The suitcase became heavy.’

SHAPE Adjective:

- (23) an-ha mæsir-e mosabeqe-ye do-ra gerd kærd-ænd.
 that-Pl. route-Ez race-Ez running-DOM round make-Past.3rd.-Pl.
 ‘They made the route of the running race round.’
 (23’) mæsir-e mosabeqe-ye do gerd šod.
 route-Ez race-Ez running round become-Past.3rd.Pl.
 ‘The route of the running race became round.’

HUMAN PROPERTY Adjective:

- (24) nomre-ye xub-æš dær emtehan u-ra xošhal kærd.
 mark-Ez good-his/her in exam him/her happy make-Past.3rd.Sg.
 ‘His/Her good mark in the exam made him/her happy.’
 (24’) u xošhal šod.
 He/She happy become-Past.3rd.Sg.
 ‘He/She became happy.’

SPEED Adjective:

- (25) dočærxe sævar soræt-æš-ra tond kærd.
 bicycle rider speed-his/her-DOM quick/fast make-Past.3rd.Sg.
 ‘The cyclist made his speed fast/accelerated.’
 (25’) soræt-e dočærxe sævar tond šod.
 speed-Ez bicycle rider quick/fast become-Past.3rd.Sg.
 ‘The speed of the cyclist became fast.’

As is clear from the examples, all the sentences with the light verb *kærdæn* ‘to make/do’ in (18-25) do have equivalent forms with the light verb *šodæn* ‘to become/turn’ in (18’-25’) i.e. all the causative/transitive sentences with *kærdæn* ‘to make/do’ have inchoative/unaccusative/intransitive forms with *šodæn* ‘to become/turn’. In the meantime, all the adjectives in the eight mentioned categories can combine with the two light verbs (*kærdæn* and *šodæn*) to form nuclear junctures. The light verb *kærdæn*, as mentioned before, has two meanings: ‘to make’ and ‘to do’. The important point worth mentioning here is that the only group of adjectives in which this light verb (*kærdæn*) can appear with the second meaning i.e. ‘to do’ along with the first meaning ‘to make’ is the VALUE adjectives. The light verb *kærdæn* has only the meaning of ‘to make’ when accompanied by other seven adjectival forms.

Along with the forms and types of the adjectives discussed above, the amount of the semantic load contributed by the adjectival elements is of crucial importance. Although, as mentioned before, the light verbs are not semantically bleached elements and contribute to the argument structure, transitivity, and aspectual information, the main semantic load is carried by the adjective. Consider the following examples:

- (26) *pedær-æš xæste šod.*
 father-his tired become-Past.3rd.Sg.
 'His father became tired.'
- (27) *kar-e ziyad pedær-æš-ra xæste kærd.*
 work-Ez much father-his-DOM tired make-Past.3rd.Sg.
 'Overwork made his father tired.'

The matrix semantic load of the two nuclear juncture, *xæste šod* 'became tired' in (26) and *xæste kærd* 'made tired' in (27), which is indeed 'the tiredness of the father' is the same even though the light verbs (*šod* 'became' and *kærd* 'made') used in the sentences are different.

4. Discussion

The findings of the adjectival NJs examination are presented in Table (1) below. In this Table the aspect types of all the adjectival/light verbal nuclear junctures along with their logical structures are presented. The basic verb classes of these NJs have been divided into activity, achievement and accomplishment based on the five diagnostic tests (Test 1: the use of the progressive expression 'in process of', Test 2: the use of the adverb 'actively', Test 3: the use of the adverbs 'quickly', or 'slowly', Test 4: the use of the expression 'for an hour', and Test 5: the use of the expression 'in an hour', originally proposed by Vendler (1967) and Dowty (1979)). RRG takes these five tests as the starting points in developing verb classes.

As is clear from the Table, no stative adjectival LVCs have been found in the Persian examples i.e. there is no state verb in our collected data which combines with the adjective (of any type) to form an adjectival LVC. This may be in part due to the fact that among all the Persian light verbs only two i.e. *kærdæn* 'make/do' and *šodæn* 'become' can combine with the adjectives and in part due to the inherent nature of the combination of these light verbs and the predicative adjectives, which may not corresponds to the state of affairs. With regard to other types of the basic three aspect types i.e. activity, achievement and accomplishment, it is observed that the majority of the adjectival nuclear junctures in Persian are of the accomplishment class and the achievement and activity predicates are placed in second and third respectively. In addition, the change in the light verbal element of the adjectival NJs (from *kærdæn* 'make/do' to *šodæn* 'become') makes no difference to the aspect type of the whole juncture i.e. the aspectual properties of the whole juncture is not predictable from that of the verbal element.

Verb Class	Adj. Type	Adjectival NJ	Logical Structure (LS)
Activity	Speed	-tond <u>kærd</u> 'made quick'	[do' (x, Ø)] CAUSE [BECOME tond' (x, y)])
		-tond <u>šod</u> 'became quick'	do' (x, [btond šodæn' (x)])
Achiev.	Value	-bæd <u>kærd</u> 'did wrong/bad things'	[INGR predicate' (x)] CAUSE [INGR bæd' (x, y)]
		-bæd <u>šod</u> 'became bad'	INGR bæd šodæn' (x)
	Physical Ch.	-sængin <u>kærd</u> 'made heavy'	[INGR predicate' (x)] CAUSE [INGR sængin' (x, y)]
		-sængin <u>šod</u> 'became heavy'	INGR sængin šodæn' (x)
Accom.	Human Pro.	-xošhal <u>kærd</u> 'made happy'	[INGR predicate' (x)] CAUSE [INGR xošhal' (x, y)]
		-xošhal <u>šod</u> 'became happy'	INGR xošhal šodæn' (x)
	Age	-pir <u>kærd</u> 'made old'	[BECOME predicate' (x)] CAUSE [BECOME pir' (x, y)]
		-pir <u>šod</u> 'became old'	BECOME pir šodæn' (x)
	Dimension	-kutah <u>kærd</u> 'shortened'	[BECOME predicate' (x)] CAUSE [BECOME kutah' (x, y)]
		-kutah <u>šod</u> 'became short'	BECOME kutah šodæn' (x)
	Colour	-abi <u>kærd</u> 'became blue'	[BECOME predicate' (x)] CAUSE [BECOME abi' (x, y)]
		-abi <u>šod</u> 'became blue'	BECOME abi šodæn' (x)
	Shape	-gerd <u>kærd</u> 'made round'	[BECOME predicate' (x)] CAUSE [BECOME gerd' (x, y)]
		-gerd <u>šod</u> 'became round'	BECOME gerd šodæn' (x)

Table (1) Summary of LS & Aktionsart Type of the Persian Adjectival/Light Verbal Predicates

The important point that arises from the Table 1 is that even though the behaviour of the LV *kærdaen* 'make/do' is compatible with that of *šodaen* 'become' (i.e. whatever the verb class of the former, the same is true for the latter), they are different in terms of the number of their arguments. Unlike *kærdaen* (which takes two arguments), the LV *šodaen* is univalent in all the adjectival nuclear junctures taking one argument (x) and they are all intransitive. With regard to the contribution of the preverbal/verbal elements in determining the aspectual properties of the whole juncture it should be noted that even though the LV *kærdaen* 'make' is an activity predicate when used as a full-heavy verb,

only one LVC (*tond kærd* 'made quick') belongs to the Activity aspect type and the other seven LVCs (out of the eight adjectival NJs with *kærdæn*) belong to either achievement or accomplishment. That is, the aspect type of these LVCs is not predictable from that of the verbal element with the exception of one case. In terms of the other eight LVCs which are formed with the LV *šodæn* 'become' it should be pointed out that this verbal element has no independent aspect type since it has no full-heavy verb form and; therefore, we cannot predict the aspect type of the whole NJ from that of the verbal element. In the following section we scrutinize the event structure of the adjectival LVCs and the contribution of the two constituents.

5. Event Structure of Adjectival NJs

From the analysis of the adjectival nuclear junctures we found out that the light verbs in these LVCs belong to the phase class of verbs i.e. *kærdæn* 'make/do' referring to the process and *šodæn* 'become' denoting the result or endpoint of an event can combine with adjective to form nuclear junctures. This is presented in Table (2) below where the LV *kærdæn* means 'make/do' in adjectival NJs unlike the nominal LVCs where this verb means 'do'.

Light Verb	LVs' Phase Features
<i>šodæn</i> 'become'	Result
<i>kærdæn</i> 'make/do'	Process

Table (2) Features of LVs as phase verbs in Persian adjectival NJs

To use the Engerer's (2007) terminology the two phase verbs (*kærdæn* 'make/do' & *šodæn* 'become') refer to the continuative and result (resultative) phases respectively shown in Figure (5.6) below (which is the same as Figure (4.5) in chapter 4).

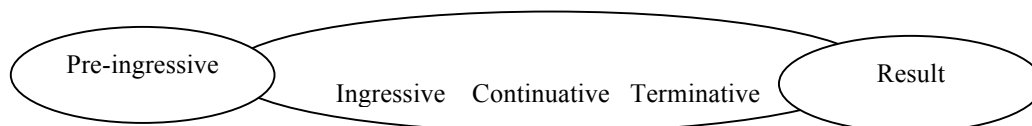


Figure 5 Phases of an event

The combination of the continuative phase verb *kærdæn* 'make/do' (both meanings of this verb show the process of the 'doing' or 'making' event) and the result phase verb *šodæn* 'become' with different adjective types as demonstrated in the following Table (3) yields interesting results. As clear from Table (3), the adjectival NJs are of two types: resultative and non-resultative. That is, the adjectival LVCs formed with the two phase verbs, namely, *kærdæn* 'make/do' and *šodæn* 'become' with the adjective types of age, dimension, colour, shape, and speed belong to the resultative constructions while fusion of the same phase verbs with the value, physical characteristic, and human property adjectives (which appear in bold form in Table (3)) yield non-resultative constructions. In other words, even though the phase verbs in both groups are the same the use of different adjective types has yielded different results. That is, in the resultative constructions the age, dimension, colour, shape, and speed adjectives belong to the SCALAR adjective types involving a process. Resultative constructions, as Saeed (2003) points out, involve the process and our focus of attention is the final point of completion in this process. On the contrary, in the non-resultative adjectival LVCs the

value, physical characteristics, and human property adjectives are of STATE/ATTRIBUTE type i.e. these adjectives do not involve a process of event and; therefore, cannot be resultative by nature. As clear from Table (3), this is also applicable to the adjectival NJ with the value adjective although in this construction the meaning of the verbal element *kærdæn*, unlike other LVCs with other adjective types, is 'do', which supports the important role of the adjective type in this respect. That is, the inherent nature of these two adjective types as scalar and state/attributes has caused these adjectival nuclear junctures to behave differently and belong to either resultative or non-resultative event type.

Adj.Type	NJ	Event Type
Age	pir kærð 'made old'	Age adj. + 'make' → Resultative
	pir šod 'became old'	Age adj. + 'become' → Resultative
Dimen- sion	kutah kærð 'made short'	Dim. adj. + 'make' → Resultative
	kutah šod 'became short'	Dim. adj. + 'become' → Resultative
Value	bæð kærð 'did wrong/bad'	Val. adj. + 'do' → Non-resultative
	bæð šod 'became bad'	Val. adj. + 'become' → Non-resultative
Colour	abi kærð 'made blue'	Col. adj. + 'make' → Resultative
	abi šod 'became blue'	Col. adj. + 'become' → Resultative
Physical Character.	sængin kærð 'made heavy'	Ph./ch. adj. + 'make' → Non-resultative
	sængin šod 'became heavy'	Ph./ch. adj. + 'become' → Non-resultative
Shape	gerð kærð 'round made'	Sh. adj. + 'make' → Resultative
	gerð šod 'became round'	Sh. adj. + 'become' → Resultative
Human Property	xošhal kærð 'made happy'	Hu./Pr. adj. + 'make' → Non-resultative
	xošhal šod 'became happy'	Hu./Pr. adj. + 'become' → Non-resultative
Speed	tond kærð 'made quick'	Sp. adj. + 'make' → Resultative
	tond šod 'became quick'	Sp. adj. + 'become' → Resultative

Table (3) Event type of the adjectival NJs in Persian

As a matter of fact, Table (1) is further evidence for this phenomenon and is consistent with what we have demonstrated in Table (3) above. The findings of the application of the five diagnostic tests in Table (1) show that the three NJs with the value, physical characteristic, and human property adjective types are the only ill-formed constructions with the first test (the use of the progressive expression 'in process of'), the third (the use of the adverbs 'quickly', or 'slowly'), and the fifth test (the use of the expression 'in an hour'). That is, unlike other LVCs presented in this Table, the result of these three tests is 'no'. This indicates that these three constructions do not involve a process of event and consequently cannot be resultative. As mentioned above, this can also be observed in Table (1) where these constructions are the only adjectival NJs which belong to the achievement verb class with the logical structure [INGR **predicate** (x)] CAUSE [INGR **predicative adjective** (x, y)]. That is, achievement constructions are instantaneous, do not take place in a time span, and do not belong to the resultative event type i.e. they have the feature of [+punctual] indicating that they lack internal duration. The [+punctual] feature of achievement LVCs distinguishes them from the other adjectival nuclear junctures with activity and accomplishment aspect types which have [-punctual] feature and involve temporal duration and therefore are of resultative event type. Consider for instance *pir kærð* 'make old' in (18) repeated here as (28) with the age adjective *pir* 'old' and *bæð kærð* 'did wrong/bad (things)' in (20) repeated here as (29) with the value adjective *bæð* 'bad':

- (28) an hadese u-ra pir kærð.
 that accident him/her old make-Past.3rd.Sg
 'That accident made him/her old.'

- (29) Ali be xod-æš bæd kærd.
 Ali to self-his bad do-Past.3rd.Sg.
 'Ali did wrong/bad (things) to himself.'

The adjectival NJ *pir kærd* 'made old' in (28) with the age adjective *pir* 'old' is an accomplishment construction with [-punctual] feature where the event 'making old' has internal duration i.e. it takes place over a period of time (in real situations nobody gets old all of a sudden) bearing a resultative event type. On the contrary, the adjectival NJ *bæd kærd* 'did bad/wrong (things)' in (29) with the value adjective *bæd* 'bad' is an achievement construction with [+punctual] feature where the event 'doing bad' is instantaneous and does not happen over a time span i.e. somebody does something wrong in a particular point of time. Our discussion in this section indicates that the adjectival element in the adjectival nuclear junctures contributes to the result event type or attribute and makes these constructions behave as resultative. In addition, the inchoative and causative light verbs in these constructions belong to the phase class of verbs. The change in the LV has no effect on the event type of the adjectival LVCs. In other words, the light verbs are bleached with regard to event type demonstrated in Figure (5) in this section. This is consistent with their behaviour in the nominal NJs where the major role in providing the event type is played by the pre-verbal element and LVs contribute to the phase of event carrying TAM and operator features. Having examined the event structure of the adjectival LVCs in this section, we now move on to explore the capability of these elements in assigning argument structure in more detail.

6. Argument Structure

We have categorized the discussion into two parts: the first part (section (6.1)) analyzes the syntactic valency or transitivity of the adjectival NJs and the second (section (6.2)) focuses on their semantic valency or thematic roles.

6.1 Syntactic Valency

As the logical structures of the two LVs (*kærdæn* 'make/do' and *šodæn* 'become') presented in Table (1) indicate, in all verb classes and all adjective types the light verb *kærdæn* 'make/do' is used transitively having (y) features. In fact, the transitivity status of the whole adjectival nuclear juncture (with *kærdæn* 'make/do') is matched with that of the full/heavy form of the verbal element. For the inchoative light verb *šodæn* 'become' one argument or macrorole feature has been presented as (x) showing the intransitive reading of this predicate. As schematized in the logical structures of the adjectival NJs with the light verb *kærdæn* 'make/do', all of the examples with this verbal element are provided with causative features that is the logical structures of activity, achievement, and accomplishment predicates with this light verb are all presented as [...] CAUSE [do ...], [INGR ...], or [BECOME ...]. In other words, regardless of the aspect type of the predicates, all the adjectival LVCs examined in this chapter belong to the causative class presenting the causative nature of the light verb *kærdæn* 'make/do' in the adjectival NJs. This indicates that the verbal element (either *kærdæn* 'make/do' or *šodæn* 'become') in these constructions plays a more important role in determining the transitivity/causativity status of the whole juncture and the adjective's role is not as influential as that of the light verb. This is contrary to what is claimed by Karimi-Doostan (1997, 2005) who maintains that light verbs are not capable

of determining the number of arguments in light verbal constructions. In fact, the problem with the previous studies of the Persian LVCs including Karimi-Doostan's analysis is that there has been no categorization of these constructions based on the specific type of the preverbal element. While in this study we have shown that the degree of the contribution of the two elements to the argument structure corresponds to the type of the preverbal element used in these nuclear junctures. As discussed above, in the adjectival NJs, for instance, the role of the light verb outweighs that of the non-verbal (adjectival) element with regard to the argument structure while the majority of the examples used by Karimi-Doostan belong to the nominal LVCs where the noun in these constructions plays a more important role in the argument structure. This has caused the above mentioned analyses to make such a claim regarding the complete bleachedness of the light verbs. In order to examine the impact of the adjectival/light verbal elements in characterizing the semantic valency or thematic roles of the whole construction this issue is explored in the following section.

6.2 Semantic Valency or Thematic Roles

As discussed above, in adjectival LVCs the syntactic valency or the transitivity status of the whole construction is in direct correspondence with the (in)transitivity reading of light verb. To determine the amount of the LV contribution to the semantic valency of these constructions consider the adjectival LVCs *kutah kærdaen* 'make short' and *kutah šodaen* 'become short' with the dimension adjective *kutah* 'short' used in examples (19) and (19') and repeated here as (30) and (30') respectively:

- (30) Mina qesse-æš-ra kutah kærd.
 Mina story-her-DOM short make-Past.3rd.Sg.
 'Mina made her story short/shortened her story.'
- (30') qesse-ye Mina kutah šod.
 story-Ez Mina short become-Past.3rd.Sg.
 'Mina's story became short.'

As clear from the above sentences, the privileged syntactic argument *Mina* is the agent and *qesse* 'story' is the patient of the sentence in (30) with two macroroles or arguments (x, y) as the logical structure of [BECOME **kutah kærd**' (x)] CAUSE [BECOME **kutah**' (x, y)] presents. On the contrary, the replacement of the LV *kærd* 'made' in (30) with the inchoative LV *šod* 'became' (the infinitive form is *šodaen* 'become') makes the sentence in (30') monovalent with *qesse* 'story' as the patient of the sentence. The behaviour of *kærdaen* 'make' with the dimension adjective *kutah* 'short' in (30) above is consistent in all the adjectival NJs where this light verb has been used with different adjective types (age, dimension, value, colour, physical characteristics, shape, human property, and speed). That is, in all the adjectival LVCs explored in this study *kærdaen* is capable of assigning the same types of thematic roles to the sentence arguments with the privileged syntactic argument as the agent and the second argument or the direct core argument as the patient. The important point is that this is consistent with the heavy form of *kærdaen* 'make' where it assigns the same thematic roles to its (x) and (y) arguments. The same compatibility is observed between the above example in (30') with the logical structure BECOME **kutah šodaen**' (x) and all the sentences with the LV *šodaen* 'become' and different types of adjective mentioned earlier. In other words, in all the adjectival NJs analyzed in this study *šodaen* is used with one patient macrorole or argument as the only thematic role assigned by this light verb. In the next section we

will demonstrate a schematic representation of the features of the adjectival nuclear junctures examined in this chapter.

7. Constructional Schemas of Adjectival NJs

In order to determine the nexus-juncture type of the adjectival NJs in this section we have used the negation nuclear operator as the sharing operator between the two structurally independent elements in these constructions. To illustrate this phenomenon consider the example in (19) with the dimension adjective *kutah* 'short' repeated here as (31) with the Persian nuclear negation operator *næ-*. Figure (6) below schematizes the structural independence of the two PRED nodes which share this operator i.e. the negation operator has scope over both elements. It should be noted here that the same phenomenon regarding the nuclear negation operator sharing between the two constituents takes place in all the adjectival LVCs with different adjective type and the two causative (*kærdæn* 'make') and inchoative (*šodæn* 'become') light verbs. That is, both construction types belong to the nuclear co-subordination linkage form.

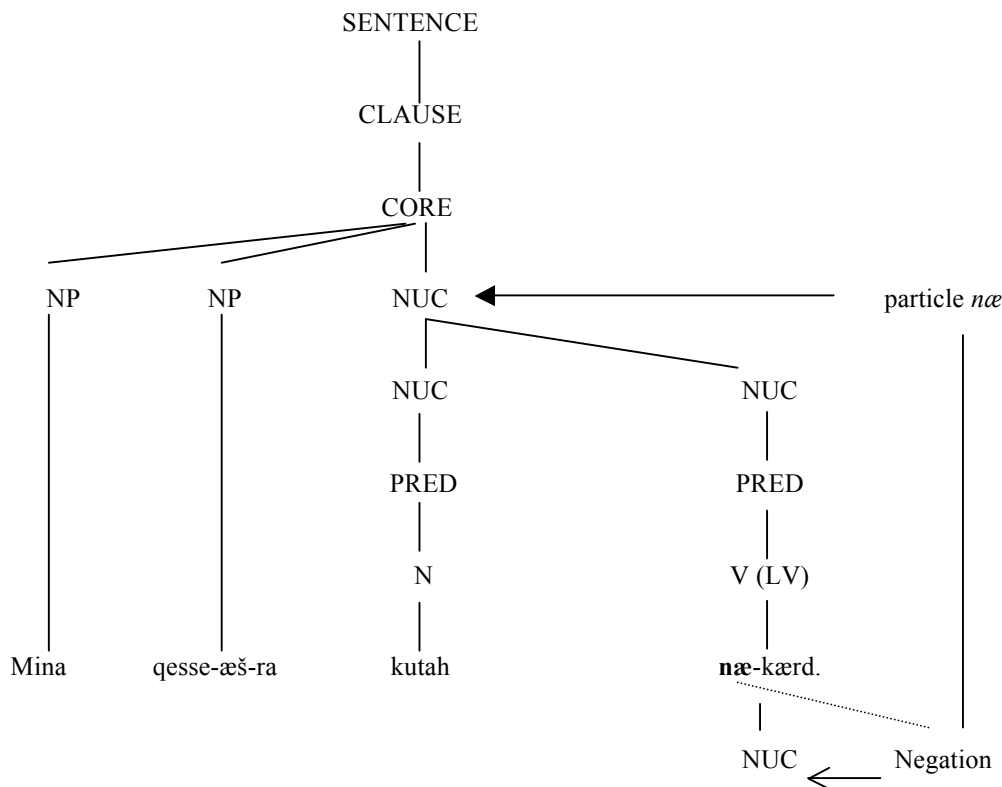


Figure 6 Operator sharing in Persian adjectival NJs

- (31) Mina qesse-æš-ra kutah næ-kærd.
 Mina story-her-DOM short Neg.Op.-make-Past.3rd.Sg.
 'Mina did not make her story short/shortened her story.'

To summarize the representation of the syntactic, morphological, semantic, and pragmatic features along with the nexus-juncture linkage type of these constructions, a constructional schema is presented below for each of the two groups of Persian adjectival nuclear junctures.

Construction: Persian adjectival nuclear juncture

SYNTAX:

Juncture: nuclear

Nexus: cosubordination

Construction type: light verbal (adjective + light verb)

[CL [CORE NP [NUC [NUC ...ADJ] [NUC ... V(LV)]] NP ...] ...]

Unit template(s): (3.6) (see section 3.4.4.1 in chapter three)

PSA: none

Linking: default

MORPHOLOGY:

PRED_{NUC1}: one of the adjective typesPRED_{NUC2}: Phase verbs: the causative light verb *kærdæn* 'make/do':[**predicate'** (x, Ø)] CAUSE [BECOME **predicative adj'** (x, y)])[INGR **predicate'** (x)] CAUSE [INGR **predicative adj'** (x, y)][BECOME **predicate'** (x)] CAUSE [BECOME **predicative adj'** (x, y)]SEMANTICS: [PRED_{NUC1}] CAUSE [PRED_{NUC2}], PRED_{NUC2} [+static]

PRAGMATICS:

Illocutionary force: unspecified

Focus structure: unspecified

Table (4) Constructional schema for Persian adjectival NJs with the causative light verb *kærdæn* 'make/do' (first group)

Construction: Persian adjectival nuclear juncture

SYNTAX:

Juncture: nuclear

Nexus: cosubordination

Construction type: light verbal (adjective + light verb)

[CL [CORE NP [NUC [NUC ...] [NUC ...]]]

Unit template(s): (3.6) (see section 3.4.4.1 in chapter three)

PSA: none

Linking: default

MORPHOLOGY:

PRED_{NUC1}: one of the adjective typesPRED_{NUC2}: Phase verbs: the inchoative light verb *šodæn* 'become'**do'** (x, [**predicate'** (x)])INGR **predicate'** (x)BECOME **predicate'** (x)SEMANTICS: [PRED_{NUC1}] CAUSE [PRED_{NUC2}], PRED_{NUC2} [-static]

PRAGMATICS:

Illocutionary force: unspecified

Focus structure: unspecified

Table (5) Constructional schema for Persian adjectival NJs with the inchoative light verb *šodæn* 'become' (second group)

8. Conclusion

This paper has been devoted to the analysis of Persian adjectival light verb constructions, or in RRG's terms, nuclear junctures. We have tried to provide a comprehensive analysis of the adjectival nuclear junctures, which have not received much attention in literature. Unlike such studies of light verb constructions as Karimi-Doostan (1997), the present investigation of adjectival LVCs provides a detailed

examination of the type and nature of the two constituents and their contribution to the event and argument structure and the aspect type of the whole juncture. The findings of the present chapter have revealed that only the causative and the inchoative light verbs (*kærdæn* 'make/do' & *šodæn* 'become' respectively) can fuse with adjective to form nuclear junctures which act as a single unit. The light verbs in these constructions belong to the phase class of verbs referring to a particular phase of an event and are bleached with regard to the event type or attributes. In fact, the preverbal or adjectival elements which can be of age, dimension, colour, shape and speed contribute to the event structure and cause these constructions to be resultative i.e. they belong to the result phase of an event. The only adjectival NJs that are not resultative are those formed with the value, physical characteristic, and human property adjective types, which are due to the inherent nature of these adjectives that do not involve a process and cannot be resultative. The causative and inchoative adjectival LVCs can be of activity, achievement, and accomplishment verb class, where the two nuclei in these constructions act as a unified element. In sum, these constructions have the nexus-juncture linkage of nuclear co-subordination. In addition, in both constructions the preverbal element has the leading role in the aspect type of the whole nuclear juncture and the verb class of the LVC is predictable from that of the verb in just a few cases and in majority of the constructions it is the preverbal element which is more important. On the contrary, the transitivity of all the adjectival NJs is predictable from that of the verbal element.

References

- Cattell, R. 1984. *Composite Predicates in English*. Orlando, Florida: Academic Press.
- Dabir-Moghaddam, M. 1997. Compound Verbs in Persian. *Studies in the Linguistic Sciences* 27 (2): 25-59.
- Dowty, D. 1979. *Word Meaning and Montague Grammar*. Dordrecht: D. Reidel Publishing Company.
- Emonds, Joseph. 1985. *A Unified Theory of Syntactic Categories*. Dordrecht: Foris Publications.
- Ghomeshi, J. and D. Massam. 1994. Lexical/Syntactic Relations Without Projection. *Linguistic Analysis* 23 (3-4): 175-217.
- Karimi-Doostan, G. 1997. Light Verb Constructions in Persian. Ph.D. thesis, University of Essex.
- Khanlari, P. N. 1979. A History of the Persian Language. vol. 1. Translated by N. H. Ansari. Idarah-I Adabiyat-I Delli, 2009, Qasimjan st., Dehli.
- Lambton, A. K. S. 1984 [1953]. *Persian Grammar*. Cambridge: Cambridge UP.
- Mahootian, Shahrzad. 1997. *Persian*. London: Routledge.
- Megerdumian, K. 2001. Event Structure and Complex Predicates in Persian. *Canadian Journal of Linguistics* 46 (1/2): 97-125.
- Megerdumian, K. 2002. Beyond Words and Phrases: A Unified Theory of Predicate Composition. Ph. D. Dissertation, University of Southern California.
- Milsark, Gary. 1977. Towards an Explanation of Certain Peculiarities of the Existential Construction in English. *Linguistic Analysis* 3: 1-29.
- Payne, Thomas E. 1997. *Describing Morphology*. Cambridge University Press.
- Rastorgueva, V. S. 1964. *A Short Sketch of the Grammar of Persian*. Transl. by S. P. Hill and ed. By H. H. Paper. Bloomington: Indiana Univ. Research Centre in Anthropology, Folklore, and Linguistics.
- Tabaian, H. 1979. Persian Compound Verbs. *Lingua* 47: 189-208.
- Thompson, Sandra A. 1988. A Discourse Approach to the Cross-Linguistic Category "Adjective." In *Explaining Language Universals*, ed. by John A. Hawkins, 167-85. Oxford and New York: Blackwell.
- Vahedi-Langrudi, M.M. 1996. The Syntax, Semantics and Argument Structure of Complex Predicates in Modern Farsi. Ph D thesis, University of Ottawa.
- Van Valin, Robert, D. 2005. *Exploring the Syntax-Semantics Interface*. Cambridge: Cambridge University Press.
- Vendler, Zeno. 1967. *Linguistics in Philosophy*. Ithaca: Cornell University Press.
- Williams, Edwin. 1980. Predication. *Linguistic Inquiry* 11: 203-38.

The Sociolinguistic Phenomenon of Modern Greek Diglossia

The Outcome of Conflicts between (H)igh and (L)ow Variety and the National Language Question in 19th – 20th c. Greece: an Historico - socio-linguistic Perspective.*

Olga – Maria Gkaragkouni

Centre for Language and Communication Studies
Trinity College Dublin

Abstract

The present paper first and foremost aims to examine the sociolinguistic phenomenon of diglossia as it was depicted within the 19th and 20th century Greek linguistic community (1830-1976). More specifically, this study tries to explore the social context in general and the political-religious-ideological context in particular within which Modern Greek Diglossia (MGD for short) first presented and developed, and how it eventually declined. The paper at hand adopts a particular sociolinguistic analysis by providing the most suitable definition for the concept of diglossia – among the many variations that have been propounded with the passage of time – under which MGD could best be described and analysed. More concretely, the specific definition adopted in our case is the initial and original Fergusonian one. The term diglossia proposed by Ferguson refers to the social and functional differentiation of two linguistic varieties – namely an (H)igh and a (L)ow one – of the same language and of the same speech community for distinct purposes. Since Katharévousa (i.e., the H code) and Dhimotikí (i.e., the L code) in MGD constitute two varieties of the same language (i.e., the continuum of the Greek language) and of the same speech community, Ferguson's model seems to be rather relevant and fairly applicable. Furthermore, due to the fact that diglossia almost always is interwoven within an historical as well as a social context, emphasis is placed on those two contexts. It has been stated by Mesthrie et al. (2000, p. 42) that 'language is embedded in a social and historical context, and a full understanding of language can only be achieved by paying attention to those contexts'. Thus, both the historico-linguistic perspective and the socio-linguistic approach that are employed in this paper intend to explain the emergence, maintenance, attrition as well as demise of MGD in the light of external socio-politico-historical factors, on the one hand, and to carefully analyse the specific characteristics of the phenomenon of MGD as such, on the other. The raising of the national language query (i.e., which of the existing Greek varieties is going to become the standard, official, symbolic, written language of the Greek nation?) – is another parameter which has to be considered side by side with the modern Greek diglossic situation. In fact, the Language Question in Greece is transformed from a clearly linguistic issue into a sociopolitical issue. Above all, the very existence of MGD is regarded as embedded in the ideological beliefs of its speakers. As a result, the conflicts that took place between the proponents of Katharévousa and the representatives of Dhimotikí in common with the reasons for such conflicts are mentioned. In the case of MGD conflicts exist between the two diglossic varieties, when in other countries the diglossia situation is not problematic at all. In Greece H and L varieties compete because their supporters compete. Last but not least, the predominance of Dhimotikí over Katharévousa is clearly justified.

1 Introduction

As a phenomenon diglossia is not a new one. In some countries like Greece it has existed at least since antiquity. As a notion, on the other hand, diglossia has been first defined and first analysed by Ferguson in 1959. Since then, many more linguists (Fishman, Gumperz, Fasold and Hudson, to name only a few) have tried to redefine the very first Fergusonian concept of diglossia. Since diglossia once constituted and even nowadays constitutes “an extremely widespread phenomenon” (Pride 1971, p. 37), many different as well as diverse theories and definitions of the initial ‘classic’ and original diglossia are formed with the passage of time.

1.1 Diglossia: origin and initial appearance of the term

The phenomenon of diglossia has attracted special attention as well as unabated interest since 1959 due to the fact that it constitutes a controversial sociolinguistic issue as far as its meaning is concerned (Paulston and Tucker 2003, p. 344). It is widely accepted that the real origin of the term diglossia emanates from the Greek word *dio* (< from *dis* meaning two) and *glossia* (< from *glōssa* meaning language), in Greek *διγλωσσία*, referring literally to the use of two and only two languages (Baker 2001, p. 44). According to Edwards (2006, p. 20), diglossia is the Greek word for bilingualism. The Greek word for diglossia is *dimorphia* or *diyfia* which stands for two forms or two styles respectively (Babiniotis 2002, p. 173).

In point of fact, Ferguson is the first one who initiates the term diglossia not only into the Anglo-American and Germanic linguistic literature but also into the international sociolinguistic bibliography (Pauwels, 1988, p. 86). Furthermore, the term diglossia constitutes a Greek loanword (Sella-Mazi 2001, pp. 84-85) rather than a French one as Ferguson (1959, pp. 325-326) as well as Fasold (1984, p. 34) accept, and a coinage for English (Sella-Mazi 2001, p. 85). However, two other linguists, - the one German and the other an Arabist - Karl Krumbacher (1902) and William Marçais (1930) respectively, are mentioned in connection to the very same phenomenon, i.e., that of diglossie (Rosenhouse and Goral 2006, p. 842; Sotiropoulos 1977 cited in Elgibali 1988, p. 59; *ibid.* cited in Paulston and Tucker 2003, p. 343). Both Krumbacher and Marçais scrutinise diglossia with particular emphasis on the Greek and Arabic diglossic communities. In addition, Marçais tries to define diglossia in French linguistic theory as ‘la concurrence entre une langue savante écrite et une langue vulgaire parfois exclusivement parlée’ (Elgibali 1988, p. 59).

Even before Krumbacher and Marçais, however, Dante Alighieri (1265-1321) is believed to be the very first person who mentions the notion of diglossia in his literary theory work ‘De vulgari eloquentia’. Giannouloupoulou (2008, p. 138) affirms that Dante had already been well-aware of a phenomenon like diglossia both in Italy and Greece. Of course, he does not name diglossia with its very contemporary name. On the contrary, he refers to the diglossic situation of Italy by saying that the Romans use a second language – just like the Greeks do – which they name ‘grammatical language’ and which is only learned by the few who succeed in assimilating the norms of that language by means of time-consuming as well as persistent study (Karouzos 1966, p. 115). What is more, Jean Psycháris – a Greek of diaspora employed as a linguist in Paris – refers to the case of Modern Greek Diglossia, in 1888, through his well-known literary novel ‘My Journey’. He (Psycharis 1888, cited in Sella-Mazi 2001, p. 85) characteristically writes to his compatriots:

“...if the intelligentsia did not subdue their own lexicon and as a result their own language (i.e., grammar and lexicon) to resemble that of the everyday common people and that of the masses, the contrary would inescapably lead to diglossia”. (my translation)

In any case, it is Ferguson (1959) who seems to establish the concept of diglossia into the sociolinguistic survey by making it a debatable issue. In other words, diglossia wholly and fully presented by Ferguson would be described as the first well-attempted instance to define such a term sociolinguistically. As Haas (2002, p. 109) puts it, Ferguson ‘has brought to the awareness of sociolinguists a language “arrangement” that

was not perceived as something specific before'. What is more, it is Ferguson who first makes the distinction of prestige H and of vernacular L code within a putative diglossic society (Kaye 2002, p. 117).

1.2 Ferguson's term of diglossia in monolingual speech communities - 'narrow' or 'classic' diglossic situations

"Diglossia is a relatively stable language situation in which, in addition to the primary dialects of the language (which may include a standard or regional standards), there is a very divergent, highly codified (often grammatically more complex) superposed variety, the vehicle of a large and respected body of written literature, either of an earlier period or in another speech community, which is learned largely by formal education and is used for most written and formal spoken purposes but is not used by any sector of the community for ordinary conversations". (Ferguson 1959, p. 336)

Ferguson (1959, p. 325) initiates the notion of diglossia in order to employ it in the description and analysis of that kind of sociolinguistic phenomenon in which two different codes or varieties of one and the same language (more frequently a 'standard' language and a regional or peripheral dialect genetically, historically, closely, and somehow structurally (Wölck 2002, p. 164) related to the previous 'standard' or less frequently two local dialects of a language (Brown and Levinson 1978 p. 110) existed in the same geographically oriented speech community (Hornby 1977, p. 6; Baker 2001, p. 44) – one known as the (H)igh variety because of its high status and prestige and the other as the (L)ow variety due to its low prestige (henceforth H and L) – are used by the speakers of the putative speech community in distinct communication circumstances and for totally different interaction purposes. In other words, in a diglossic community the two codes H and L of the same language cooccur in the repertoire of the same speaker's mental lexicon. Two strict restrictions are posed by Ferguson in order for a speech community to be characterised as diglossic. The first restriction concerning Ferguson's model of diglossia has to do with the use of no more than just two varieties of one and the same language (Hoffmann 1991, p. 167; Romaine 1995, p. 35; Baker 2001, p. 44, among others). The second one is that of functional separation of the two varieties which is deemed as something socially acceptable – 'tacitly' accepted, according to Schiffman (1997, p. 205) - as well as well-preserved within a diglossic society.

In fact, the most focal as well as significant sociolinguistic feature of so-called classic diglossia is the sharply marked sociofunctional segregation of the H and L varieties concerning their use in society (Romaine 1995, p. 33). In Hamers and Blanc's (2000, p. 22), Ann's (2001, p. 44) and Schiffman's (1997, p. 205) own terms, both formal and informal linguistic varieties in a diglossic situation happen to be found in a definitely complementary social as well as functional distribution, i.e., in a nonconflictual relationship, as Fishman (1975, p. 74) puts it. That is to say that the variety called H is employed in only those contexts of language use in which the variety called L is forbidden to be used and vice versa. Ryan, Giles and Sebastian (1982, p. 4) point out that it seems that by means of this particular compartmentalisation of the social functions of the two codes 'diglossic speech communities have imposed autonomy on their varieties as well as useful social boundaries between them' in order to maintain 'a state of functional equilibrium' (Hamers and Blanc 2000, p. 21) and to limit cases of social rivalry and conflict between H and L.

Moreover, the functional separation between the two codes is so sharply and strictly predetermined that it is almost unlikely that the two codes can overlap or coincide under the same field of linguistic use (Edwards 1976, p. 59; Fasold 1984, p. 52; Gafaranga 2007, p. 281). Even in the case where there is a little overlapping between H and L (i.e., situational switching from H to L or vice versa), this does not mean that H and L interconnect or that they are used together under the same domain of language use. As noted by Elgibali (1988, p. 52), each spoken or written utterance is 'either H or L, but not a mixture of both'. Only one variety is being used at a time (Romaine 1995, p. 121).

Furthermore, it is fairly certain that in a diglossic community apart from the shared everyday spoken language variety (i.e., the vernacular L variety) which speakers of that community appear to acquire and learn as their mother tongue, there also exists another well-codified, well-standardised, well-normalised and well-institutionalised variety of that same language, the so-called H or standard or superposed variety (viz., it is learned later as Ferguson (1959, p. 325) stresses). H's acquisition always follows L's acquisition, since H is learned as a second or rather as a foreign language and under no circumstances as the mother tongue (Nercissians 2001, p. 61).

H is frequently more complicated than L as far as phonology, grammar (i.e., morphosyntax) as well as lexicon are concerned. What is more, it is exclusively being employed in the legal system, the educational and religious domains and above all in the governmental sphere as well as in the military service. There is a tendency for H to be learned outside the home environment, more regularly at school under the supervision of a well-qualified teacher or by means of dictionaries, grammar and orthography books. Sometimes, since it is said that H also depicts the status quo or prestigious language code of religious, cultural and other literary traditional circles of society, it is taught under the auspices of the aforementioned institutions (Wardhaugh 2006, p. 91). As opposed to L which is always an informal spoken variant, H is both a formal written and oral one but is almost never used for ordinary speech and chat among the speakers of the speech community in question (Sella-Mazi 2001, p. 85). Thus, it constitutes 'a conscious artefact' (Glinert 1987, p. 47). On the other hand, the L variety is, as Yule (2006, p. 200) mentions, the 'local version' of the H variant. It is then acquired within the narrow boundaries of a given speech communication, i.e., local acquisition in the home environment.

1.3 Ferguson's model of diglossia and MGD

It is very appropriate at this point of the present paper to maintain that the most suitable definition for diglossia as well as the specific evolutionary framework adopted under which MGD is best described and analysed is that propounded by Ferguson in 1959. In the case of MGD, Ferguson's model is fairly applicable and undoubtedly totally relevant. The reason for such a choice is simple; since Katharévoussa and Dhimotikí in MGD constitute two socially as well as functionally distinct varieties of the same language (i.e., the Greek language) - which, nevertheless, seem to be historically and genetically related - and belonging to the same speech community (i.e., Greece), it is apparent that the most appropriate and relevant theoretical, sociolinguistic model on diglossia analysis is that of Ferguson. By means of the nature of the diglossia definition supported by Ferguson, Katharévoussa and Dhimotikí are 'not two different languages',

but ‘two different realisations’ of one and the same language (Kotzantonoglou 1995, p. 31). Besides, Ferguson names Greece as one of his four prototypical diglossic countries (the other three are Haiti, Switzerland and the Arabic speaking countries) that he first pays attention to and analyses according to his model of diglossia.

1.4 Are Katharévousa and Dhimotikí mutually intelligible?

At this point a last question remains to be answered; namely whether Katharévousa and Dhimotikí are mutually intelligible languages or not. Although some diglossic communities exhibit a degree of ‘mutual unintelligibility’ between the H and the L code of one and the same language, as if they are two completely distinct languages (Hudson 1999, p. 431), in the case of MGD the exact opposite seems to happen. Both Katharévousa and Dhimotikí are codes of the same language (ancient or modern), i.e., the Greek language, which are placed side by side for years, even for centuries (Wardhaugh 2006, p. 89). In addition, even though there are supporters of the view that Katharévousa appears to be ‘historically distant’ from Dhimotikí (Spolsky 1989, p. 141), there are others who prefer to emphasise the ‘uninterrupted’, ‘unbroken continuity’ of the Greek language (Frangoudaki 1992, p. 370, 374). There are, of course, those who focus on the existence of ‘two phases’ in the history of Greek language rather than on the occurrence of two totally unrelated languages (Petrounias 1970, p. 2). In any case, Katharévousa and Dhimotikí seem to be mutually intelligible linguistic varieties.

2 An Historical Overview of Modern Greek Diglossia

2.1 Emergence, maintenance and decline

As a phenomenon, diglossia comes to the fore of the Greek dominion since the first century B.C. and continues its existence for more than twenty centuries until the twentieth century A.D. (Horrocks 1997, p. 5; Babinotis 2002, p. 168). In particular, the case of MGD is presented as an historico-socio-linguistic phenomenon in 1830, certainly not for the first time, since the roots of MGD lie in Byzantium which constitutes a diglossic community at the time as well (Petrounias 1970, p. 3).

In 1830, Greece becomes a state and acquires its national freedom after four centuries of enslavement under the Ottoman domination. Henceforth, great conflicts take place between conservative Greeks (i.e., the Archaisers) and the more radical ones (viz., the Demoticists) concerning the choice of a national and official Greek language. Since it is generally agreed that language seems to play a significant role as far as a nation’s rebirth from a foreign power’s occupation is concerned, the focus is specifically placed on the written linguistic form by means of which the Greek population would be educated (Andriotis 1992, p. 146). Thus, the Language Question, in Greek “to Glossikó Zítima”, is posed from the very beginning of the foundation of the Greek nation-state, thus, perpetuating the existence as well as the maintenance of MGD with its two distinct linguistic varieties (i.e., Katharévousa and Dhimotikí) and lasting until the solution of the problem in 1976 along with the triumph of Dhimotikí over Katharévousa, the abolishment of Katharévousa in particular and the dissolvment and demise of MGD in general. It is now generally recognised that the Greek language once was diglossic. In fact, nineteenth and twentieth century Greece forms a diglossic speech community until 1976, where, as noted by Mackridge (1985, pp. 6-7) ‘the contemporaneous existence’ of two discrete varieties – one labaled as Katharévousa

and the other as Dhimotikí – of the same language (i.e., the Greek language) are used for distinguishable purposes. What is more, it should be pointed out that the very coexistence of both varieties definitely leads to the dominance of both Katharévousa and Dhimotikí, each one prevalent for its own linguistic purposes (Nercissians 2001, p. 60). In point of fact, Katharévousa is the variety determining the social circumstances and situations where Dhimotikí may be used. Katharévousa or in other words the lofty H variety is the specific language used for formal and conventional occasions (i.e., the focus is on writing), whereas Dhimotikí, the L variety, that is, the secular language, is the informal code employed in more friendly and day-to-day communicative circumstances (i.e., the focus is on speech). Dhimotikí is the maternal language as opposed to Katharévousa which is the second language. Dhimotikí is expected to be presented within the local community, i.e., home, hearth (Grillo 1989, p. 4). However, on the whole, L, in our case Dhimotikí, is scarcely viewed as a language at all.

According to Grillo (ibid.), in a diglossic community, one of the varieties, usually the H variety, seems to be obligatory. In the case of MGD, Katharévousa plays such a role. It is Katharévousa that is appropriate for state, administration, court and religious affairs. Katharévousa, under no circumstances, is used for face-to-face speech interactions; it is employed as a medium of oral communication only in cases of reading loudly, often a political or religious speech.

2.2 Attitudes towards Dhimotikí and Katharévousa

Speakers' attitudes towards Dhimotikí and Katharévousa are usually dictated and formed by means of which variety holds the greater prestige. On the whole, it has been suggested that Dhimotikí is perceived as the '*bad*' or the '*poor*' language, whereas Katharévousa is the '*good*' language, since it depicts the standard and official language of the Greek nation-state. Dhimotikí is considered corrupt and degenerate; it is the '*debased*' code, a '*broken*' language, an impoverished variety as well as the '*poor relative*' of the glorious Ancient Greek language, according to Katharévousa-proponents. On the other hand, Dhimotikí, as the Greek origin of the word attests, is the only democratic variety for its supporters, since it is the maternal and the most intimate language of the '*demos*', namely of all the Greek population. Even if Dhimotikí is the oral language of all the Greeks, some (i.e., the Katharévousa-educated promoters) treat Dhimotikí as a disparaged code, as a crude, vulgar idiom and as an uncultivated language. For them, Dhimotikí is the secular, popular, trite and commonplace variety, the language of mere laymen and the dialect of the peasants. Furthermore, the supporters of Katharévousa are of the opinion that Dhimotikí does irreparable harm rather than good to the Greek nation-state (Babiniotis 2002, p. 171).

It is often the case that attitudes to high and low varieties are a reflection of social, political, ideological as well as educational matters. It is usually the élites, namely the educated and more socially privileged classes, who attribute to varieties other than their own derogatory and pejorative characterisations. Thus, the linguistic variety spoken by the non-élites is automatically deemed inferior, low-status and non-prestigious. In the Greek case the previous statement holds true, since it is the schooling and, as a result, the Katharévousa-user, and under no circumstances the Dhimotikí-speaker, who has a better chance for social and political advancement. Katharévousa's style is rather pompous, rhetorical, artificial, stiff, bookish, grandiose, flowery, archaic, sophisticated, but delicate. That is the reason why it is exclusively being employed in the

governmental sphere, the legal system, and only by the élites. It is the beauty, efficacy, richness and logic of Katharévousa's style that its advocates mostly bolster about. On the other hand, the representatives of Dhimotikí regard Katharévousa as a language rather '*passé*', old-fashioned in the century of industrialisation and modernisation. Moreover, Katharévousa lacks naturalness, vividness and spontaneity (Mandilaras 1972, p. 94). With time, it is true that the proponents of Katharévousa become more and more distant from the living language of the masses.

2.3 The Language Question: a new dilemma for Greece

The language question – in Greek "*to Glossikó Zitima*" – is posed from the very beginning of the foundation of the Greek state and lasts until the solution of the problem in 1976, composing a new dilemma for the newly-established Greek state. In fact, this particular dilemma concerns the decision on which of the two coexisting languages – or rather to put it better, which of the two styles of the Greek language as Iósipos Misiódax very tellingly remarks (Babiniotis 2002, p. 172) – would become the national standard Greek language.

2.4 Three implacable foes: Classicists versus Demoticists versus Compromisers

The language question is explicitly faced and argued by three categories of intellectuals of that era who are differently placed towards this particular problem and who intensely struggle to support their own view against that of their opponents, often resulting in political and social unrest. By means of intellectual books, articles, and often libels against their adversaries, each of these firstly philological and then linguistic circles of scholars – be they Classicists (the ruling class), Demoticists (forming the disadvantaged group), or the so-called Compromisers (forming the privileged group) – seem to promote their own linguistic option as the most suitable and proper instrument to be used as the national language of Greece, both in speaking and in writing (Mackridge 1985, p. 7).

2.4.1 The Classicists

To begin with, there are those who are in favour of the Ancient Greek language by slavishly using the so-called old Attic dialect, namely the language of Socrates, Plato, Aristotle, Xenophon and Demosthenes. These intelligentsia, the so-called *Classicists* or *Purists* or *Archaisers* or *Atticists* or differently *Conservatives*, claim that the regeneration of the Greek nation can only be achieved through the systematic usage and, in fact, the resurgence and revivalism of the Ancient Greek culture as well as language not only as a means of written language but also as a spoken one. For them, the official language of the newly-established Greek state should reflect Ancient Greek and Byzantine past glories (Mandilaras 1972, p. 51; Horrocks 1997, p. 344). What is more, any attempt to promote the status of Dhimotikí is taken as a threat. Last but not least, it has to be clarified, however, that the Classicists support Korais and Katharévousa with the passage of time. It is exactly then that Classicists perceive Katharévousa as '*a factor unifying all Greeks*' (Browning 1982, p. 55).

2.4.1.1 The Phanariots

The Classicists are often members of the Greek élite, in other words, the upper social stratum ruling power group, namely higher civil servants or higher military officers. Some of them, in fact, belong to the well-known Phanariot aristocrats of Constantinople (Panayiótis Soútsos, to cite an example), who stick to tradition and decline any kind of change of the already ‘existing power structure’ (Wardhaugh 2006, p. 92) and the already well-established social hierarchy, i.e., the order of things, the ‘status quo’ (Browning 1982, p. 53). The Phanariots act as men of power and form the ‘head of the enslaved nation’, that is the reason why they totally ‘influence and control the enslaved nation’ (Kotzantonoglou 1995, p. 12). They had indeed well-established and well-maintained their own power both before and mainly after the Fall of Constantinople by the Turks in 1453. As confirmed by Mackridge (1985, p. 4):

“...at the very centre of the Ottoman Empire, Greeks [those were the Phanariots] were entrusted by the Sultan with key administrative posts, ...”

2.4.2 The Demoticists

Secondly, there exist the so-called *Demoticists* or *Liberals* or *Vulgarists*, the fervents of the popular language, who undoubtedly consider Ancient Greek to be an unintelligible language. For that reason, they try to impose Dhimotikí - and by Dhimotikí we mean the Peloponnesian dialect which forms the basis of the Athenian dialect once Athens becomes the capital of Greece (Browning 1969, p. 106) - not only for oral purposes but also for writing ones. Demoticists attempt to render Dhimotikí both in speaking and mainly in writing as a privilege of the masses rather than a privilege of the few élites. According to them, the written language in any case must depict the speakers’ spoken language, which is created by the speakers themselves, in order that ‘*an unbridgeable gulf*’ does not exist between the two (Mandilaras 1972, p. 61). Writing in 1991, Andriotis (1992, p. 146) comments that both the Archaisers themselves and the Atticising language which is being employed by the latter - a language undoubtedly very difficult as far as its grammar, lexicon and orthography are concerned – seem to constitute an impediment to the already existing rudimentary education of the Greek masses. Often, the Demoticists regard Archaisers as another means of slavery (linguistic this time) that comes to replace the slavery of the Turks (ibid.). Dionysios Solomos (ibid.), the national poet of Greece and a fervent supporter of Dhimotikí, addresses Archaisers by saying:

“ I would like to remind you that your reign in Greece has come to an end along with the Ottoman Empire’s kingdom”.
(my translation)

Dhimotikí is mostly supported by socialist and leftist parties, which usually happen to be the most progressive ones (Baslis 2000, p. 72), as opposed to ‘*rightist*’, *juntist* and generally more conservative parties which are in favour of Katharévousa (Horrocks 1997, pp. 356, 360). That is the reason why the Conservatives quite often call Dhimotikí as ‘*malliari*’, namely hairy (ibid. p. 357). Petrounias (1970, p. 21) quotes the following:

“[In Modern Greek] /ma'lja/ means hair. The name was ironically used at the beginning of the century, because a number of the pioneers and militant supporters of Demotiki in literature wore long hair. In their zeal they made some (linguistic) exaggerations”.

What is more, in those days the specific expressions, syntactic '*schemata*' (structures), even the sort of words a speaker used to employ seemed to be a feature of her/his political beliefs and ideology (Browning 1969, p. 110).

To sum up, the former group assumes that the Greek nation has declined not only intellectually and culturally but also linguistically. They attribute such a national decay as well as decadence to the loss of Ancient Greek as their national language and, therefore, they struggle to revive and restore it (Petrounias 1970, p. 3, 5 ; Archakis and Kondyli 2004, p. 104). The only thing Classicists are interested in is the archaic language per se, rather than the education of the Greek masses. That is the reason why they underestimate as well as disparage the everyday, colloquial demotic language as the sole instrument of written discourse and, thus, they try to employ the '*pure*' Ancient Greek language which forms a continuity with Ancient Greece and which will remind them of their past. On the other hand, Demoticists - many of whom are Greeks of Diaspora or belong to the well-known middle-class bourgeoisie and are supporters of the Enlightenment and Democracy - attempt to promote the already spoken demotic variety of that time free from local, strong, dialectal features, which they wish to adopt as their national standard and official language both in writing and in speaking.

2.4.3 Koraís's proposal: the '*middle – way*'; the conciliatory solution

Between the former two opponent groups, an advocate of an intermediary and conciliatory solution, Adamántios Koraís, comes to the fore. It is fair to suggest that Koraís represents the '*middle – way*'. As a compromiser, he appears to resolve the already existing conflict between Classicist and Demoticists concerning the official language of Greece, at least for the time being (1830-1880). Koraís is the creator and the father of Katharévousa, namely the '*pure*' or '*purifying*' language, a mixture of Demotic Greek and Ancient Greek. In fact, Katharévousa tends to resemble Ancient Greek much more than Dhimotikí (Petrounias 1970, p. 3; Frangoudaki 1992, p. 336); it is, as other linguists often remark (Mackridge 1985, p. 14), the '*extension*' of Ancient Greek. It uses suffixes and prefixes resembling Ancient Greek attached to the lexical stem of demotic lexical items (Baslis 2000, p. 48). For instance, the word *πουλίον*, consists of a demotic kind of stem (i.e., *πουλ-*) and an Ancient Greek-like suffix (i.e., *-ιον*) and it forms the word of Katharévousa *πουλίον* which in English stands for bird. What is more, at the beginning Katharévousa is neither codified nor standardised; it is, therefore, a variety which is likely to face extinction or to more or less become ever more identical to Ancient Greek even more (Baslis 2000, pp. 48-49). With time, and more particularly after 1880, Katharévousa is actually equated with Ancient Greek. Thus, the previous lexical item *πουλίον* becomes *πτηνόν*.

Moreover, knowledge of Katharévousa certainly presupposes an excellent command of Ancient Greek (Browning 1969, p. 108) and, therefore, it can never be spoken naturally because of its difficulty. Its limited usage demonstrates another disadvantage; it can almost function as a means of face-to-face communication among the majority of the Greek population, nor can it be learned as a foreign language (Petrounias 1970, pp. 5-6). It is now very clear to state that Koraís's proposal turns out to support a language which is neither a maternal language nor a foreign one (Horrocks 1997, p. 350). Nevertheless, Katharévousa acquires its attendants since its grammar as well as vocabulary are simpler compared to those of Attic Greek (Andriotis 1992, p. 148).

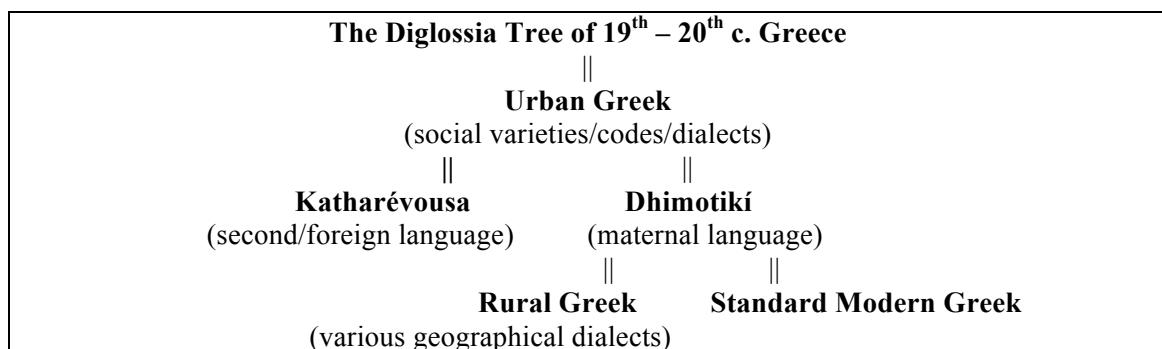
Koraís suggests that the spoken language must be corrected morphologically (Andriotis 1992, p. 147) and must be cleansed of all the strong dialectal features (Browning 1969, p. 104) as well as the Turkish loanwords that the Ottomans left behind (Horrocks 1997, p. 345; Christidis 2005, p. 201). However, those Turkish words are replaced by Greek equivalents or better by prestigious French words. As Kakridi- Ferrari (2001, p. 204 cited in Archakis and Kondyli 2004, pp. 104-105) characteristically points out:

“While the purpose of Katharévoussa was to ‘clean’ the Greek language, inter alia, from the Turkish and Italian loanwords such as μπαζέζ→κήπος ‘garden’ and μινίστρος→υπουργός ‘minister’, it also allowed the insertion and adoption of many French loanwords like λαμβάνει χώρα ‘to take place’ or διαμέρισμα ‘apartment’”.
(my translation)

The emphasis of Katharévoussa on languages of prestige like French has as a result the usage of that kind of variety in order to indicate a social feature of superiority and high status. In nineteenth and twentieth century Greek society, the notion of division of the social classes is prevalent. Thus, Katharévoussa exactly appears to indicate that kind of superiority of its representatives (Browning 1982, p. 50).

2.5 An important clarification

At this point, an additional point has to be emphatically clarified; it has been argued by some scholars (Browning 1969, p. 109; Thomson 1989, p. 106; Archakis and Kondyli 2004, pp. 105-106, among others) that the nineteenth and twentieth century Greek speech community is triglossic, or even multilingual rather than merely diglossic. The reason for such an assumption is that a number of linguistic varieties seem to coexist in Greece at the time, namely Atticising Greek, Katharévoussa, Dhimotikí and many more regional dialects. The truth is that with the passage of time Attic Greek gives its place to Katharévoussa which is the only legitimate descendant of the former. Furthermore, as far as the many different, at the time, existing local dialects of the Greek dominion are concerned, they are not taken into consideration in the paper at hand, since they are regarded as elements (mostly phonological, morphological and lexical) incorporated into the demotic variety spoken by the rural Greek populations.



2.6 A second clarification

Secondly and most importantly, it seems to the author of this paper that each of the aforementioned groups struggles to promote and ultimately impose its own preferable linguistic variety to the others, simply because the Neo-Greeks were almost never in favour of diglossia, since the latter appears to promote great social differences and

inequalities among the classes. Chambers (2003, p. 9) reports that *“coexistent languages are never sociologically equal, though of course they are linguistically equal”*. Diglossia seems to constitute a rather oppressing language situation for the Greeks. In fact, Greeks do not think of diglossia as an essential and necessary linguistic situation. Diglossia rather confuses Greeks due to the existence of two forms of grammar, orthography and lexicons. At least in the case of MGD, it is quite obvious that both the proponents of Katharévousa and those of Dhimotikí are fond of monolingualism; either Katharévousa or Dhimotikí and under no circumstances both varieties. More specifically, supporters of Dhimotikí have neither social motivation nor an individual reason why to use Katharévousa which is a language without native speakers.

As noted previously, Ferguson specifically highlights the fact that a diglossic community is a legally established and a socially protected linguistic situation which is clearly defined as such by the linguistic community itself. It is a sociolinguistic convention which has been decided to exist by the speakers of the putative diglossic community as such. In Coulmas's (2002, p. 61) own terms *“diglossia is not a natural situation, it is an artifact, which means that it is historically and [socially] contingent”*. In other words, diglossia is a well-accepted social consensus among the speakers of a given diglossic community. Chambers (2003, p. 9) remarks that *“native speakers understand the unwritten rules for diglossia... because they are integral elements of the value system of their societies”*. That is the reason why diglossia remains a quite stable and uniform sociolinguistic phenomenon. As a result, there are no conflicts between the two coexisting varieties since each variety's function is always fully predetermined to be maintained as such (i.e., the function of each code in diglossia is defined a priori). In MGD, once again, the exact opposite appears to have happened. Since both of the foregoing groups of Greeks believe that the existence of more than one varieties of the same language is likely to lead to a national quarrel, as it actually happened in the case of nineteenth and twentieth century Greece, the proposal of the selection of one national variety that will constitute the only standard seems to be the best solution.

2.7 Dhimotikí and its predominance.

The existence of two functionally distinct varieties in the same speech community entails and engenders a kind of rivalry (linguistic conflict) between them. Although Fishman (1972, p. 74) insists on believing that there is no such rivalry between H and L forms in a diglossic situation, simply because one code complements the other, conflicts between H and L are likely to appear due to sociopolitical matters. In fact, when speakers of both varieties become conscious of the fact that there is a kind of dualism in their linguistic community which is unnecessary, they realise they must struggle to abolish the least useful variety by shifting from the more useless linguistic form to the most appropriate one.

After one century and a half of conflicts and struggles, in 1976, Greece acquires its national and official language that depends on the spoken language of the Greeks. At the same time, the spoken language is the written one as well. This is the so-called Standard Modern Greek (SMG) which highly reflects Dhimotikí. The usage of Katharévousa as a distinct style, on the other hand, is generally abandoned. Besides, as Maher (1991, p. 80) affirms *‘elaborate language forms gradually die out, leaving only those informal variants used in the intimate setting’*. Nevertheless, Katharévousa is

still, even nowadays, the written language of the Greek Orthodox Church, the army as well as the court. Katharévousa is now regarded as '*a useless written register*' (Baslis 2000, p. 40).

3 A Sociolinguistic Analysis of Modern Greek Diglossia

3.1 The characteristics of diglossia

According to Ferguson (1959, pp. 328-336), a diglossic situation is briefly characterised by the sociofunctional differentiation between the H and the L variety in accordance with (i) the social function of each variant, i.e., the distinct domains of language use, (ii) the status, i.e., how prestigious each variety is, (iii) the kind of pre-existing literary tradition, (iv) the acquisition (in the case of the vernacular L) or the learning-teaching process (in the case of H), (v) the degree of standardisation, codification and institutionalisation, (vi) the stability of the phenomenon of diglossia, and last but not least (vii) the grammatical structure of both varieties (viz., differences concerning the phonological, morphological, syntactic and lexical level). The foregoing characteristics, typical of the Fergusonian trend of diglossia, can be presented more concisely in the following table:

- | |
|--|
| <ol style="list-style-type: none"> 1. Function: There are specialised functions for H and L. 2. Prestige: Speakers regard H as superior to L in some respects. 3. Literary Heritage: There is a large, respected body of written literature in H. 4. Acquisition: Adults use L in speaking to children. Children use it in speaking to one another. L is acquired naturally and H is learned, usually in school. 5. Standardisation: There is a strong tradition of grammatical study of H. 6. Stability: The situation in which H and L occur persists for several centuries. 7. Grammar: H has grammatical categories not present in L. 8. Lexicon: The bulk of vocabulary in H and L is shared. 9. Phonological: There is a single phonological system of which L is basic. H has phonological distinctions that L does not have. |
|--|

(Ann 2001, p. 44)

Table 1: The characteristics typical of the Fergusonian trend of diglossia

3.1.1 Function

The most strikingly obvious discrepancy between H and L variety has to do with the function, the domains of language use in which each of those two varieties is employed, i.e., formality, how (in)formal the written or spoken circumstance appears to be. Either way, the functional separation between the H and L codes is not only '*the defining characteristic of diglossia*' (Kotzantonoglou 1995, p. 3) but also the first inviolable restriction and rule that Ferguson poses in his very definition of diglossia. In other words, H is suitable only for those linguistic circumstances which are different from those of L. Furthermore, both Gumperz and Hymes (1972, p. 240) claim that the code, namely H variety, which differs from the '*casual vernacular*', namely L variety, is always appropriate for formal occasions. In Greece, given that political speeches, and more generally, public talks such as ecclesiastical sermons, newscasts and university lectures along with the writing of formal letters, scientific articles as well as Sunday and daily newspapers of serious sociopolitical content, are deemed to be highly formal and etiquette-like domains of language use, they are almost always composed by their

speakers or writers in H, i.e., Katharévousa. The contrary seems to happen with the L vernacular variant; daily home and household interactions with parents, grandparents and siblings, informal friendly conversations with the kin circles or other peer-group acquaintances, and last but not least the composition of informal letters are some of the informal domains of language use in which Dhimotikí is rather employed exclusively and explicitly. Ferguson's prototypical and general predictions concerning the possible functional domains of language use of both H and L variants are depicted in Table 2.

An additional list of domains of linguistic use is provided in Table 3, simply in order to pinpoint the functionally different situations in which Katharévousa and Dhimotikí are being employed in MGD. This last table, moreover, is an excellent case to discern how much MGD diverges from Ferguson's initial trend of diglossia as far as function is concerned.

Domains of language use	H	L
Sermons in church or mosque	+	
Instructions to servants, waiters, workmen, clerks		+
Personal letter	+	
Speech in parliament, political speech	+	
University lecture	+	
Conversation with family, friends, colleagues		+
News broadcast	+	
Radio "soap opera"		+
Newspaper editorial, news story, caption on picture	+	
Poetry	+	
Folk literature		+

Table 2: Domains of language use

Domains of language use	H	L
Orthodox Christian Sunday sermon*	+	(+)
Instructions to servants , waiters, workmen, clerks		+
Personal letter	+	
Speech in parliament, political speech	+	
University lecture*	+	(+)
Conversation with family, friends, colleagues		+
News broadcast	+	
Radio "soap opera"		+
Sunday and daily newspapers	+	
Caption on political cartoon		+
Poetry*	(+)	+
Prose	+	
Folk literature (i.e., demotic folk-songs)		+

Table 3: Domains of language use

As can be seen from Table 3, whereas Greek prose is almost always written in Katharévousa, there is no doubt that nineteenth and twentieth century Greek High poetry is written in Dhimotikí, which is the vernacular spoken language of the Greeks. It is a literary tradition since ancient times that Greek poetry is always written in a language different from that used for writing prose (Aiginitis 1958, p. 19). Given this, MGD seems to definitely diverge from Ferguson's diglossic model in which every kind of poetry but folk-songs is written in H. In fact, the majority of Greek poets coming from the Ionian Islands (Dionýsios Solomós, Aristotélis Valaoritis, Julius Typáldos) and the New Athenian Literary School (Kostís Palamás) employ the vernacular spoken language of the Greek masses as a linguistic instrument for writing their poems. In Kotzantonoglou's (1995, p. 4) own terms:

"in Greece there was a long tradition of poetry written mostly in demotic by writers who regarded Katharévousa as an artificial language, unable to express the passions and the pains of the souls".

On the other hand, there is, of course, a minority of other poets (Aléxandros Ragavís), the so-called Romantic poets, who form the Old Athenian Romantic Literary School and who still use Katharévousa in their own writings. Moreover, it can be seen from the last table that two domains of language use seem to be quite ambivalent; namely the situation of the Orthodox Christian Sunday sermon and that concerning University lectures, since they appear to use both H and L variants. As far as the former instance is concerned, we have to say that along with those prelates who support and promote the use of Katharévousa both inside and outside the Church, there are others, as well-educated as the former ones, who try to promote the understanding of their preaching among their flock by using the spoken language of the masses rather than the artificial and unintelligible Katharévousa. In addition, Dhimotikí is the medium of instruction and book publication (Browning 1982, p. 56) at the University of Thessaloniki but it is not supported by the National University of Athens. That is the reason why University lectures of the former are almost always in Dhimotikí, whereas of the latter always in Katharévousa. Petrounias (1970, p. 17) quotes the following:

"At the one school of letters of international renown, that of Salonica, Demotiki is used. The same happens at the new school of Jannena. At the third, that of Athens, Katharevusa is obligatory. The rest of University Schools use more or less Katharevusa. Professors at the schools of Law and Theology and at the school of letters in Athens are firm supporters of Katharevusa (a student will not pass the exams or will not even be admitted, if he does not try to use it). Usually the teacher reads aloud from a text Written in any form of Katharevusa. As a rule, there is no discussion".

A speaker's 'code shift' or better 'code-switching' from the H form to another lower variety of the same language (i.e., from classical to colloquial Greek or better in our case from Katharévousa to Demotic Greek) usually depends upon the speaker's social setting, social activity or the context of her/his interaction (Halliday 1978, p. 65). This is the so-called situational switching. The sociolinguistic situation in turn tends to determine the speaker's language choice. In case L is employed in linguistic domains which categorically pertain to H linguistic sphere, then non-serious discourse, 'artificial', 'pedantic', even 'insulting' language are likely to be produced (Ferguson 1959, p. 337; Edwards 1976, p. 59; Schiffman 1997, p. 214). Conversely, if a speaker or writer speaks and writes in H respectively, whereas L is supposed to be used by her/him, we then normally and certainly are lead to that speaker's ridicule as well as to

the mockery of the writer in question (Ferguson 1959, p. 329; Archakis and Kondyli 2004, p. 101). The speaker or writer in this last situation at least appears to be ‘facetious’, ‘ludicrous’, ‘weird’, even ‘sarcastic’ (Kaye 2002, p. 120). Schiffman (1997, p. 213) poignantly holds that

“the use of L where H is expected (or vice versa) constitutes a violation of communicative competence rules...[and such] violations of social norms stem from an inadequate understanding of the linguistic culture”.

Kaye (2002, p. 118) further bolsters the viewpoint that *‘some things can only be said in L, and although one can translate those into H, they would be awkward, to say the least’*. With particular reference to MGD, using Katharévousa at home would be like wearing your Sunday clothes and using Dhimotikí in public speeches would be like wearing your bathing suit in the Parliament (Hudson 1996, p. 52). Furthermore, Kotzantonoglou (1995, p. 4) contends that employing Dhimotikí, the L variant, in cases where Katharévousa, the H variant, holds both the norm and the primacy, may lead to *‘a feeling of uneasiness or even contempt’*. On the contrary, employing Katharévousa in domains in which Dhimotikí is appropriate rather appears to create a stilted, affected as well as unnatural nuance. Furthermore, in Greece the speaker or writer who deliberately or because of ignorance misplaces and misuses the two codes, is often regarded as a *‘rebel’* (ibid.) who is supposed to want to overthrow the already well-established diglossic as well as sociopolitical status quo. Last but not least, Greek speakers who employ the wrong linguistic code in situations other than the desired ones can even be called *‘traitors’* (ibid.). A highly salient example of such a situation is the following; Aléxandros Pállis’s translation of the New Testament in 1903 led to protests and riots in the streets of Athens by the students of the National University of Athens who are in favour of Katharévousa. The result is that those who had taken part in such translations into Demotic Greek, are now accused of treason towards the Greek Nation and the Eastern Orthodox Christian Church.

3.1.2 Prestige

Archakis and Kondyli (2004, p. 101) argue that

“Katharévousa has the tendency to display greater status and to be deemed superior to Dhimotikí, which is to say that the former variant is more correct and more capable of expressing more complex thoughts”.
(my translation)

In addition, Katharévousa is the only nationally recognised variety; therefore, it is considered more prestigious, logical (i.e., being able to express serious thoughts and ideas), elegant, powerful and beautiful, whereas Dhimotikí more domestic. Due to the fact that Dhimotikí is very rarely employed in writing until 1976 except for poetry, that is the reason why it is regarded as a non-status as well as a non-prestigious variety.

Katharévousa serves ideological as well as political expediencies (Browning 1982, p. 54), since it constitutes an instrument by means of which social, political, professional advancement and progress as well as economic opportunities are likely to be attained. Political and other public figures as well as the élites employ Katharévousa as *‘a linguistic mark of distinction in a socially deeply divided society’* (ibid., p. 50) like Greece so as to demonstrate their high-status origin and their high-ranking education, two parameters which can actually differentiate them from the lower-class masses. Even though Ferguson affirms that it is almost always the situational circumstance, and

under no circumstances the social class and the status of the speaker, that determines the use of H and L each time, in MGD both the social situation and the speaker's social class seem to take place concerning the selection of the appropriate variety (Lyons 1995, p. 313). What is more, Katharévousa has been selected so as to demonstrate the origin of the Neo-Greeks back to the roots of Ancient Greece (Archakis and Kondyli 2004, pp. 104-105). That is to say, the Neo-Greeks constitute the continuity of their ancestors. Furthermore, even at school 'children were taught to admire Katharévousa' as a means of promoting 'social advancement, success and prestige' and to deny the very existence and usage of Dhimotikí as a language of 'backwardness' (Kotzantonoglou 1995, p. 5).

Last but not least, it is suggested by Ferguson (1959, p. 330) that Katharévousa is the language of the New Testament and, therefore, this particular variety has very strong bonds with religion. Although Katharévousa is not exactly the language in which the New Testament is written, it is quite similar to that. New Testament's language is the Hellenistic Koine which is simpler to be understood than Katharévousa. In any case, Katharévousa at the time is the prestige language that clergymen employ for the Sunday and daily sermons as well as the catechism.

3.1.3 Literary Heritage

In a diglossic situation there is usually a great literary tradition of poetry, prose and theatre recorded and written in the linguistic variant of the H form rather than the L form. This is simply due to the fact that L is the '*everyday colloquial vernacular*', whereas H, i.e., the '*real*' language, the elevated written tongue or as Cooper (1989, p. 137) tellingly states '*the bearer of an esteemed literary tradition*'. Thus, it is suitable for the writing of High poetry and fiction as well as religious liturgical texts.

Although the Fergusonian model of diglossia requires High poetry to be written in the H variety, namely Katharévousa in the Greek case, it is largely known that MGD seems to definitely diverge from Ferguson's prototypical diglossic model. In MGD, high-standard poetry is obviously written in Dhimotikí, i.e., the vernacular spoken variety, since nineteenth and twentieth century Greek poetry mainly expresses the struggles of the Greeks against the Turkish yoke and against injustice on the whole. It is the majority of the Greek poets (the Ionian poets such as Dionýsios Solomós and the New Athenian Literary School poets such as Kostís Palamás) who choose to employ the vernacular spoken Dhimotikí in order for their poems to be clearly and fully understood not only by the élites but also and mainly by the Greek population as a whole. The Demoticist poets go against the Katharévousa poets; the latter still exist but there are only those few who survive in the Old Athenian Romantic Literary School circles.

3.1.4 Acquisition and Learning

As far as the acquisition of the two varieties is concerned, a significant discrepancy is remarked; namely, while L is acquired, H is learned from scratch through teaching. Children acquire the L variety (i.e., the L form is their mother tongue, the nascent language) quite easily and naturally in their surrounding, immediate, familiar environment, whereas they learn the H variety through the formal educational training and teaching at school. Moreover, they can learn the H through an official '*religious and cultural indoctrination*' like Church, for instance (Wardhaugh 2006, p. 91). It has been argued by Romaine (1984, p. 132) that speakers in diglossic communities seem to

be well-aware of the fundamental social differences of the two codes in question, so as to adopt the L variety, i.e., their maternal language, since their infancy, as well as to adapt to the H one (viz., an additional second or foreign language) since schooling starts.

In nineteenth and twentieth century Greek diglossic speech community, most considerable of all is the fact that Dhimotikí, which is everyone's mother tongue, remains forbidden as a linguistic medium of instruction at school as well as at university. The medium of instruction is Katharévousa which requires a rather persistent as well as conscious effort to be mastered at an advanced level, often by employing methods such as the learning of grammar and vocabulary by rote. As a result, Greek children –the boys only, since the girls still stay at home - are unable to understand what the teacher is saying upon their arriving at school for the first time. Therefore, they have little opportunity to master Katharévousa at a proficient level, since they commit many errors of grammar and vocabulary. Additionally, children grow up unable to speak, read and write in Katharévousa, unless their parents help and teach them all four skills of that variety at home. This, of course, does not happen in everyone's home; only the wealthy élites and only those who have undertaken university education have the opportunity to educate their children either themselves or by paying extra-teachers at home. Thus, it is apparent that Katharévousa rather promotes social inequality among children at school. Paulston (2002, p. 132) has this to say about the learning of the H variety:

“Having no native speakers of the H form in diglossia entails great pressure on book learning and education, especially in the form of economic resources and leisure time for study, a situation that very much favors the élite classes and ultimately serves to legitimate their status, not infrequently with ties to religion”.

3.1.5 Standardisation

Rather than dealing with the standardisation and codification of the L variant which is the everyday colloquial language of the masses, in diglossic societies the H variant, which is the language of the few élites, is that which is undertaken a great degree of standardisation, codification, normalisation, elaboration and, last but not least, institutionalisation. Such kind of standardisation of H is achieved by means of written normative-prescriptive grammar - Antonio Gramsci believes that *‘the imposition of normative grammar is un atto politico’* (Steinberg 1987, p. 205) - dictionaries, spelling guides as well as pronunciation manuals and companions by means of which the so-called prescriptive rules are applied (viz., what has to be written and spoken, and not what is actually being written and spoken). As a result, the H code is standardised and described in detail for *‘scholarly liturgical, literary and other formal purposes’* (Cooper 1989, p. 137). In Greece, it is the Academy of Athens that undertakes and is engaged in the standardisation of the national language, which, until 1976, is no other than Katharévousa. Aiginitis (1958, p. 32) contends that

“one of the most important tasks and duties of the Academy is the study, purification and normalisation of the national language and, therefore, the creation and compilation of a common standard Grammar, Syntax as well as a [national] Dictionary”.

(my translation)

Recent research by Diatsendos (2008, pp. 155-156) shows that the role of the Academy of Athens is dual at the time of MGD; on the one hand, its role has to do with *‘the*

maintenance and defence of the national Greek language against its decay’ and on the other, its aim is to define a linguistic model which will constitute the common linguistic norm of the nation-state and which will be ‘*stable and generally acceptable*’. Once a common norm is being decided and standardised, every ambitious person who tries to achieve his/her social or political advancement has to forget his/ her regional linguistic variety and to faithfully as well as accurately follow and comply with the normative linguistic code (Baslis 2000, p. 50).

As far as Dhimotikí is concerned, there is no systematic effort to standardise this particular sort of variety, since it is regarded as consisting of many local dialectal pronunciations and having a simpler grammar compared to that of Katharévousa (ibid.). Besides, Dhimotikí is regarded as ‘*improper*’ Greek, infantile and uncultivated language, and thus, not wholly codified and standardised. Although there are some efforts to standardise Dhimotikí before the Greek Revolution in 1821, especially by Greeks of Diaspora such as Nikólaos Sophianós and Athanásios Christópoulos, it is only in 1940 that Triantaphyllidis provides the first, complete modern Grammar of Dhimotikí which is appropriate for school usage as well (Browning 1969, pp. 115-116).

3.1.6 Stability

There is an assumption made by Ferguson (1959, p. 332) that the phenomenon of diglossia may be proven to be a highly stable one with the passage of time. This stability rather is due to the fact that diglossia may be retained for years or even centuries and millennia. This last statement holds true for both Ancient Greek – Byzantine diglossia and MGD; MGD lasts for more than a century and a half, although in the last decades of the twentieth century Greece is converted from a diglossic speech community into a monoglossic one. Furthermore, with particular reference to the phenomenon of Greek diglossia as a whole, it is evident that existing from the first century B.C. (Ancient Greek diglossia) up to the nineteenth-twentieth century situation (MGD) through Byzantine diglossia, the phenomenon of diglossia in Greece actually forms a continuity – instead of three different phases – that lasts for more than two millennia. Therefore, what is previously mentioned is strong evidence in favour of the steadiness of diglossia at least as far as the case of Greek diglossia is concerned. What is more, even in case diglossia heads for its decline (since even the notion of stability is relative and subjective, according to Romaine (1995, p. 36)), this is not due to conflicts between H and L varieties, since both varieties are linguistically equal, but because of conflicts within a given society, either sociopolitical (the Junta domination in 1967 in Greece which overthrew the teaching of Dhimotikí from schools, for instance) or ideological-educational rivalries among the speakers of that particular diglossic community. Ferguson (1959, p. 332) suggests that a solution to a diglossic situation in the face of attrition and consequently instability, would be the insertion of an intermediate linguistic variety combining lexical and then grammatical and, why not, phonological characteristics of both H and L variants. Such a variety which, in other words, is a mixed variety, is employed by the Greek press (mostly newspapers) during the period of MGD. It is the so-called Greek Miktí variety. Greek Miktí, which comes to the fore just before the beginning of World-War II, is an updated version of the old or ‘*pure*’ Katharévousa. However, it consists of the fusion of both non-archaic Katharévousa elements and mostly of contemporary lexical items taken from Dhimotikí (Horrocks 1997, p. 364). It is this particular Greek Miktí that gives Dhimotikí its place with time. Therefore, in MGD the vernacular code (i.e., Dhimotikí) triumphs over the superposed code (i.e., Katharévousa).

3.1.7 Phonology

The existence of fundamental phonological differences is rather significant between the H and L variants, although L forms the phonological basis upon which H is created and based on. However, in MGD the exact opposite seems to happen; it is fairly certain that Katharévousa and Dhimotikí have phonological similarities (Wardhaugh 2006, p. 91). As Ferguson himself (1959, p. 335) reports, '*H and L phonologies may be quite close, as in Greek*'. As far as the phonological differences are concerned, merely an outstanding example has to be mentioned; namely, whereas in Katharévousa we have the presence of the final *v* [n] as a word ending, in Dhimotikí this *v* is absent.

3.1.8 Grammar

The H variety is likely to display a more complicated grammatical structure (i.e., morphosyntax) and have a richer morphology as well as a more complex syntactic structure in contrast to the L variety. Therefore, H is deemed better than L, a position which first appeared in Schlegel's philological beliefs (Petrounias 1970, p. 26).

3.1.8.1 Morphology

Both Katharévousa and Dhimotikí are highly inflected linguistic varieties concerning the verb declension as well as the noun declension. Even in this case, Katharévousa presents a more complex tense system than Dhimotikí. As far as the verb and noun endings of the two varieties are concerned, they diverge from each other but not widely. Tsiouris (1989, p. 164) stresses the fact that '*many [verb] affixes have been kept intact*' between Katharévousa and Dhimotikí. Furthermore, whereas Dhimotikí has four cases for nouns (i.e., nominative, genitive, accusative and vocative), Katharévousa has five cases for nouns, namely, the previous ones along with the dative case.

3.1.8.2 Syntax

What follows is a list providing differences between Katharévousa and Dhimotikí at the syntactic level of analysis adapted from Tsiouris (1989, p.185).

KATHARÉVOUSA	DHIMOTIKÍ
1. More complicated and elaborate syntax.	1. Simpler syntax
2. Hypotaxis of clauses (usage of embedded and dependent clauses with various conjunctions)	2. Parataxis of clauses (connection of clauses with the conjunction ‘and’ mostly)
3. Passive syntax	3. Active syntax
4. Usage of all the nominal cases (nominative, genitive, dative, accusative)	4. Accusative and nominative cases only.
5. Maintenance of the dative case used in Ancient Greek to express the notion of <i>giving</i> .	5. Elimination of the dative case on the whole, but maintenance of dative in idiomatic, fossilised clichés such as Δόξα τῷ Θεῷ (i.e., Thank God)
6. A strict (S)ubject-(V)erb-(O)bject word order (SVO).	6. All possible word orders are likely to happen in Dhimotikí, namely SVO, SOV, VSO, VOS, OSV, OVS.

(Adapted from Tsiouris 1989, p. 185)

Table 4: Syntactic level differences between Katharévousa and Dhimotikí

3.1.9 Lexicon

It is widely accepted that the vocabulary of H and L varieties may present some similarities; as far as the lexical similarities in MGD are concerned, Katharévousa and Dhimotikí appear to share common lexemes such as grammatical words, mainly conjunctions i.e., ‘και’ and, ‘τι;’ what?, et cetera as well as some ancient Greek words i.e., ‘θάλασσα’ sea, ‘ουρανός’ sky, and so on (Kotzantonoglou 1995, p. 42). Apart from the similarities, H and L vocabulary may present many more discrepancies with respect to form, usage and meaning (Ferguson 1959, p. 334). In general, H consists of technical terms such as literary, philosophical and scientific terms; such lexical items do not exist in the L variety (Trudgill 2000, p. 97; Holmes 2001, p. 28). For instance, L’s lexicon contains more informal lexical items such as *fruits* and *vegetables*, which primarily have to do with the daily reality. On the other hand, H’s lexicon comprises formal lexemes such as *classicism*, *psychoanalysis*, *bioengineering* and *aesthetics*. Similarly in MGD, Katharévousa is the language of science, whereas Dhimotikí is the language for everything else but science. As Kotzantonoglou (1995, p. 44) persuasively affirms:

“The prevailing attitude had been that demotic was not sophisticated enough to qualify for the expression of the elevated concepts of science. Most scientific writing was done in Katharevusa and demotic was slow to evolve in that field”.

Moreover, for expressing the same lexical notion in discrete sociofunctional settings – both formal and informal – each of the two varieties can use different lexical items. Archakis and Kondyli (2004, p. 102) point out that the coexistence of such semantic pairs – in Ferguson’s (1959, p. 335) own words ‘lexical doublets’ – are found in complementary distribution. Ferguson (1959, p. 334) in turn has this to say about lexical doublets:

“...a striking feature of diglossia is the existence of many paired items, one H one L, referring to fairly common concepts frequently used in both H and L, where the range of meaning of the two items is roughly the same, and the use of one or the other immediately stamps the utterance or written sequence as H or L”.

What follows is some sociofunctionally contrasting lexical doublets of Katharévousa (i.e., the formal – written lexeme) and Dhimotikí (i.e., the informal - colloquial lexeme), existing in MGD:

Greek	Katharévousa	Dhimotikí	Gloss
	ρόδον	τριαντάφυλλο	rose
	τέκνον	παιδί	child
	γεώμηλον	πατάτα	potato
	θέρος	καλοκαίρι	summer

4.1 Conclusion

Sociolinguistically speaking, the language situation in Greece (1830-1976) has been described as diglossic, in the classical sense of Ferguson’s definition (1959), since the two codes involved (Katharévousa and Dhimotikí) are forms of one and the same language. However, the case of MGD has somehow proven to be a more complex and unique one, because its divergence at some points from Ferguson’s initial model is certainly obvious. Usually there exist no conflicts between the two diglossic varieties H and L in most diglossic speech communities, since the diglossia situation is established by the speakers of the putative diglossic country themselves. However, the diglossic situation seems to be problematic in the case of MGD. This happens due to the fact that H and L varieties struggle against each other. In other words, Katharévousa and Dhimotikí compete since their supporters compete. As a result, the Language Question in Greece (i.e., which of the existing Greek varieties is going to become the standard, official, written language of the Greek nation?) is transformed from a clearly linguistic issue into a sociopolitical one.

To conclude, since the establishment of the Greek independent state in 1830, there has been much debate concerning the national and official language of Greece. Among the three types of language that are being proposed (Ancient Greek, Katharévousa, Dhimotikí), Katharévousa predominates as the national language of Greece until 1976. During that period, the existence of both Katharévousa for highly formal situations and Dhimotikí for less formal ones lead to the occurrence of the two codes at the same time, a phenomenon widely known as diglossia. However, Dhimotikí gradually gains ground and is finally recognised as the official language of the Greek state in 1976 and ever since.

** I would like to wholeheartedly thank Dr. Jeffrey Kallen, my supervisor, for his careful, constructive as well as rigorous criticism of an earlier draft of this paper. In addition, I would like to apologise to all those linguists and sociolinguists whose work was incorrectly cited or unwittingly misunderstood in the present paper. Of course, I am solely responsible for any kind of opinion expressed and supported in the paper at hand.*

References

Aiginitis, D. 1958. *To Glossiko Zitima; I Neoelliniki Glossa* [The Language Question: The Neohellenic Language]. Athens: Academy of Athens.

- Andriotis, N. 1992. *Istoria tis Ellinikis Glossas* [History of the Greek Language]. Thessaloniki: Institute for Modern Greek Studies.
- Ann, J. 2001. Bilingualism and Language Contact, in C. Lucas (ed), *The Sociolinguistics of Sign Languages*, pp. 33-60. Cambridge: Cambridge University Press.
- Archakis, A. and Marianna Kondyli. 2004. *Isagogi se Zitimata Kinonioglossologias* [Introduction to Sociolinguistic Issues]. 2nd ed. Athens: Nissos.
- Babiniotis, G. 2002. *Sinoptiki istoria tis ellinikis Glossas; isagogi stin istoricosigritiki glossologia* [A Brief Introduction of the Greek Language; an introduction to comparative-historical linguistics]. 5th ed. Athens: Babiniotis.
- Baker, C. 2001. *Foundations of Bilingual Education and Bilingualism*. 3rd ed. Clevedon: Multilingual Matters.
- Baslis, G. 2000. *Kinonioglossologia: Mikri Isagogi* [Sociolinguistics: A Small Introduction]. Athens: Grigoris.
- Brown, P. and Stephen C. Levinson. 1978. *Politeness: Some universals in language usage*. Cambridge: Cambridge University Press.
- Browning, R. 1969. *Medieval and Modern Greek*. London: Hutchinson.
- , 1982. Greek diglossia yesterday and today, *International Journal of the the Sociology of Language* 35, pp. 49-68.
- Chambers, J.K. 2003. *Sociolinguistic Theory: linguistic variation and its social significance*. Oxford: Blackwell.
- Christidis, A.-F. 2005. *Istoria tis archaias ellinikis glossas* [History of the Ancient Greek Language]. Thessaloniki: Institute for Modern Greek Studies.
- Cooper, R. 1989. *Language planning and social change*. Cambridge: Cambridge University Press.
- Coulmas, F. 2002. Writing is crucial, *International Journal of the Sociology of Language* 157, pp. 59-62.
- Diatsendos, P. 2008. *The Language Reform between the Intellectual Elites and the Greek State during the Second-half of 19th Century*, in Studies in Greek Linguistics: Proceedings of the Annual Meeting of the Department of Linguistics, May 2008, pp. 147-158. Thessaloniki: Institute for Modern Greek Studies.
- Edwards, A. D. 1976. *Language in Culture and Class: The Sociology of Language and Education*. London: Heinemann Educational.
- Edwards, J. 2006. Foundations of Bilingualism, in T. K. Bhatia and W. C. Ritchie (eds), *The Handbook of Bilingualism*, pp. 7-31. Malden, Mass.; Oxford: Blackwell.
- Elgibali, A. 1988. The Language Situation in Arabic-speaking Nations, in C. B. Paulston (ed), *International Handbook of Bilingualism and Bilingual Education*, pp.47-62. New York ; London: Greenwood.
- Fasold, R. 1984. *The Sociolinguistics of Society*. Oxford: Blackwell.
- Ferguson, C. 1959. Diglossia., *Word* 15, pp. 325-340.
- Fishman, J. 1972. *Advances in the Sociology of Language Vol II*. The Hague: Mouton.
- , 1975. *Sociolinguistics: A Brief Introduction*. Rowley (Mass.): Newbury House.
- Frangoudaki, A. 1992. Diglossia and the present situation in Greece: A sociological approach to the interpretation of diglossia and some hypotheses on today's linguistic reality, *Language in Society* 21, pp. 365-381.
- Gafaranga, J. 2007. Code-switching as a conversational strategy, in P. Auer and L. Wei (eds), *The Handbook of Multilingualism and Multilingual Communication*, pp. 279-314. Berlin; New York: Mouton de Gruyter.
- Giannouloupoulou, G. 2008. *Diglossia in Greece and Italy and the Contemporary* Annual Meeting of the Department of Linguistics, May 2008 pp. 138-146. Thessaloniki: Institute for Modern Greek Studies.
- Glinert, L. 1987. Hebrew – Yiddish diglossia: type and stereotype Implications of the language of Ganzfried's Kitzur, *International Journal of the Sociology of Language* 67, pp. 39-55.
- Grillo, R. D. 1989. *Dominant Languages: Language Hierarchy in Britain and France*. Cambridge: Cambridge University Press.
- Gumperz, J. and Dell Hymes (eds). 1972. *Directions in Sociolinguistics: The Ethnography of Communication*. New York, London: Holt, Rinehart and Winston.
- Haas, W. 2002. Comment, *International Journal of the Sociology of Language* 157, pp. 109-115.
- Halliday, M. A. K. 1978. *Language as social semiotic: The social interpretation of language and meaning*. London: Edward Arnold.
- Hamers, J. and Michel H. A. Blanc. 2000. *Bilinguality and Bilingualism*. 2nd ed. Cambridge: Cambridge University Press. pp. 109-115.

- Hoffmann, C. 1991. *An Introduction to Bilingualism*. London: Longman.
- Holmes, J. 2001. *An Introduction to Sociolinguistics*. 2nd ed. Harlow: Longman.
- Hornby, P. 1977. *Bilingualism: Psychological, Social, and Educational Implications*. New York: Academic Press.
- Horrocks, G. 1997. *Greek: A History of the Language and its Speakers*. London: Longman.
- Hudson, G. 1999. *Essential Introductory Linguistics*. Malden, Mass., Oxford: Blackwell Publishers.
- Hudson, R. A. 1996. *Sociolinguistics*. 2nd ed. Cambridge: Cambridge University Press.
- Karouzios, X. 1966. O Dante kai i glossa [Dante and his Language], in *Prosfora ston Dante* [Tribute to Dante], pp. 111-122. Athens: Embassy of Italy in Athens.
- Kaye, A. 2002. Comment, *International Journal of the Sociology of Language* 157, pp. 117-125.
- Kotzantonoglou, C. 1995 *Greek Diglossia: An Historical and Sociolinguistic Approach*. Unpublished M.Phil. thesis, Trinity College Dublin.
- Lyons, J. 2004. *Isagogi sti Glossologia* [Language and Linguistics: an Introduction]. Translated from English by M. Arapopoulou et al. 12th ed. Athens: Patakis.
- Mackridge, P. 1985. *The Modern Greek Language: A Descriptive Analysis of Standard Modern Greek*. Oxford: Oxford University Press.
- Maher, J. 1991. A cross-linguistic study of language contact and language attrition, in H. Seliger and R. Vago (eds), *First Language Attrition*, pp. 67-84. Cambridge: Cambridge University Press.
- Mandilaras, B. 1972. *Studies in the Greek Language: Some aspects of the development of the Greek language up to the present day*. Athens: Xenopoulos Press.
- Mesthrie, R. et al. 2000. *Introducing Sociolinguistics*. Edinburgh: Edinburgh University Press.
- Nercissians, E. 2001. Bilingualism and diglossia: patterns of language use by ethnic minorities in Tehran, *International Journal of the Sociology of Language* 148, pp. 59-70.
- Paulston, C. 2002. Comment, *International Journal of the Sociology of Language* 157, pp. 127-134.
- Paulston, C. B. And G. Richard Tucker (eds). 2003. *Sociolinguistics: The Essential Readings*. Malden, Mass., Oxford: Blackwell.
- Pauwels, A. 1988. Diglossic communities in transition: the cases of the Limburgs and Swabian speech communities in Australia, *International Journal of the Sociology of Language* 72, pp. 85-99.
- Petrounias, E. 1970. Modern Greek Diglossia and its Sociocultural Implications, *Linguistic Communications* 2, pp. 1-41.
- Pride, J. B. 1971. *The Social Meaning of Language*. London: Oxford University Press.
- Romaine, S. 1984. *The Language of Children and Adolescents: The Acquisition of Communicative Competence*. Oxford: Blackwell.
- , 1995. *Bilingualism*. 2nd ed. Oxford: Blackwell.
- Rosenhouse, J. and Mira Goral. 2006. Bilingualism in the Middle East and North Africa: A Focus on the Arabic – Speaking World, in T. K. Bhatia. and W. C. Ritchie (eds), *The Handbook of Bilingualism*, pp. 835-868. Malden, Mass.; Oxford: Blackwell.
- Ryan, E., Howard Giles and Richard J. Sebastian. 1982. An Integrative Perspective for the study of attitudes toward language variation, in E. B. Ryan and H. Giles (eds), *Attitudes towards Language Variation: Social and Applied Contexts*, pp. 1-19. London: Edward Arnold.
- Schiffman, H. 1997. Diglossia as a Sociolinguistic Situation, in F. Coulmas (ed), *The Handbook of Sociolinguistics*, pp. 205-216. Oxford: Blackwell.
- Sella-Mazi, E. 2001. *Diglossia kai Kinonia: i elliniki pragmatikotita* [Bilingualism and Society: the greek reality]. Athens: Proskinio.
- Spolsky, B. 1989. *Conditions for Second Language Learning: Introduction to a general theory*. Oxford: Oxford University Press.
- Steinberg, J. 1987. The Historian and the Questione della Lingua, in P. Burkert and R. Porter (eds), *The Social History of Language*, pp. 198-209. Cambridge: Cambridge University Press.
- Thomson, G. 1989. *I Elliniki Glossa Archaia kai Nea* [The Greek Language, Ancient and Modern]. Translated from English by C. Alexiou. 2nd ed. Athens: Athens Publishing Institute.
- Trudgill, P. 2000. *Sociolinguistics. An introduction to language and society*. 4th ed. London: Penguin.
- Tsiouris, E. 1989. *Modern Greek: A Study of Diglossia*. Unpublished Ph.D. dissertation, University of Exeter.
- Wardhaugh, R. 2006. *An Introduction to Sociolinguistics*. 5th ed. Oxford: Blackwell Publishing.
- Wölck, W. 2002. Ethnolects: Between Bilingualism and Urban Dialect, in L. Wei, J. M. Dewaele and A. Housen (eds), *Opportunities and Challenges of Bilingualism. Contributions to the Sociology of Language*, pp. 157-170. Berlin: Mouton de Gruyter.
- Yule, G. 2006. *The Study of Language*. 3rd ed. Cambridge: Cambridge University Press.

Development of an Enhanced Generic Data Mining Life Cycle (DMLC)

Markus Hofmann

Department of Informatics

Institute of Technology Blanchardstown, Dublin 15, Ireland

Tel.: +353-1-885 1553

E-mail: markus.hofmann@itb.ie

Brendan Tierney

School of Computing

Dublin Institute of Technology

Kevin Street, Dublin 8, Ireland

Tel.: +353-1-402 4348

E-mail: brendan.tierney@comp.dit.ie

Abstract

Data mining projects are complex and have a high failure rate. In order to improve project management and success rates of such projects a life cycle is vital to the overall success of the project. This paper reports on a research project that was concerned with the life cycle development for large scale data mining projects. The paper provides a detailed view of the design and development of a generic data mining life cycle called DMLC. The life cycle aims to support all members of data mining project teams as well as IT managers and academic researchers and may improve project success rates and strategic decision support.

An extensive analysis of eight existing life cycles leads to a list of advantages, disadvantages, and characteristics of the life cycles. This is extended and generates a conglomerate of several guidelines which serve as the foundation for the development of a new generic data mining life cycle. The new life cycle is further developed to incorporate process, people and data aspects. A detailed study of the human resources involved in a data mining project enhances the DMLC.

Keywords: Data mining life cycle, DMLC, life cycle analysis, data mining, knowledge discovery

1 Introduction

Data mining is an interdisciplinary field (Simoudis, 1998), incorporating many different approaches, technologies, and methodologies to be able to generate and discover previously unknown knowledge. Data Mining is a non-trivial process (Fayyad *et al.*, 1996b) which has to be manageable in order to achieve the anticipated success in any data mining or knowledge discovery project. Due to the interdisciplinary nature and complexity of stages, processes, data and process flows during the progress of any data mining project the necessity for a comprehensive and complete data mining life cycle has been identified. The aim of the research project on which this paper reports is to provide a complete development report of a new generic data mining life cycle called DMLC. The life cycle is a model that should assist all members of the data mining project team to succeed in their work and to deliver on time results that are within the predetermined budget.

The paper briefly describes the analyses of various academic as well as commercial data mining life cycles and defines, based on critical analysis, all the advantages and disadvantages of each life cycle. This is followed by the life cycle analysis section which describes the structured approach that was taken throughout the development of the DMLC. A list of guidelines will form the foundation of the main part of this paper

which will describe the actual life cycle, its stages, processes, features, and all other parts that contribute to the comprehensiveness and integrity of the life cycle. The final section concludes and summarizes the needs of a data mining life cycle and its functionality.

2 Background

The following life cycles have been chosen as they represent the most authoritative, most cited, and most applied life cycles in both academia and industry:

- Knowledge Discovery in Databases (KDD) Process (Fayyad *et al.* 1996a; Collier *et al.*, 1998; Feldens, 1998)
- Refined KDD Paradigm (Collier *et al.*, 1998)
- Knowledge Discovery Life Cycle (KDLC) Model (Lee and Kerschberg, 1998)
- Information Flow in a Data Mining Life Cycle (Ganesh *et al.*, 1996, Kopanakis and Theodoulidis, 1999)
- CRoss-Industry-Standard Process for Data Mining (CRISP-DM) (CRISP-DM, 2000)

The life cycles and their structure were explored, and the data or information flows were identified. The aim of the investigation stage of the project was to identify the advantages of stages or tasks within the life cycles, which would enhance the data mining project outcome. The authors indicated the disadvantages of stages and tasks within the life cycle, which could affect the data mining project negatively.

Some of the life cycles only differ marginally whereas others differ considerably in structure and comprehensiveness. All but the CRISP-DM life cycle have been developed by academia. Although data mining has been a very evolving research area in recent years, there is still a need for a comprehensive and complete life cycle. The CRISP-DM reference model is the most complete and also the most widely accepted and applied data mining life cycle. The extensive analysis has been summarized in Table 1 and Table 2.

3 Life Cycle Analysis

The life cycles mentioned in the background section have been critically analyzed and compared with each other. Table 1 maps various characteristics of the life cycles discussed and represents some of the results of the analysis. The list of characteristics is an accumulation and summarization of all features identified throughout the discussion of the life cycles. The matrix will aid to recognize important and critical features every data mining life cycle should consist of and will, in relation to this paper, help to create a new and improved data mining life cycle. The assessment column on the far right of the table indicates the importance of the characteristics with regard to the DMLC development. The letter 'C' stands for Critical, 'D' stands for Desirable and 'ND' stands for Not Desirable. The authors will refer to this table throughout this paper to verify and justify the importance of some of the features in the newly created DMLC.

Table 1: Characteristic matrix of data mining life cycles

	Fayyad et al. (1996a)	Collier et al. (1998a)	Feldens et al. (1998)	Collier et al. (1998b)	Lee et al. (1998)	Ganesh et al. (1996)	Koppanakis et al. (1999)	CRISP-DM (2000)	Assessment
General									
Number of Processes	6	6	3	8	6/7	6	6	6	>5
Level of Authority	H	M	M	M	M	M	M	H	N/A
Data Centric	✓	✓	✓	✓		✓	✓		C
Process Centric				✓	✓	✓	✓	✓	C
People Centric					✓	✓	✓		C
Definite Start	✓	✓	✓	✓		✓	✓	✓	C
Definite End	✓	✓	✓	✓		✓	✓	✓	C
Categorised Processes							✓		D
Processes									
Business Understanding								✓	C
Data Understanding								✓	C
Define Objective/Hypotheses				✓	✓				C
Selecting	✓	✓		✓		✓	✓	✓	C
Sampling		✓							C
Data Processing	✓	✓	✓	✓	✓			✓	C
Transforming	✓	✓	✓	✓				✓	C
Data Mining/Modelling	✓	✓	✓	✓	✓	✓	✓	✓	C
Evaluation	✓	✓		✓	✓			✓	C
Deployment				✓				✓	C
Post processing			✓						C
Personnel									
Knowledge Engineer					✓		✓		D
Domain Experts					✓				C
Data Miner/Analyst						✓			D
Sources									
Data	✓							✓	ND
Data Warehouse		✓	✓		✓	✓	✓		D
Information Repository					✓				C
Other Sources					✓				D
Iteration									
Bi-directional Flow	✓	✓	✓		✓			✓	C
Forward skipping		✓			✓				ND
Cycle Iteration	✓	✓	✓	✓	✓	✓	✓	✓	C
Inner Circle	✓	✓	✓		✓			✓	D
Sequential Flow	✓	✓	✓	✓		✓	✓	✓	C

Symbol	Meaning	Description
C	Critical	Indispensable, essential – a critical element of the life cycle
D	Desirable	This is an element or a feature of the life cycle which is worth having or doing and will be useful or advantageous. It is advisable
ND	Not Desirable	This is an element or a feature of the life cycle which is not worth having or doing and will not be useful or advantageous and might even decrease the likelihood of the project's success.
N/A	Not Applicable	
H	High	
M	Medium	

Table 2: Summary of life cycle advantages and disadvantages

Life Cycle	Advantage	Disadvantage
Fayyad et al. (1996a)	<ul style="list-style-type: none"> – Provides user with main stages – Detailed data pre-processing processes – Iterative life cycle 	<ul style="list-style-type: none"> – Data source is not specified and simply labelled 'Data' – No deployment process and therefore difficult to verify and justify the results – Newly generated knowledge is not stored in a repository – Inner circles can only be started after completion of the evaluation process
Collier et al. (1998a)	<ul style="list-style-type: none"> – Provides user with main stages – Detailed data pre-processing processes – Data warehouse as data source – Inner circles/iteration is supported – Iterative life cycle 	<ul style="list-style-type: none"> – No deployment process and therefore difficult to verify and justify the results – Newly generated knowledge is not stored in a repository – Processes can be skipped (forward skipping)
Feldens et al. (1998)	<ul style="list-style-type: none"> – Good iteration between the process – Post-processing phase 	<ul style="list-style-type: none"> – only 3 phases – entire life cycle is not detailed enough
Collier et al. (1998b)	<ul style="list-style-type: none"> – iterative life cycle – definition of data mining objective(s) – Deployment process 	<ul style="list-style-type: none"> – Inner circles or iteration of processes is not possible unless entire cycle is iterated – Newly generated knowledge is not stored in a repository – No clearly identified data source
Lee et al. (1998)	<ul style="list-style-type: none"> – Newly generated information and knowledge are stored in information repository – Definition of hypotheses – Focused on knowledge relevancy, validation, and knowledge evolution – Involvement of experts 	<ul style="list-style-type: none"> – Very poor data and process flow which leads to confusion and misinterpretation – No deployment process – No sequential flow – Confusion where to set objective or hypotheses
Ganesh et al. (1996)	<ul style="list-style-type: none"> – Involvement of experts – Verification and evaluation process of the data mining model 	<ul style="list-style-type: none"> – Poor data pre-processing phase – No deployment process – No overall verification and evaluation phase
Kopanakis et al. (1999)	<ul style="list-style-type: none"> – Involvement of experts – Subdivided processes 	<ul style="list-style-type: none"> – Poor data pre-processing phase – No deployment process – No overall verification and evaluation process
CRISP-DM (2000)	<ul style="list-style-type: none"> – Initial processes are 'business understanding' and 'data understanding' – Simple but comprehensive – Inner circle/iteration is supported but limited 	<ul style="list-style-type: none"> – Poor detail in data preparation phase – Data source is not specified and simply labelled 'Data' – Deployment process seems to be a dead end – Newly generated information or knowledge are not stored permanently in some sort of information repository – Involvement of the various experts is not mentioned

The results of this analysis have been displayed in two tables. One consists of the characteristic matrix of all life cycles (see Table 1) whereas the second table (see Table 2) addresses the various advantages and disadvantages. Both tables assisted in creating and developing a new and improved life cycle, incorporating all the findings that this analysis revealed. The final deliverable of this section is a list of shortened guidelines the DMLC is based on:

- The number of processes is important to provide a comprehensive and detailed life cycle and should be above six;

- The life cycle should incorporate process, people and data issues in order to become equally process, people and data centric since all these aspects are considered to be important throughout data mining projects;
- A definite starting point is as important as a definite ending point of an individual cycle as well as numerous sub-cycles;
- Categorized processes add to the comprehensibility and task co-operation as well as distribution;
- The following processes have been identified as critical and are necessary to build a comprehensive life cycle: business understanding, data understanding, objective or hypotheses definition, selecting, sampling, data processing, transforming, data mining/modelling, evaluation, deployment, and post processing. The naming of the processes will be discussed in the development section;
- In order to address the aforementioned feature of being people centric, personnel involved throughout the data mining project have to be identified and included in the new life cycle;
- The data sources have to be clearly identified;
- The issue of storing space and technology where newly gained information and knowledge will be kept is one of the most important issues of the data mining life cycle;
- The iteration of the life cycle should include the option to iterate through inner loops as well as to iterate the entire life cycle;

4 Data Mining Life Cycle (DMLC)

The life cycle shown in Figure 1 represents a comprehensive approach to managing and optimizing data mining projects. The DMLC consists of 9 different processes which are part of 3 stages. The hypotheses/objectives preparation stage consists of the three processes: business understanding, data understanding and hypotheses/objectives definition. The second stage is called data preparation stage and represents the processes select/sample, pre-process and transformation. The final stage consists of the data mining process, the evaluation process and the deployment process. Two data stores build the foundation of the life cycle: data warehouse/data mart and the information and knowledge repository (IKR). Different data and process flows allow the project team to work within a flexible environment in order to maximize the project outcome. The outer circle of the diagram shows all the human resources or skill groups that have to be present throughout a large scale data mining project. This brief description of the life cycle will help to understand the following sections about human resource involvement in data mining projects. The placement of the symbols representing the human resources in the outer circle has no specific meaning.

The paper will focus on how this life cycle evolved and along what guidelines it was developed. Many features of the DMLC have been identified as advantages in other life cycles. It should be noted that this paper describes and focuses on the development phases and the foundation of the life cycle segments and does not deal with the actual elements that have been implemented and displayed in Figure 1.

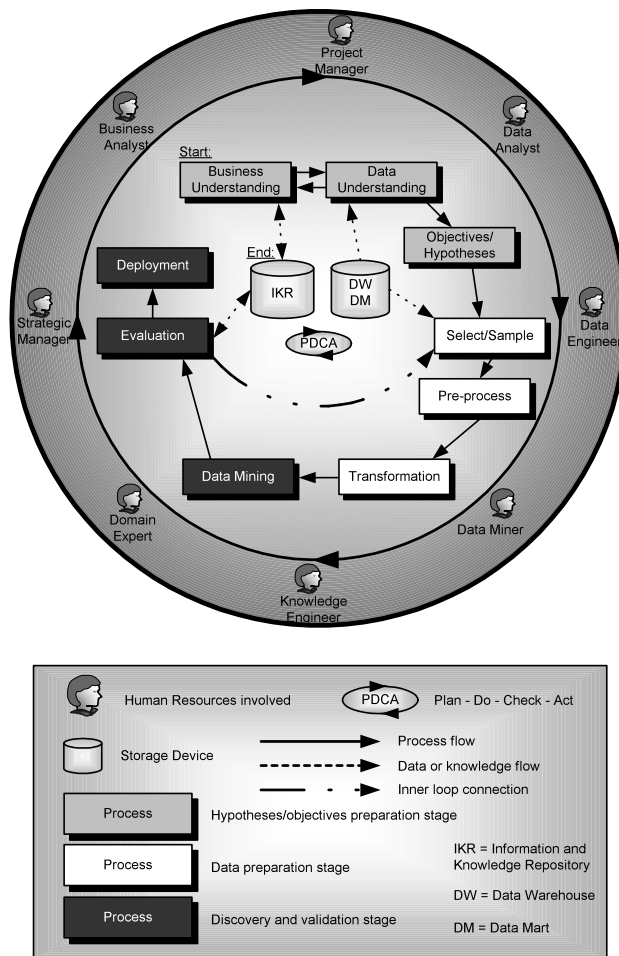


Figure 1: Data Mining Life Cycle – DMLC

5 Development Phases of the DMLC

This core part of the paper deals with the development phases of the DMLC based upon features identified or not identified in the life cycles analysed. Throughout the development phases this section will explain the various features, processes, or stages that will be introduced in detail. The section begins with the detailed foundations and guidelines of such a life cycle and is based on the list of guidelines identified and compiled in the section above.

Three different reasonings lead to the guidelines which ultimately form the new and enhanced data mining life cycle:

1. A feature, process, or stage has been identified as a strength or positive influence of a life cycle and therefore adds to the overall life cycle output. The emphasis of such an event would therefore be important and critical to incorporate into the new life cycle development;
2. The feature, process, or stage that has been defined as weakness or negative influence of a life cycle and therefore detracts from the overall life cycle output. This event needs to either improve the detraction in such a way that it becomes a strength or has to be left out entirely in order to improve the feature, process, or stage and therefore the overall life cycle;

3. The life cycle was lacking in one area and the authors identified a missing feature, process, or stage, which also detracts from the overall life cycle output. This event leads to the necessity of adding the missing feature, process, or stage in order to improve the overall life cycle output.

The following sections will address the guidelines in greater detail.

5.1 Scope of the life cycle processes

After analysing the existing life cycles it became obvious that the new life cycle has to have at least six processes in order to be detailed enough and to qualify as comprehensive and complete. The life cycles from Feldens (1998) and Simoff and Maher (1998) show the lack of completeness by only producing 3 phases. For example Feldens (1998) introduces a process called 'post-processing'. The user is unable to determine what post-processing means and includes. It is not mentioned that any processes or tasks should be included in the post-processing process such as evaluation, deployment or storage of the results.

The KDD Process (Collier *et al.*, 1998) on the other hand introduces eight processes and produced in fact one of the more coherent life cycles. The amount of processes should be manageable and add to the project planning and execution rather than causing confusion and deflection. After limiting the lower borderline to 6 processes, the upper borderline is limited to approximately ten processes in order to keep the life cycle manageable and straightforward. This will not allow the life cycle to become too complex and also emphasises the necessity to concentrate on processes rather than on activities. For example Collier *et al.* (1998) include the process 'Clean data' in their life cycle, which is an activity rather than a process. The process should be named with a noun and not with an active verb since the final deliverable will be a life cycle and not a methodology. Once a process is named with a noun it cannot be seen as a task or activity but rather as a milestone, which can be reached by carrying out various tasks and activities. This will contribute to the ease of understanding and also to the integrity of the life cycle.

5.2 Process, people and data issues

There were three orientations detected after analyzing the life cycles. Some of the life cycles were data centric, some process centric and others tried to incorporate the people issues and requirements. Only Ganesh *et al.* (1996) and Kopanakis and Theodoulidis (1999) used all three aspects to improve their life cycle. Using all three aspects of the data mining project will enhance the life cycle due to greater comprehensiveness and completeness. Therefore the life cycle should incorporate process, people and data issues in order to become equally process, people and data orientated. Fayyad *et al.* (1996b), Ganesh *et al.* (1996) and Kopanakis and Theodoulidis (1999) mention human resources as critical source in their models and only the latter two authors cover all three issues, even if only marginally. The new life cycle has to identify clearly what data sources are used, what data flows exist, what processes are necessary to generate the data flow, and furthermore, who are the people responsible for carrying out these processes. The life cycle has to consider all three factors equally in order to provide a platform for successful data mining project planning and implementation. This will result and reflect on the following three factors:

- Defining the exact data sources (where the data has originated) and destinations (where the data will be finally stored) extended by the data flows throughout the life cycle;
- Defining in detail all processes involved extended by the process flows throughout the life cycle;
- Defining the human resources who will more than likely be involved in any data mining project to ensure success.

5.3 The Processes

This section will describe the various processes defined for the DMLC. The processes are split into three stages each containing three processes:

- Objectives/Hypotheses preparation stage;
- Data preparation stage;
- Discovery and validation stage.

Business Understanding, Data Understanding and Objectives/Hypothesis build the ‘Objectives/Hypotheses preparation stage’ which should be seen as a whole. It is, for example, not possible to carry out the business understanding analysis if no initial thought or draft of a hypothesis or objective is in place. And, vice versa, it is not possible to define the final objectives or hypotheses without carrying out the business understanding or data understanding process. It is therefore important that these three processes are approached simultaneously, going back and forth until the objectives or the hypotheses are set. It is further noteworthy to mention that the first two stages take up to 80 percent of the effort (Feldens *et al.*, 1998). Feldens *et al.* (1998) recommend to “...make analysis and pre-processing the most critical issue, as proper focusing and data preparation are considered 80% of the effort to successful discovery...”. Although Inmon (2002) and Turban *et al.* (2001) do not give a percentage, both agree that the first two stages take up most of the workload in order to obtain a valid and beneficial data mining result.

The various processes and their integration into the life cycle as well as the human resources that are responsible to create the process deliverable are described in the following paragraphs. Again, this is not a methodology and therefore the deliverable of this paper is not a complete list of activities or tasks that have to be carried out but rather a guideline for what role the process plays in the overall life cycle.

5.3.1 Business Understanding

This process is one of two fundamental processes of the DMLC. Not only because it is the starting point but also because of its influence and importance with regard to the overall data mining project. This process is necessary to set an objective or to formulate the hypothesis. In order to do so, the user has to understand how the business works, what the overall objectives of the business are and of course, what the rules of the business are. The following activities are necessary to cover the business understanding process:

- Determine the Business Objectives – Research the background, the business objectives, and business success criteria (CRISP-DM, 2000).

- Assess the overall situation – research the requirements, assumptions, and constraints, estimate the risk and contingencies and based on that research create a cost and benefit analysis (CRISP-DM, 2000).
- Determine basic business rules that are necessary for the data mining project and store them in the Information and Knowledge Repository (IKR).

The sharing of knowledge is important to achieve consistency and correctness in the anticipated data mining results (Turban *et al.*, 2001). It is also important to mention that there should be a distinct difference between the IKR and any metadata related to the semantics of the data kept in the data warehouse/mart. The IKR is simply responsible for holding business rules and previously achieved data mining results (Lee *et al.*, 1998) whereas the usual metadata is focused on the semantics of the data (Kimball *et al.*, 1998). This differentiation is necessary to ensure integrity and reduce redundancy of these two storage devices.

The business analyst holds the main responsibility of this process. However, the data analyst, domain expert, and the strategic manager assist throughout this process. The IKR is used to access previously defined business rules or previously gained information or knowledge.

5.3.2 Data Understanding

Business understanding is the second of two fundamental processes in the DMLC. Data understanding is necessary to create a good platform for the data mining project. The following issues have to be addressed to fulfil the requirements of this process, assuming that the initial data collection has already taken place:

- Describe data (CRISP-DM, 2000) and store this information in the metadata repository of the data source (data warehouse or data mart) (Kimball *et al.*, 1998). This contributes to the general data understanding and the semantics of the individual attributes themselves as well as their values and restrictions. It is, according to Inmon (2002), important to describe tables and their relation to each other. Without metadata the workload of the data mining project increases considerably (Inmon, 2002).
- The second important activity is to explore data (CRISP-DM, 2000) in order to more completely understand the contents of the data source and the data itself. Missing values, outliers, or skewed distributions can affect the data mining model and distort its results considerably (Fayyad *et al.*, 1996a; Kimball *et al.*, 1998; SAS, 2002). This is usually carried out with a small sample and not with the entire data set (Fayyad *et al.*, 1996a).
- To know the volume of the data such as number of records or number of attributes is helpful to find the right sample size for the later processes (Fayyad *et al.* 1996a). Information about the initial data type is also necessary.
- Verification of the data quality is vital (Inmon, 2002) to determine what steps have to be carried out in the data preparation stage. If there is an issue with quality the user has to analyse how distorting this error is in order to take the appropriate action and whether this error can be removed or not.

The data analyst holds the main responsibility of this process. However, the business analyst and the data engineer assist throughout this process. The data warehouse/mart is used to access data and metadata. Again, this process should be carried out in

concurrence with the remaining two phases of this stage. Input from and to the business understanding processes is vital.

5.3.3 Objectives or Hypotheses Definition

The last process of this stage is the objectives/hypotheses definition process where the knowledge and outputs from the two previous processes are brought together and the final objectives or hypotheses of the data mining project can be defined. CRISP-DM (2000) warns of the confusion between business objectives and data mining objectives. A data mining result can lead towards the business objective, but cannot be the same.

For example:

- Business objective: e.g. To better co-ordinate linked bus journeys
- Data mining objective: e.g. Predict how many passengers will be in need of linked bus journeys of a certain route, considering journey behaviours and patterns over the last 4 years and demographic information (age, salary, and route).
- Data mining hypothesis: e.g. Knowing the number of required linked trips on a certain route would improve planning and scheduling processes.

This process can be further improved by stating the data mining success criteria (CRISP-DM, 2000). A success criterion could contain, for example, the level of predictive accuracy, the level of significance, the p-value or the power of the results. It is believed that an estimation of the result prior to the data mining execution could eliminate or identify impossible results and therefore decrease mistakes within or throughout the data mining life cycle.

To define an objective or a hypothesis is only mentioned by Collier *et al.* (1998b) and Lee *et al.* (1998). CRISP-DM (2000) mentions that determining the data mining goals as part of their business understanding process. The determination of, what CRISP-DM (2000) call 'data mining goals' is before the data understanding process and also not an individual process. To set the definition of the objectives or hypotheses as an individual process is considered critical and vital. Lee *et al.* (1998) states that the generation of a hypothesis is important but this gets lost in the unstructured way the life cycle is presented. Only Collier *et al.* (1998b) add the process of defining an objective to the life cycle. They further say that the objectives used in conjunction with the business understanding, can successfully reveal and discover new business insights. This was also confirmed by Turban *et al.* (2001).

This process concludes the cooperation of the following human resources: business analyst, data analyst, domain expert, data engineer, and strategic manager. Both data stores are accessed to increase data, information, and/or knowledge transparency.

5.3.4 Select and Sample

The goal and final deliverable of this process is to identify and select the target data, which is the data needed to carry out the data mining algorithm (Fayyad *et al.*, 1996a). Selection and sampling data from a larger data source such as data warehouse or data mart is responsible for creating the required target data. Data selection includes manual and automatic selection of records, selection of attributes or features, as well as reducing the number of values, for example, by applying discretisation techniques (CRISP-DM, 2000; Klösgen, 2002b; Reinartz, 2002). The focus has to be on a subset of variables or data samples (Fayyad *et al.*, 1996a). The discovery is then performed on

the data sample. According to Collier *et al.* (1998a) this process of data extraction does help to streamline and speed up the project life cycle. The selection and sampling process often has to be iterated numerous times in order to finally select a suitable and correct data sample (Kopanakis *et al.*, 1999). The selected data set/sample will then be further processed and finally used for modelling and the main analysis work. Reinartz (2002) warns that the selection criterion not only includes relevance to the data mining goal, but also technical constraints, such as limits on data volume or data types.

The selection process covers the selection of attributes as well as records from one or more tables (Date, 2000). The decision on what data is used for the analysis is based on a number of criteria, including relevance to the data mining objective/hypotheses, data quality, and technical constraints (CRISP-DM, 2000).

5.3.5 Pre-Process Data

After selecting and sampling the suitable data set further steps are necessary to adjust the data to comply with the general and specific needs of the data mining model or algorithm. Although the data obtained from the data warehouse (or similar) has already undergone steps such as data migration, data scrubbing, and/or data auditing (Feldens *et al.*, 1998), it still needs to be further processed to guarantee the most suitable and error free data set (Ganesh *et al.*, 1996; Collier *et al.*, 1998a; Feldens *et al.*, 1998; Kopanakis *et al.*, 1998). To improve the quality of the data it has to be cleansed from noise and outliers. Outliers are attribute values that did not come from the assumed population of data (Turban *et al.*, 2001). This can include a non-numeric value when the user is only expecting numeric values or data items that fall outside the boundaries set by most of the other data items in the data set (Two Crows, 2002). Data can be referred to as noisy when it includes errors such as many missing or incorrect values or when there are irrelevant attributes (Collier *et al.*, 1998a).

These constraints have to be removed in order to maximise the data quality and therefore the quality of the result. More ambitious techniques such as the estimation of missing data by modelling can further contribute to the improvement of data quality (Bloom, 2002; Reinartz, 2002). A strategy or proceedings for handling missing data items has to be created (Fayyad *et al.*, 1996a). Many more filters exist to enhance the suitability of the data set.

5.3.6 Transform Data

In the transformation process, which follows the pre-processing phase, the data is constructed, integrated and formatted (CRISP-DM, 2000; Reinartz, 2002) to finally comply with all data mining model requirements. It has to be transformed to fit the essential rules implied by the model (Collier *et al.*, 1998b). Transformation is the data reduction and projection – using dimensionality reduction or transformation techniques to condense the effective number of variables under consideration or to discover invariant representations of the data (Fayyad *et al.*, 1996a). This could simply mean to eliminate unwanted or highly correlated fields so the results will be valid.

The last three processes are usually carried out by the data engineer and data miner who obtains assistance from the data analyst. The required data is accessed from the data warehouse/mart.

5.3.7 Data Mining

“...Today, data mining can make the difference in every industry and organisation throughout the world. You can mine your data and use the results to determine not only what your customers want, but to also predict what they will do...” (Noonan, 2000).

After all the data preparation has been concluded, the appropriate data mining model can be applied. During this process the information or knowledge is extracted from the main data set. The following list includes the most common types of information obtained by data mining algorithms:

- Classification: gather the significant characteristics of a certain entity or group (e.g. customers who changed their route of travelling)
- Clustering: recognises entities or groups that share a particular characteristic (This differs from classification in the sense that no predefined characteristic is given)
- Association: identifies relationships between events that occur at one time
- Sequencing: similar to association, except that the relationship is present over a period of time

Although the type of information that is aimed for is already known from a very early stage of the life cycle, it becomes crucial in supporting the decision what data mining model (e.g. decision trees, neural networks, memory based reasoning, etc.) should be used to carry out the analysis task. Most problem types can be solved by applying different or a combination of data mining models (Fayyad *et al.*, 1996b; Kimball *et al.*, 1998; Turban *et al.*, 2001).

The data miner's main responsibility is to generate a data mining model and to run this model in order to produce the anticipated analysis result. The expertise of the domain expert supports this task.

5.3.8 Evaluation

The evaluation process is aimed at validating the result and putting it into context of the initial objectives or hypotheses. Many authors claim that the data mining process can produce an unlimited number of patterns hidden in the data and the evaluation process is solely responsible for selecting the useful results (Fayyad *et al.*, 1996a; Hsu *et al.*, 1998; Collier *et al.*, 1998a). Due to the fact that the DMLC has a clearly defined objective or hypothesis, it should not be necessary to choose from different results since the entire data mining algorithm is based on the objective or hypothesis. CRISP-DM (2000) and Shearer (2000) say that the evaluation process is mainly responsible for validation of the model and the results. Obviously one must keep the business rules and data mining objective or hypothesis in mind. This process also includes the overall review process and determines further steps such as reiteration (inner loop) or deployment. Each correct result is stored in the IKR, regardless of whether the outcome is relevant to the current business situation or not. If it is a correct result and therefore reflects a business rule, limitation, or boundary, it has to be stored in order to include it in any future data mining project. CRISP-DM (2000) states that the evaluation should include the search for incidentally generated results which could be beneficial for the business understanding process or could trigger another data mining project. It is important that the data mining result is understood.

The domain expert, the business analyst, and the strategic manager ensure that the evaluation of the results are carried out. The knowledge engineer assisted by the domain expert is responsible for the storage of the data mining and evaluation results.

5.3.9 Deployment

The deployment process covers the deployment activities in the event that the data mining result added to the business understanding and discovered new knowledge. Only Collier *et al.* (1998b) and CRISP-DM (2000) cite the deployment stage as a necessity of a data mining life cycle. Noonan (2000) and Battaglia (2001) say that Return on Investment (ROI) of data warehouses cannot be achieved without data mining and successful data mining cannot be attained without correct deployment. To get the information to the place where it is needed is the key (Noonan, 2000) but this can also become a difficult task. Data mining deployment enables communication about the knowledge and experience gained from data mining projects to the human resources interested in the new findings. Deployment of data mining results provides employees with the information they need, in a form they can use, where they need it and exactly when they need it (Battaglia, 2001).

After deploying the results it is important to analyse the impact of the deployment. Only Collier *et al.* (1998b) indicated this aspect in their life cycle. The meaning of the result could lead to deployment of a small sample – a test run. The analysis of that deployment would give an indication whether to introduce the findings of the data mining result on a larger scale or whether to abort the deployment. An example of this is the typical beer and nappies scenario. The result is that every Friday many customers tend to buy beer along with nappies. What the analyst does not know is what to do with that result. Should the beer be stocked beside the nappies or should it be kept on the opposite side of the supermarket hoping that the customer purchases more goods on the way to the beer or the nappies? Looking at the beer/nappies example, two possibilities arise. One, knowledge about a similar situation already exists and can be used to apply the necessary changes or, two, the result has to be deployed and the life cycle has to be repeated comprising the changes provoked by the impact of the deployment. By deploying the data mining results in a selective distribution, further knowledge can be gained which is filtered and analysed through a new data mining project. If for example 10 supermarkets locate the beer and nappies next to each other and a further 10 stores locate them as far from each other as possible the result generated through a new data mining project will reveal which of the options was more profitable and therefore will be deployed on a larger scale.

The deployment process is usually under the control and supervision of the strategic manager and the domain expert.

5.4 Human Resources

Only three (Ganesh *et al.*, 1996; Lee *et al.*, 1998; Kopanakis *et al.*, 1999) of eight analysed life cycles consider human resources as vital and include or mention them in their life cycle description or diagrams. The following human resources were mentioned:

- Data Miner (Ganesh *et al.*, 1996)
- Data Analyst (Ganesh *et al.*, 1996)
- Knowledge Engineer (Kopanakis *et al.*, 1999)
- Domain Experts (Lee *et al.*, 1998)

After consulting various general systems development literatures (Hoffer *et al.*, 2001; Whitten *et al.*, 2001), indications that data mining projects require more qualified and specialised personnel covering the various aspects and skill requirements arising during a data mining project became more obvious. The following human resources have been identified as necessary to approach and implement a data mining project successfully. All identified human resources have been taken from Ganesh *et al.* (1996), Lee *et al.* (1998), Kopanakis *et al.* (1999), Berry *et al.* (1997), Hoffer *et al.* (2001), and Whitten *et al.* (2001):

- Business Analyst
- Data Analyst
- Data Engineer
- Domain Expert
- Data Miner
- Knowledge Engineer
- Strategic Manager
- Project Manager

The following paragraph will describe why these skill groups are considered as crucial for the success of a data mining project and what their tasks throughout the project are:

- The business analyst is responsible to understand the business aspects and plays the major role in generating the hypotheses or objectives in cooperation with the data analyst, domain expert, and the strategic manager. Whitten *et al.* (2001) defines the business analyst as “...a business analyst is a systems analyst that specialises in business problem analysis and technology-independent requirements analysis...”. The business analyst also evaluates the data mining result and qualifies its relevance to and impacts on the current or future business situation.
- A data analyst is someone who analyses database requirements and designs and constructs corresponding databases (Whitten *et al.*, 2001). The data analyst is responsible for the data understanding process and plays the other major role in building the hypotheses or objectives in cooperation with the business analyst, domain expert, and strategic manager.
- Data engineers are computer professionals trained to elicit knowledge from domain experts (Hoffer *et al.*, 1996) and their responsibilities are based on a specialised body of knowledge (Whitten *et al.*, 2001). They are responsible for the entire data preparation stage. The inputs to the hypotheses or objectives. The data analyst will help and guide the data engineer through this task.
- A domain expert is a subject matter expert with relevant background, experience, or expertise in specific subjects. These can include individuals in research, academia, government, industry, or non-profit institutions (Wong, 1999). In many cases these 'experts' will be locally active individuals with indigenous knowledge of their communities, environment and cultures (Wong, 1999; Knublauch, 2002). Knublauch (2002) further says that the domain expert works closely with the knowledge engineer.
- The data miner is responsible for the generation of the data mining algorithm or model. It is also necessary to forward all requirements to the data engineer. Briefly, a data miner needs to know more than just database technology or statistics to perform efficiently. Data mining requires knowledge in the areas such as

database/data warehousing, domain expertise, statistics, and business processes (Luan, 2002; Mitkas, 2002).

- The knowledge engineer plays a critical role in ensuring that knowledge is not only obtained, but also represented and structured for optimal use and re-use (Brasza, 2000). The knowledge engineer is further responsible for storing, extracting and maintaining information and knowledge kept on the IKR. He/she contributes indirectly to the hypotheses or objectives generation and to the evaluation process.
- The strategic manager or planner is mostly concerned with crystallising the strategic issues that ought to be addressed (Thompson *et al.*, 2001). Thompson *et al.* (2001) further add the responsibilities of providing data, conducting studies of industry and competitive conditions and to developing assessments of strategic performance. The strategic manager is mainly concerned with the evaluation and deployment of the results but also plays a minor role during the definition stage of the hypotheses or objectives. Knowing the business and its parameters extensively, the impact of the results and their deployment has to be evaluated by the strategic manager or planner.
- The project manager's responsibility is to define, plan, direct, monitor, organise, staff, and control a project to develop an acceptable system (Hoffer *et al.*, 1996; Whiten *et al.*, 2001) and to execute a data mining project within the prearranged budget and time. He/she also supervises and controls all processes and interactions between the other human resources. The tasks comply with the general tasks of a project manager.

The human resource involvement diagram shown in Figure 3 has been developed as an aid to understand the involvement of the various human resources throughout a data mining project. It uses the following four symbols which are also shown in the associated legend:

Oval circle represents an entity and in this case the human resource that contributes to the tasks that have to be carried out throughout a process. There are seven different human resources shown in the diagram. The project manager is not included in the diagram as he/she supervises the entire project and is involved at least indirectly in every process execution. The subdivided squares represent a process. There are only 6 processes in this diagram summarising the 9 processes identified in the DMLC. The arrows indicate the involvement of the human resources and the data or information flows. The two parallel lines symbolise the data stores. Two different data stores are used throughout the diagram.

5.4.1 Human resource interaction and process matrices

Table 3 is an indirect deliverable from the diagram shown in Figure 3. It shows the interaction between the various human resources required throughout the data mining project. The two-dimensional matrix shows these human resources on the vertical as well as on the horizontal axis. The tick simply indicates that there is an interaction throughout the project, whereas no tick means the opposite – there is no direct or important interaction between the human resources. The matrix should assist in managing the project and also to ensure correct communication between the according parties.

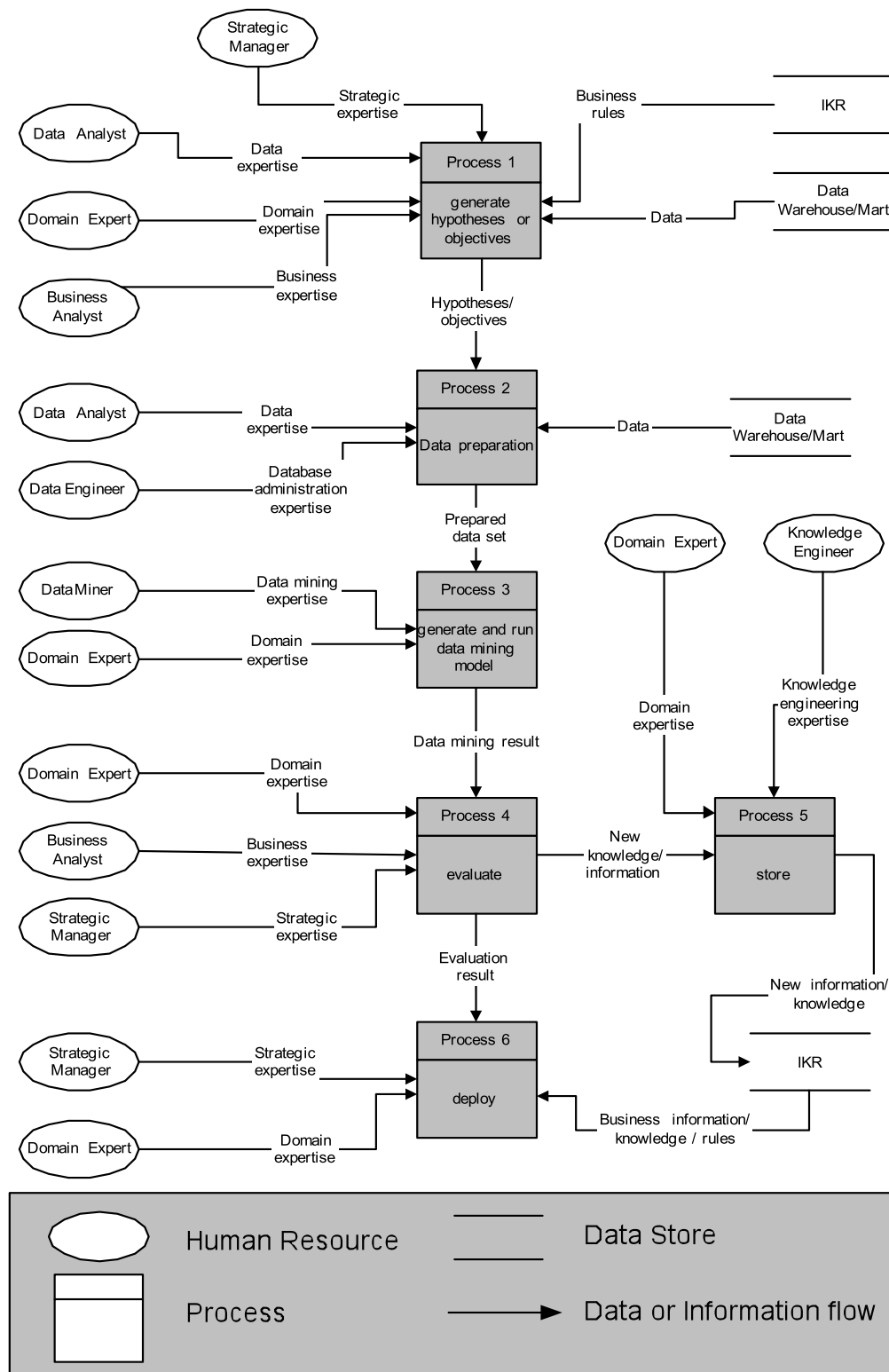


Figure 2: Human Resource Involvement Diagram

Table 3: Human resource interaction Matrix

	Business Analyst	Data Analyst	Data Engineer	Domain Expert	Data Miner	Knowledge engineer	Strategic Manager	Project manager
Business Analyst		✓		✓			✓	✓
Data Analyst	✓		✓	✓			✓	✓
Data Engineer								✓
Domain Expert	✓	✓			✓		✓	✓
Data Miner				✓				✓
Knowledge engineer	✓			✓				✓
Strategic Manager	✓	✓		✓				✓
Project Manager	✓	✓	✓	✓	✓	✓	✓	

Table 4 shows a matrix mapping the various human resources to the processes used in the data mining life cycle. This table should be seen as an addition to Figure 2.

After analysing the human resources involved and going through the steps of the data mining life cycle the following matrix emerged. The matrix (Table 4) maps the involvement of the human resources to the life cycle processes.

Table 4: Life Cycle Process – Human Resource Matrix

		Human Resources							
		Business Analyst	Data Analyst	Data Engineer	Domain Expert	Data Miner	Knowledge engineer	Strategic Manager	Project manager
Life Cycle Processes	Business Understanding	✓	✓		✓			✓	✓
	Data Understanding	✓	✓		✓			✓	✓
	Hypotheses/Objectives	✓	✓		✓			✓	✓
	Select/Sample		✓	✓					✓
	Pre-process		✓	✓					✓
	Transformation		✓	✓					✓
	Data Mining				✓	✓			✓
	Evaluation	✓			✓		✓	✓	✓
	Deployment				✓			✓	✓

5.5 Data Source

The data source has to be clearly identified. Many authors are unclear what the actual data source for a data mining project should be. Some say that any data store is sufficient to carry out the analysis (Fayyad *et al.*, 1996a; Lee and Kerschberg, 1998), others do not even mention this issue throughout their life cycle (Collier *et al.*, 1998b; CRISP-DM, 2000). On the other hand, many authors explicitly state the necessity to have a data warehouse (Ganesh *et al.*, 1996; Feldens, 1998; Kopanakis and Theodoulidis, 1999).

We believe that any semi-structured source of data is more or less sufficient to carry out data mining operations (Hofmann *et al.*, 2003). However, to ensure and enhance the level of quality in the anticipated results the data should be pre-processed and put into structured form, which usually complies with the characteristics of at least a small data mart or a data warehouse (Hofmann *et al.*, 2003). Data warehouses and data marts are inevitable data sources for larger data mining projects (Inmon, 1996; Kimball *et al.*, 1998; Turban and Aronson, 2001).

The issue of storing space and technology where newly gained information and knowledge will be kept is one of the most important issues of the data mining life cycle. An information knowledge repository (IKR) is a collection of both internal and external knowledge and is generally stored on a relational database in a way that enables efficient storing (Turban and Aronson, 2001). Turban and Aronson (2001) further state that the scope of the knowledge repository mainly depends on the type of knowledge that has to be stored. A brief overview will describe the three basic types of repositories found in practice (Davenport *et al.*, 1998):

- External knowledge, such as competitive intelligence, which generally needs explanations and interpretation.
- Structured internal knowledge, such as research reports, presentations, and marketing materials, which is mostly explicit knowledge with some tacit knowledge.
- Informal internal knowledge, such as discussion databases, help desk repositories, and shared information databases.

The importance of creating and maintaining an information or knowledge repository has been identified. The term metadata for the repository is purposely circumvented since metadata is already present and used in relation to the data source. In practice both logical data stores can of course be kept in the same data warehouse (Lee and Kerschberg, 1998). Metadata is according to Kimball *et al.* (1998) all of the information in the data warehouse environment that is not the actual data itself. Metadata describes the data being investigated on the semantic, structural, statistical, and physical level in order to support tasks such as data validation and imputation, selection and application of data mining methods, and interpretation of the results (Klösger, 2002b). Only Lee and Kerschberg (1998) mention the usage of an information and knowledge repository and insist on storing the newly gained information and knowledge.

5.6 Starting and Ending Point

A definite starting point is as important as a definite ending point of an individual cycle as well as numerous cycles (when iteration becomes necessary). Although most of the

analysed life cycles have a starting point as well as an ending point, it is often not clear where the cycle actually begins and even more importantly when and where the end of the cycle has been reached. Lee and Kerschberg (1998) have neither, which leads to more confusion than actual guidance throughout the data mining project. The only three life cycles where the ending point is chosen are Collier *et al.* (1998), CRISP-DM (2000) and Feldens (1998). However, in all three cases the ending point is defined as a process, which automatically means that data, information, or knowledge are getting lost. The authors believe that the ending point has to be a data store in order to store the outcome of the last process and to build an improved platform for the processes that access this data store throughout the life cycle. More important than simply having a starting and ending point is the placement of the two such important milestones. Where should the project begin and where does the life cycle finally end or lead back into the starting point? This is a very important question. Two different ways have been analysed:

- The life cycle starts with the data source which then has to be further processed (Fayyad *et al.*, 1996a; Ganesh *et al.*, 1996; Feldens, 1998; Kopanakis and Theodoulidis, 1999)
- The starting point is equivalent to the first process of the life cycle (Collier *et al.*, 1998b; CRISP-DM, 2000)

The authors believe that the first process should indicate the starting point since the data source (as the word source indicates) should only be used as the basis of the life cycle – the initial input. The data source should therefore be in a stage where data can be extracted, fulfilling the requirements of the initial data mining processes. After determining the starting point (the first process), the life cycle has to clearly indicate where the loop is closed or where the life cycle finally ends.

5.7 Categorisation of Processes into Stages

Categorised processes add to the understandability and task cooperation as well as distribution. Kopanakis and Theodoulidis (1999) were the only authors who subcategorised their processes. The authors believe that this helps to understand the life cycle significantly since individual categorisations can be analysed separately. Feldens (1998) says that every data mining life cycle consists of 3 separate stages which are ‘pre-processing’, ‘data mining’, and ‘post-processing’. The authors agree with that statement, but disagree with the terminology. The separation will also help in setting milestones and assigning human resources to various tasks within the process or categorisation. In larger data mining projects different managers can be assigned to be responsible for the various processes in one subcategory.

5.8 Iteration

The iteration of the life cycle should include the option to iterate through inner loops as well as to iterate the entire life cycle. Inner loops are necessary to get a data mining result correct without going through processes that remain unchanged. For example the data selection or data mining algorithm may change throughout a project whereas the hypothesis or objective remain the same. Often more than one iteration is necessary to achieve the anticipated result and to prove or disprove the hypothesis or objective (Klösigen, 2002a). The feature ‘forward skipping’ is when certain processes can be skipped throughout the data mining projects. This has been defined by the authors as a disadvantage and will therefore not be supported in the new DMLC. A sequential flow

will be present at any given time in order to contribute to the transparency and comprehensiveness of the life cycle.

5.9 Quality

The quality of the life cycle and its outcome is seen as one of the most important objectives. Most authors forget about quality assurance and therefore minimise the usefulness of the result or outcome. According to Fitzpatrick (1996) quality is the “...extent to which an industry-defined set of desirable features are incorporated into a product...”. To introduce quality into a life cycle is rather difficult since the quality of the outcome is determined by the handling of the activities within the processes. However, a good data and process flow between the various processes controlled by the suitable skill group can considerably improve the quality of the outcome. Since all processes are dependent on their deliverables, the quality of these deliverables is crucial to the quality and therefore the success of the project. In order to ensure the quality of the deliverables a methodology was introduced that ensures the successful completion of each process and thus the complete data mining life cycle. The methodology is a variation of the Plan Do Check Act cycle (PDCA Cycle) which is also known as the Deming Cycle (Deming, 2000). Although this control circle is usually used on a larger scope such as entire projects rather than individual processes, the PDCA methodology is very suitable to control each of the processes. The methodology is also used by ISO 12207 which is the industry standard for software development life cycles (ISO, 2000). Other overall objectives in creating the life cycle are to fulfil the following characteristics:

- Industry neutral (CRISP-DM, 2000): The aim is to develop a generic life cycle that applies to all industries. This is seen as an advantage since the life cycle has to incorporate issues applying to all industries whereas an industry specific life cycle might not include aspects necessary for data mining projects of neighbouring industries.
- Application neutral (CRISP-DM, 2000): The aim is to create a generic life cycle that applies to all applications used for the execution of the data mining project. The same advantage applies as mentioned above: since the life cycle aims to be application neutral, it has to incorporate all issues no matter what application(s) are used to carry out the project.
- Tool neutral (CRISP-DM, 2000): The aim is to create a tool neutral life cycle that incorporates all issues irrespective of the tools used to execute the data mining project.
- Easy to comprehend: The comprehensibility of the life cycle is vital. The user should be able to apply the life cycle to the data mining problem type without having to do much background reading. Again, the life cycle must not be seen as a methodology and does not act as a detailed step-by-step guide to carry out a data mining project. It is rather to set the cornerstones and the data or process flows between these. Even users who have a general IT understanding but not a specific knowledge about data mining should be able to comprehend the life cycle.

This section examined the guidelines determined in the life cycle analysis and gave a detailed description of what the DMLC has been based on.

6 Conclusions

The exploration and classification of eight life cycles built the foundation of the Data Mining Life Cycle (DMLC). The life cycles have been qualified for their usage and suitability for implementing data mining projects. This analysis led to the guidelines for the design and development of the DMLC. The advantages, disadvantages and characteristics of each life cycle contributed significantly to the overall outcome.

The definition and visualisation of the involvement of human resources and their skill groups in a data mining project contributed to the completeness and comprehensiveness of the DMLC. The DMLC aims to be process, people and data focused. The development phases of a generic data mining life cycle were the core part of this paper. The final version of the DMLC was built on various guidelines that were derived from an extensive life cycle analysis. Characteristics, advantages and disadvantages were the foundations of these guidelines.

The data aspect introduced the Information and Knowledge Repository (IKR) which stores all analysis findings as well as business rules and requirements. The data flow as well as the data content is different to that seen by other authors. Only Lee and Kerschberg (1998) introduced a repository which is, however, mainly focused on database and data warehouse information and not on the actual discovered knowledge and therefore the business knowledge. The life cycle is built and based on data warehouses or data marts, which ensure better data integrity and quality than OLTP systems.

The processes as well as the process flows are more comprehensive and complete than generally displayed in other life cycles as identified throughout the paper. This is in accordance with the PDCA methodology, which ensures the quality of each process and therefore the overall quality from a process point of view.

To see the data mining life cycle from a human resource point of view contributes considerably to the DMLC as well as to the present body of knowledge. The listing of all skill groups involved in a general data mining project indicates the multi-disciplinary nature of such projects.

The main contribution however is the product of these three aspects – the complete life cycle, which shows the interactions of the three aspects as well as all other features. The DMLC consists of nine different processes, various iteration possibilities, two different data sources, eight different skill groups, and a methodology that ensures the successful completion of each life cycle (PDCA).

It is believed that the life cycle can contribute significantly to data mining projects when applied correctly. Project management is a key success factor to ensure the expected outcome with a predefined budget. The DMLC and its underlying methodology focuses on all areas arising throughout a data mining project and can contribute to managing complexity, is able to improve project outcome and is therefore an information technology tool that can be used successfully to improve strategic management.

References

- Collier, K. *et al.* (1998a) 'A Perspective on Data Mining', Centre for Data Insight, Northern Arizona University, USA, pp 2-4.
- Collier, K. *et al.* (1998b) 'A Perspective on Data Mining', Centre for Data Insight, Northern Arizona University, USA, pp 4-5.
- CRISP-DM (2000) – 'CRISP-DM 1.0 – Step by Step data mining guide', CRISP-DM Consortium.
- Davenport, T. H. and Prusak, L. (1998) *Working knowledge: How Organizations Manage What They Know*, Harvard Business School Press, Boston, USA.
- Deming, W. E. (2000) *Out of Crisis*, Massachusetts Institute of Technology, Centre for Advanced Engineering Study, MIT Press, Cambridge, MA, USA.
- Fayyad, U., Piatetsky-Shapiro, G. and Smyth, P. (1996a) 'Knowledge Discovery and Data Mining: Towards a Unifying Framework', *Proceedings of the Second International Conference on Knowledge Discovery and Data Mining (KDD-96)*, AAAI Press, USA.
- Fayyad, U., Piatetsky-Shapiro, G. and Smyth, P. (1996b) 'From Data Mining to Knowledge Discovery: An Overview', *Advances in Knowledge Discovery and Data Mining*, AAAI Press, USA.
- Feldens, M. (1998) 'Towards a Methodology for the Discovery of Useful Knowledge – Combining Data Mining, Data Warehousing and Visualization', CNPq/Protem-cc Fase III (SIDI Project), Universidade Federal do Rio Grande do Sul, Brazil.
- Fitzpatrick, R. (1996) 'Software Quality: Definitions and Strategic Issues', Staffordshire University, School of Computing Report.
- Ganesh, M. *et al.* (1996) 'Visual Data Mining: Framework and Algorithm Development', Department of Computing and Information Sciences, University of Minnesota, MN, USA.
- Hofmann, M. and Tierney, B. (2003) 'The Involvement of Human Resources in Large Scale Data Mining Projects', *International Symposium on Information and Communication Technologies*, Dublin, Ireland.
- Hofmann, M., O'Mahony, M. and Tierney, B. (2003) 'A Framework to Utilise Urban Bus Data for Advanced Data Analysis', *10th World Congress on Intelligent Transport Systems*, Madrid, Spain.
- Inmon, W. H. (1996) *Building the Data Warehouse* (2nd edn), John Wiley & Sons, Inc., New York, USA.
- Inmon, W. H. (2002) *Building the Data Warehouse* (3rd edn), John Wiley & Sons, Inc., New York, USA.
- ISO (1998) 'Information technology – Guide for ISO/IEC 12207 (Software Life Cycle Processes)', Technical Report, ISO/IEC TR 15271.
- Kimball, R., Reeves, L., Ross, M. and Thornthwaite, W. (1998) *The Data Warehouse Life-cycle Toolkit*, John Wiley & Sons, Inc., New York, USA.
- Klösgen, W. (2002a) 'Data Mining Tasks and Methods – Change Analysis', In Klösgen, W. and Zytkow, J. M. (eds), *Handbook of Data Mining and Knowledge Discovery*, Oxford University Press, New York, USA, pp. 361-364.
- Klösgen, W. (2002b) 'Types and Forms of Data', In Klösgen, W. and Zytkow, J. M. (eds), *Handbook of Data Mining and Knowledge Discovery*, Oxford University Press, New York, USA, pp. 33-44.
- Koppanakis, I. and Theodoulidis, B. (1999) 'Visual Data Mining & Modeling Techniques', Centre of Research in Information Management (CRIM), Department of Computation, University of Manchester Institute of Science and Technology, UK.
- Lee S. W. and Kerschberg, L. (1998) 'A Methodology and Life Cycle Model for Data Mining and Knowledge Discovery in Precision Agriculture', *Conference Proceedings of the IEEE International Conference on Systems, Man, and Cybernetics*, IEEE Computer Society Press, pp. 2882-2887, San Diego, CA, USA.
- Simoff, S. and Maher, M. L. (1998) 'Analyzing Participation in Collaborative Design Environments', Key Centre of Design Computing, University of Sydney, NSW, Australia.
- Simoudis, E. (1998) *Discovering Data Mining*, foreword in Cabena, P *et al.*, Upper Saddle River, Prentice Hall PTR, New Jersey, USA.
- Turban, E. and Aronson, J. (2001) *Decision Support Systems and Intelligent Systems* (6th edn), Prentice-Hall, New Jersey, USA.

Creating access to education with progression pathways via blended learning of Deaf Studies at third level in Ireland: Open innovation with digital assets

Brian Nolan ¹, Lorraine Leeson ²

¹ Institute of Technology, Blanchardstown, Dublin IRELAND

² Trinity College Dublin (University of Dublin) IRELAND

brian.nolan@itb.ie, leesonl@tcd.ie

Abstract

Irish Sign Language (ISL) is an indigenous language of Ireland and is recognized by the EU as a natural language. It is a language separate from the other languages used in Ireland, including Irish, English and, in Northern Ireland, British Sign Language. Some 6,500 Deaf people use ISL on the island of Ireland. Deaf people are the most under-represented of all disadvantaged groups at third level, posing two challenges: (1) getting Deaf people into third level and (2) presenting education in an accessible form. Two higher education institutions, Trinity College Dublin (TCD) and the Institute of Technology, Blanchardstown, Dublin (ITB) have partnered to create a unique elearning environment based on MOODLE as the learning management system, in the delivery of Deaf Studies programmes at TCD. We intend to create access to education plus the provision of progression pathways into and through third level in the Irish National Quality Framework within the European Bologna model. We deliver third level programmes to students online to resolve problems of time, geography and access, maximizing multi-functional uses of digital assets across our programmes. Signed languages are visual-gestural languages and online content is required to be multi-modal in nature and utilize rich-media learning objects. This presents many important challenges, including (1) Universal design in an online curriculum for Deaf students, (2) Assessing signed language interpreting skill in an online context, (3) Using the Signs of Ireland corpus in blended learning contexts in a MOODLE environment and (4) Issues of assessment in an elearning context. In this paper, we introduce the Irish Deaf community and their language; the educational context that leads to disadvantage and negative outcomes in employment and our work to date in developing accessible elearning with progression pathways for Deaf Studies programmes at TCD.

Keywords: Elearning, Deaf Studies, Strategic Innovation Fund, Irish Sign Language, Accessibility, Progression pathways, Inter-institutional collaboration, educational innovation.

1. Background

This paper outlines the establishment and development of blended learning at two partnered institutions in Ireland, namely Trinity College Dublin (TCD) and the Institute of Technology, Blanchardstown (ITB). This paper focuses on the creation of a unique elearning environment delivered on the learning management system, MOODLE, for the delivery of Deaf Studies programmes at TCD. We will describe how we deliver third level programmes to students online to resolve problems of time, geography and access, maximizing multi-functional uses of digital assets across our programmes, and outline work in progress to maximize the “Deaf-friendliness” of blended learning delivery for Deaf and hard of hearing students. We also touch on how this innovative engagement feeds into our wider agenda for innovation in Deaf Studies in Ireland, supported by the Higher Education Authority’s Strategic Innovation Fund and supported by the mission imperative of ITB. We provide a context to the situation of Deaf people in Ireland, and introduce Irish Sign Language and the Signs of Ireland corpus.

In this regard, in particular, the mission of the Institute of Technology Blanchardstown is to achieve consistently high standards of relevance and quality in teaching, research, development and consultancy, and offer a welcoming and supportive environment to students from all educational and social backgrounds, and to adults wishing to increase their level of technical skills. ITB is providing flexible third-level programmes designed to meet regional and national

requirements with an emphasis on specialist higher education for leading-edge industries in the region, upgrading of specialist technical/technological skills, continuing education and the needs of mature students, in-service courses, retraining and updating of skills, special needs arising from educational disadvantage or disability. The Institute is committed to lifelong learning and access to third-level education. The learning strategy of the Institute is aimed at guiding students towards the levels of knowledge and skills acquisition for an evolving working life. Inherent in this approach is the essential attitudinal development for increasing motivation and for promoting self-management, critical analysis, decision-making, problem solving and entrepreneurship.

2. The Deaf Community

Deaf signed language users form Deaf communities that have identifiable cultural and behavioural norms which include use of a shared (signed) language (though signed languages differ from territory to territory), similar educational experiences (which we describe further below), endogamous marriage patterns, close community ties, and a strong sense of communion with other Deaf people in other countries (see Ladd 2003, Matthews 1996, Lane, Hoffmeister and Bahan 1996). This differentiates them from non-signed language users, including those who are hard of hearing or who become deafened post-lingually, but who use spoken language as their preferred means of interaction. Approximately 1 person in a 1000 is a signed language user (Johnston 2004, Conama 2008), which suggests that there are some 490,426 Deaf signed language users in the EU. In Ireland, there are approximately 5,000 Irish Sign Language users in the Republic (Matthews 1996) and an approximate 1,500 ISL users in Northern Ireland. Only 5-10% of deaf children are born to Deaf parents, which means that for the majority, the acquisition of a signed language does not follow a normative path. That is, deaf children with Deaf parents, acquire signed language in a natural way, following the same general milestones that hold for hearing children acquiring a spoken language. For the majority of deaf children, the acquisition of signed language is bootstrapped on “home sign” use – a highly idiosyncratic and systemised use of gesture developed in individual hearing families to bridge the language gap - with fully grammatical signed language use developing only when a deaf child comes in contact with other deaf children and adults (see Goldin-Meadow 2003 for detailed description of this process).

Deaf people across Europe share a history of linguistic suppression, ‘normalisation’, and oppression. Since the 1880s, across the western world, signed languages have been suppressed in education, with significant negative educational outcomes for Deaf people, including functional illiteracy levels for averagely intelligent Deaf people in the majority language of their country (see Conrad 1979, EUD Update March 2001, Kyle and Allsop 1997, Ladd 2003, Lane 1984, Leeson 2006, 2007). Part of the reason for this is the fact that in many states, including Ireland, teachers of the deaf are not required to know or use a signed language in their work and are often still actively discouraged from signing (Leeson 2006). Deaf children too have been actively discouraged from signing, or even punished for using signed languages: in Ireland, for example, children were forced to sit on their hands to prevent signing and encouraged to give up the use of signed language for Lent, the Catholic period of preparation for Easter, while parents were advised (incorrectly) that use of a signed language would impede acquisition of oral language skills (e.g. McDonnell and Saunders 1993, Leeson and Grehan 2004, Leeson 2006, Leeson 2007). In some countries, eugenics movements targeted Deaf people, leading to forced sterilisation (Biesold 1999), while the implementation of widespread cochlear implantation programmes coupled with genetic selection technologies (Johnston 2004), the closure of many schools for the deaf and the trend towards mainstream education (which impacts on use and trans-generational transfer of signed language and cultural norms) has been tagged “linguistic genocide” (Skutnabb-Kangas 2000).

The fact that signed languages are still not considered official languages in many countries, including Ireland, with Deaf people considered as disabled rather than as members of a

linguistic minority community, conspires to mark Deaf people as a disadvantaged minority in Europe (Timmermans 2005, Krausnecker 2001). Signed languages are recognized as “real” natural languages worthy of protection by international organisations however: the European Parliament (1988, 1998) has passed 2 resolutions on signed languages while in 2003 the Council of Europe’s parliamentary assembly passed a resolution calling for the protection of signed languages (Leeson 2004, Timmermans 2005). UN documents also recognise the value of signed languages: both UNESCO’s Salamanca Statement (1994) and the UN Convention on the Rights of Persons with a Disability (2006) call for the use of signed languages in education.

2.1 Deaf communities in Europe as educationally disadvantaged

The fact that signed languages are not formally recognised, and in many EU countries, not actively used or encouraged in education limits educational attainment for Deaf children. In countries where signed languages are not included in national curricula, and where children are still expected to learn via lip-reading (“oral education”), the average reading age for Deaf school leavers is comparable to that of an 8-9 year old hearing child (Conrad 1979, Leeson 2006, 2007).

	Total d/hh students 2004/2005 (O'Shea)	Total d/hh students 2006/2007 (Mathews)	Change in d/hh from 2004 to 2007	Total students with disability 2006/2007	Percentage of d/hh of total students with disabilities 2006/2007
NUI Galway	19	16	-3	265	6.03 %
Trinity College Dublin	36	39	+3	400	9.75%
University College Dublin	23	21	-2	374	5.61%
University College Cork	27	29	+2	430	6.74%
University of Limerick	4	6	+2	280	2.14 %
Dublin City University	5	6	+1	142	4.23%
NUI Maynooth	No data given	11	Not available	172	6.40 %
Total	114	128	+3	2063	6.20%

Table 1: Deaf and Hard of Hearing Students in Universities in Ireland (Leeson 2007)

While figures for participation at tertiary level are not available on a European level, we know that Deaf students are severely under-represented (EUD Update 2001, Kyle and Allsop 1997). In an Irish context, Deaf and hard of hearing students (*d/hh*) are amongst the most under-represented categories of students, making up just 2% of the student population (consider that 1 in 7 of the population has a hearing loss of some kind). Table 1 provides an overview of the most recent statistics available regarding the Irish situation.

In an increasingly globalised world, where literacy is key to full participation, educational progression and employment success, the barriers to participation in education for Deaf sign language users represent a challenge to our assumption that a meaningful education is available as a right to all EU citizens in the 21st century. In this context, elearning is a tool for greater equalisation of opportunity for Deaf people generally, and Irish people specifically, insofar as we can harness the potential for streaming video content in signed languages, with associated text-based content in an accessible manner. Providing training in an appropriate language (i.e. a signed language), with associated on-line supports (e.g. online tutorials) and assessment is a significant step in the direction of facilitating access to third level programmes for Deaf people.

2.2 Irish Sign Language (ISL) and the Signs of Ireland (SOI) corpus

Irish Sign Language is an indigenous language of Ireland. It is used by some 5,000 Irish Deaf people as their preferred language (Matthews 1996) while it is estimated that some 50,000 non-Deaf people also know and use the language to a greater or lesser extent (Leeson 2001). While ISL is not officially recognized by the Irish government, it has *de facto* recognition given the range of provisions made for criminal proceedings for Deaf defendants and witnesses (Leeson 2004) and the range of educational supports in place to facilitate deaf and hard of hearing students at tertiary level such as signed language interpreting, note-taking and reading support. ISL (along with British Sign Language) is recognized in Northern Ireland (by the British government). The complexity of the ISL data in the Signs of Ireland Corpus, captured in ELAN (and which is available for analysis by students and researchers), is evidenced in Figure 1.

In terms of their production, signed languages are articulated in three dimensional space, using not only the hands and arms, but also the head, shoulders, torso, eyes, eye-brows, nose, mouth and chin to express meaning (e.g. Klima and Bellugi 1979 for American Sign Language (ASL); Kyle and Woll 1985, and Sutton-Spence and Woll 1999 for British Sign Language (BSL); and McDonnell 1996; Leeson 2001; O'Baoill and Matthews 2000 for Irish Sign Language (ISL)). This complexity leads to highly complex, multi-linear, potentially dependent tiers that need to be coded and time-aligned when signed languages are captured, stored, annotated and analysed electronically. As with spoken languages, the influence of gesture on signed languages has begun to be explored (Armstrong, Stokoe and Wilcox 1995, Stokoe 2001; Vermeerbergen and Demey (2007)), while discussion about what is linguistic and what is extra-linguistic in the grammars of various signed languages continues (e.g. Engberg-Pedersen 1993, Liddell 2003, Schembri 2003).

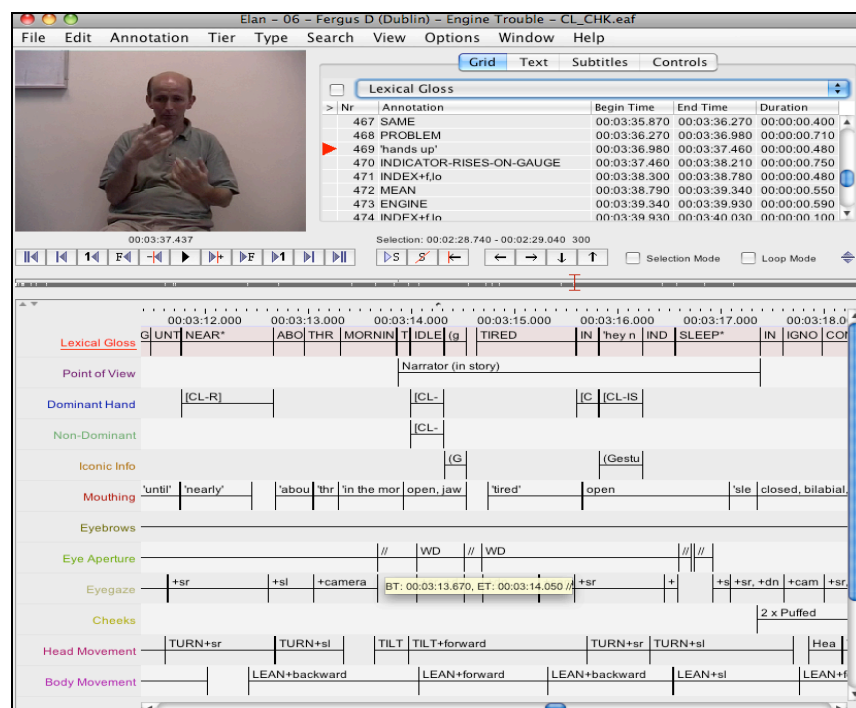


Figure 1: A screenshot from the Signs of Ireland corpus

While these remain theoretical notions at a certain level, decisions regarding how one views such elements and their role as linguistic or extra-linguistic constituents plays an important role when determining what will be included or excluded in an annotated corpus, such as the Signs of Ireland (SOI) corpus, which forms part of the Languages of Ireland programme at the School of Linguistic, Speech and Communication Sciences, TCD and comprises data from 40 Deaf Irish Sign Language (ISL) users across Ireland.

Thus, decisions about linguistic description also determine how ISL items are notated, particularly in the absence of a written form for the language being described. This in turn is a pre-cursor for any follow on work that makes use of these and other signed language digital learning objects in elearning contexts.

3. Innovation in support of a blended learning context

The Signs of Ireland corpus has been piloted in blended learning at the Centre for Deaf Studies with increasing sophistication since 2006-7 (Nolan & Leeson 2009a, 2009b). Today it features in Irish Sign Language courses, introductory courses on the linguistics and sociolinguistics of Irish Sign Language, and a course that focuses on aspects of translation theory and interpreting research (TIPP). From September 2009, it will be at the heart of our new Bachelor in Deaf Studies programme, a four year pathway with specialisation in ISL/English interpreting and ISL teaching. At present the corpus exists on each client-side computer. Students are provided with training in how to use ELAN in order to maximize use of the corpus. The implications of this are that students must be able to access the corpus in a lab, presenting a challenge for blended learning delivery where students require Internet access to the corpus. We also use the corpus as part of the continuous assessment of students in our Introduction to the Linguistics and Sociolinguistics of Signed Languages course. For example, students are required to engage with the corpus to identify frequency patterns, distribution of specific grammatical or sociolinguistic features (e.g. lexical variation) and to draw on the corpus in preparing end of year essays. In the Translation and Interpreting: Philosophy and Practice course, students engage with the corpus to explore issues of collocational norms for ISL, look at the distribution of discourse features and features such as metaphor and idiomatic expression (See Leeson 2008 for further discussion).

Beyond the corpus, the challenge of creating “Deaf-friendly” academic content, which can facilitate blended learning more generally, is one we are tackling head on. Amongst the work in progress is work on digitizing a first year course on Deaf history, culture and the experiences of being deaf, Perspectives in Deafness, and delivering content in with some spoken/written materials to support learning for deaf and non-deaf students. This also creates challenges in terms of data protection legislation, distribution, copyright and general access issues that need to be resolved as we move forward. For example, subsets of the data are already used as digital learning objects, but no decision has yet been made regarding what would constitute an optimal management and deployment of the corpus. We will need to learn from the use of the materials in a live context with students, from September 2009, and make decisions accordingly. We have developed assessments to Council of Europe Common European Framework of Reference level B1 (productive/ expressive skill) and B2 (receptive/ comprehension skill) level for ISL. This includes a receptive skills test, which includes multiple choice questions linked to data taken from the Signs of Ireland corpus. The corpus data sits amid other test items, a sample of which is outlined in Table (2).

Test Item	Domain	Duration	Test Format
Multiple Statements	Life Experience	1 1/2 minutes video (10 minutes)	1. Visual images (10 items)
The Deaf Summer Camp (SOI)	Life Experience Travel Deaf Current Affairs	1 minute video (10 minutes total)	1. MCQ 2. Paraphrase 3. True/False Qs 4. Pen & paper (10 items)
“My Goals”	Ambitions Professional Focus	1 minute video (10 minutes total)	1. MCQ 2. Paraphrase 3. True/False Qs 4. Pen & paper (10 items)

Table 2: Sample ISL Receptive Test Using Digital Objects

Our work to date in moving towards online and blended learning in the area of Deaf Studies creates significant challenges in terms of data protection legislation, distribution, copyright and general access issues that need to be resolved as we move forward. For example, subsets of data from the Signs of Ireland corpus are already used as digital learning objects, but no decision has yet been made regarding optimal management and deployment of the corpus (or, for that matter, other digital learning objects). In our teaching and learning of Irish Sign Language, for example, we have developed assessments to Council of Europe Common European Framework of Reference levels B1 and B2 (independent users) for ISL and are working towards the development of digital learning objects that map onto levels C1 and C2 (proficient users). This includes receptive skills tests, which includes multiple choice questions linked to data taken from the Signs of Ireland corpus. Working with D-Signs project partners, these will be brought to a new level, allowing for interactive tests of (e.g.) student capacity for understanding how objects are placed in signing space (known as “placement” in sign language teaching and learning), whereby signs are mapped to real world or notional locations, a threshold concept for learning and using signed languages.

4. Leveraging digital learning objects

To optimally leverage the Signs of Ireland corpus within a learning environment, we have begun to determine what the actual functional requirements are with respect to how the application will be used by both students and academics in the blended learning context. At the moment, MOODLE is populated with a wide variety of modules delivered within the suite of CDS undergraduate programmes (Nolan & Leeson 2008). The Signs of Ireland digital corpus is tagged in ELAN. We have traditional classroom and blended delivery of content. We also have (in preparation) digital signed lecture content embedded in PowerPoint presentations and are in the process of developing digital ISL resources which will supplement and enrich the delivery of ISL courses in a variety of Deaf relevant ways. The present programme architecture is very vertical in orientation (Figure 3).

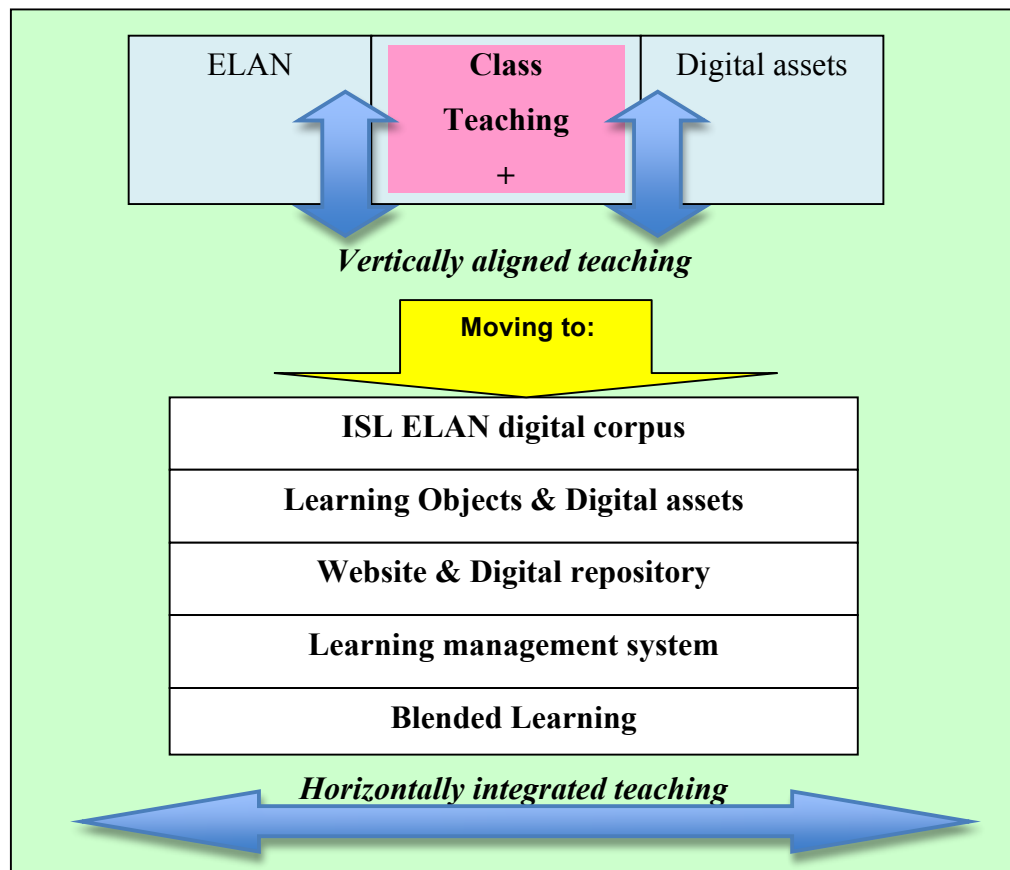


Figure 3: Our Model of Horizontally Integrated Teaching

The challenge is to achieve horizontal integration through the use of information technology, the Internet and a blended learning approach. In this regard, we apply universal design principles as best practice by design. Our understanding of what constitutes best practice here will be guided by feedback and direct interaction with the Deaf community, our researchers, instructional designers and academics, and of course, our students.

5. Framework for online signed language learning

We have also given much thought to the overall architecture and framework for moving forward. We are in the process of determining what profiling and other user related information we require to capture and tag data regarding the user environment and their interaction with the digital classroom and curriculum. Additionally, we are in progress with the analysis of (i) types of learning objects required for each lecture for each of the programme's modules and (ii) number and type of items, with the intention of making aspects of our blended learning Diplomas and Degrees available online from September 2009.

Our initial base assumption is that target client devices are browsers on Internet aware laptops and desktops.



Figure 4: A MOODLE Screenshot from the ITB hosted site

This assumption can be expected to evolve, over time, into mobile devices such as the Apple iPhone, iPod Touch and similar mobile and distributed computing appliances. This will deliver to us a plan for the capture and creation of the respective digital rich media that we intend to deploy within our learning objects. We are also keen to maximize quality by making use of high definition video capture data, and utilizing best practice guides for filming for Deaf audiences (in terms of background, lighting, quality, etc.) (Sheikh 2009, Hooper, Miller, Rose and Veletsianos 2007).

6. Issues of assessment in an elearning context

We are also developing an assessment model, based on best pedagogical practice as appropriate to our online blended learning environment. From there, as an integral part of our design phase, we will determine how to implement this online. We will need to link, in a principled and structured way, the assessments to the learning outcomes of individual modules, for example, An Introduction to the Linguistics and Sociolinguistics of Signed Languages, and to a particular lecture's thematic learning outcomes as appropriate. This is something supported by the Bologna Process. We also consider the effectiveness of the assessment with students in a blended learning situation, and the embedding of multimedia Problem Based Learning exercises within the elearning environment.

7. Moving forward with SIF II

Our Strategic Innovation Fund (SIF II) Deaf Studies project is scoped for a three-year window, which commenced in June 2008). A challenging year one plan has been created that will yield infrastructure changes, achievements and digital assets as well as the approval of a four year Bachelor in Deaf Studies (approved May 2009, due for roll-out in September 2009). We have completed an analysis phase to identify the learning objectives for all elements on the 4 year degree and, for some courses, have advanced our work to the point where themes (on a week-by-week basis) have been identified and aligned to learning objects and assessment frameworks. For example, week 1, lecture 1 has learning objectives LO1, LO2 and LO3, etc. Typically, this will broadly equate with a lecture plan that is rolled out over a semester (or

term). For example, the module ‘An Introduction to the Linguistics and Sociolinguistics of Signed Languages’ is delivered over two semesters totalling 24 weeks with 24 2-hour lectures over the academic year. We will need to make explicit the learning objectives of each of these lectures such that each objective may be supported by up to, say, four learning objects initially (Figure 5).

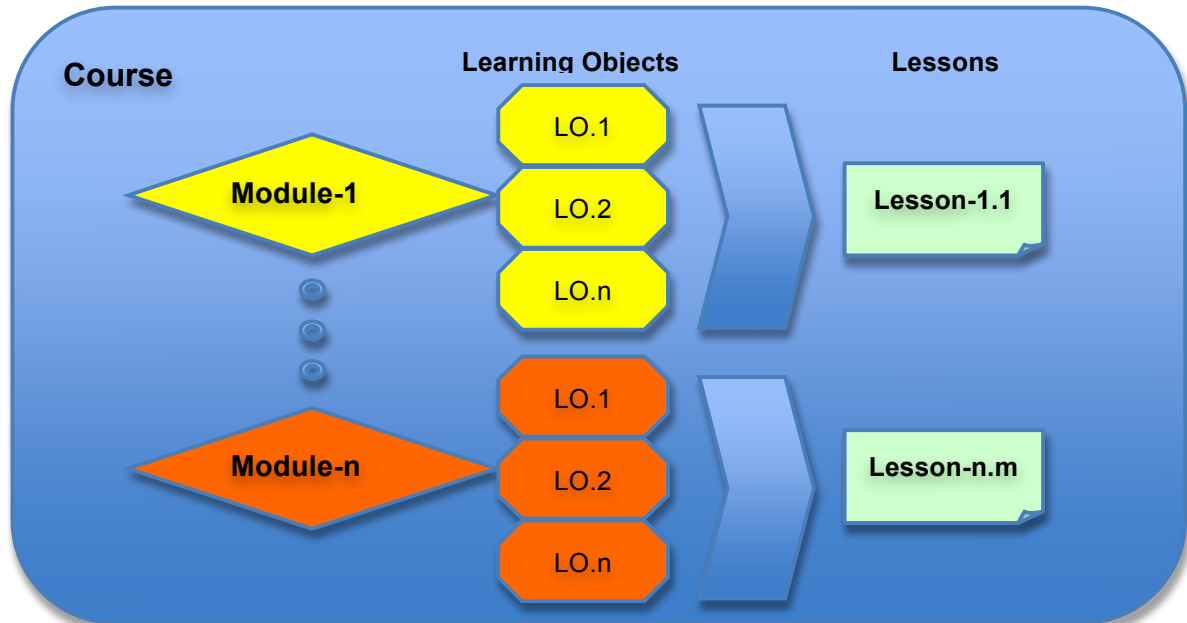


Figure 5: Learning object components as a unit within a module to support a lesson

These learning objects are expected to form a composite unit, but will be made up of different media types. A composite unit, therefore, will include the lecture notes (.pdf or .ppt), MOODLE quizzes and exercises, video data of signing interactions (in Macromedia Breeze/Adobe Connect, Apple QuickTime, Flash and/or other formats), and ELAN digital corpora. To make a composite unit, each learning object needs to be wrapped with proper tagging. This tagging will facilitate searches for these learning objects within a digital repository. We plan that this will be done for all modules across all weeks, across all four years of the Bachelor in Deaf Studies programme for courses delivered by CDS.

We will identify and implement appropriate assessment models for a blended learning delivery of signed language programmes. In addition to an assessment model, we need to devise a model for determining the overall effectiveness of the programme within the blended learning approach that will take a more holistic and pedagogical perspective to the programme objectives. Effectiveness key performance indicators will determine the answer to the question: Are we successful with this programme and how can we tell? Our project trajectory is towards a rollout of our blended learning programmes on a national basis, with the collection of longitudinal student performance information, with retention statistics, over the delivery years to determine the effectiveness of the efforts and the student benefit. Following from our initial trial period, and with a sufficiency of initial data, we will compare and contrast assessments with anonymous (but marked for age and social background, gender, hearing status, etc.) and start to compare longitudinal figures with the initial first year outputs for this blended programme. As this programme is to be modelled for a blended learning environment, we will need to build in a model of student support to include in an appropriate way, online college tutors, peer-learning and mentoring, in order to address any retention issues that may arise and provide the students with the ingredients of their learning success within a productive and engaging community of practice. We intend to create a website for this SIF II Deaf Studies Project with links to the learning management system/MOODLE, other technology platforms

including, for example, Flash, and the rich digital media assets as we determine to be useful in support of the teaching of Irish Sign Language within 3rd level education. We will also use this website to disseminate programmatic and research outcomes and other relevant information. We will address the technology related issues pertinent to the design and implementation of the framework for digital learning objects in a repository to facilitate access-retrieval, update, and search. We will determine the tagging standards that will operate across this. We have already piloted data in the Centre for Deaf Studies in Dublin from September 2008 as supplementary to traditional modes but plan a more integrated delivery of multimedia digital blended content in September. We will capture feedback from students and analyse this critically.

In terms of the human resources required to build the framework and create the digital assets for the full programme, and the appropriate skill-levels required, we have had setbacks as a result of the global economic situation, which resulted in a delay in funds made available via SIF II. Given this, we have had to significantly revise our initial plans to roll out our blended learning programme in three other institutions nationally, and our recruitment plan was affected. However, we have in place one SIF II funded Deaf academic who will manage many aspects of the SIF II work (notably, coordination of the Bachelor in Deaf Studies and participation in the digital data creation process) and have just recruited two PhD students, based at ITB, to work on key research questions aligned to the SIF II project. Moreover, at CDS, most of the full-time academics are Deaf and all full time academics are fluent ISL users. Additional funding has been secured via Trinity College Dublin's Faculty of Humanities, Arts and Social Sciences Innovation Funds, ring-fenced for additional staffing for this project. Moving forward, there are considerations regarding the cultural and work practice implications for academic staff delivering curricula in this manner. There are also corresponding implications for students receiving education in a blended learning approach via elearning technology. What will assume a greater importance immediately for academics and students is the minimum level of computer literacy skills and access to modern computing equipment and a fast broadband network required to engage in this kind of learning environment. We also plan, therefore, to devise a training programme for academic staff to induct them into the new teaching and learning environment and plan for a similar induction for students enrolled on the programme.

8. Summary

In this paper we have discussed decisions we have made regarding annotation of the Signs of Ireland corpus. We discussed ongoing work to place Irish Sign Language learning online through the application of MOODLE as the platform of choice as we move forward. We outlined the range of applications currently made with respect to the Signs of Ireland corpus in elearning/ blended learning contexts and noted the added value provided by the research programme of our team. This will also, in addition to having a focus on elearning and the provision of access to Deaf Studies education plus progression pathways in education at third level, contribute to the study of the morphosyntactic-phonological interfaces within ISL in order to deepen our understanding of ISL grammar and lexicon while contributing to the richness of the SOI corpus. Our study too of Deaf culture in an Irish context will also be of enormous importance to the Deaf community. We indicated how we will leverage the corpus within a framework for elearning and blended learning, situated in an online architecture to support signed language learning. Issues of assessment in an elearning context were also addressed.

9. References

- Armstrong, D.F., W.C. Stokoe and S.E. Wilcox (1995) *Gesture and the Nature of Language*. Cambridge: Cambridge University Press.
- Biesold, H. (1999) *Crying Hands: eugenics and deaf people in Nazi Germany*. Washington DC: Gallaudet University Press.
- Conama, J.B. (2008): *Review of the Signing Information Project, Mid-West Region*. Limerick: Paul

- Partnership.
- Conrad, R. (1979): *The Deaf School Child. Language and Cognitive Function*. London:Harper and Row.
- European Parliament (1988): Resolution on Sign Languages as Adopted by the European Parliament in Plenary Session on 17 June 1988. (Doc. A2-302/87).
- European Parliament (1998): Resolution on Sign Languages as Adopted by the European Parliament in Plenary Session on 18 November 1998. (B4-0985/98).
- EUD. European Union of the Deaf (2001): *EUD Update. Special Edition: Update on the Status of Sign Languages in the European Union*. Volume 4, Number 10, March 2001.
- Engberg-Pedersen, E. (1993), *Space in Danish Sign Language*, Hamburg, Signum Verlag.
- Goldin-Meadow, S. (2003) *The Resilience of Language: What gesture creation in deaf children can tell us about how all children learn language*. Hove: Psychology Press
- Hopper, S., C. Miller, S. Rose and G. Veletsianos (2007) The Effect of Digital Video Quality on Learner Comprehension in an American Sign Language Assessment Environment. *Sign Language Studies*, Vol 8 (1), Fall 2007, 42-58.
- Johnston, T (2004) *W(h)ither the deaf community? population, genetics, and the future of Australian Sign Language*, American Annals of the Deaf 148:5.
- Klima, E. and U. Bellugi (1979). *The Signs of Language*, Harvard University Press, Harvard.
- Krausneker, Verena (2001): Sign Languages of Europe-Future Chances. In Leeson, L. (ed.). *Looking Forward- EUD in the 3rd Millennium- The Deaf Citizen in the 21st Century*. Gloucestershire, UK: Douglas McLean Publishers. 64-73.
- Kyle, J.G. and B. Woll (1985). *Sign Language: The Study of Deaf People and their Language*, Cambridge: CUP.
- Kyle, J.G. and L. Allsop (1997): *Sign On Europe: A Study of Deaf People and Sign Language in the European Union*. Bristol: Centre for Deaf Studies, University of Bristol.
- Ladd, P. (2003): *In Search of Deafhood*. Multilingual Matters: Clevedon.
- Lane, H. (1984) *When the Mind Hears: A History of the Deaf*. Penguin Books.
- Lane, H.; R.J. Hoffmeister, and B. Bahan, (1996): *A Journey into the Deaf World*. San Diego, CA. Dawn Sign Press.
- Leeson, Lorraine (2008). Quantum Leap. Leveraging the Signs of Ireland Digital Corpus in Irish Sign Language/English Interpreter Training. *The Sign Language Translator and Interpreter* 2 (2), 231-258.
- Leeson, Lorraine (2007): *Seeing is Learning. A Review of education for deaf and hard of hearing people in Ireland*. Report submitted to the National Council for Special Education.
- Leeson, Lorraine (2006): *Signed Languages in Education in Europe – a preliminary exploration. Preliminary Study*. Strasbourg: Language Policy Unit, Council of Europe. www.coe.int/lang
- Leeson, Lorraine (2004): Signs of Change in Europe: European Developments on the Status of Signed Languages. In Patrick McDonnell (ed.) *Deaf Studies in Ireland: An Introduction*, Coleford, England, Doug McLean.
- Leeson, Lorraine (2001). *Aspects of Verb Valency in Irish Sign Language*, Unpublished Doctoral Dissertation, Centre for Language and Communication Studies, TCD, Dublin.
- Leeson, Lorraine and Carmel Grehan (2004). *To the Lexicon and Beyond: The Effect of Gender on Variation in Irish Sign Language*. In M. Van Herreweghe and M. Vermeerbergen (eds.): *To The Lexicon and Beyond: The Sociolinguistics of European Sign Languages*. Gallaudet University Press, pp. 39-73.
- Leeson, Lorraine and Brian Nolan (2008). *Digital Deployment of the Signs of Ireland Corpus in Elearning*. LREC2008 – 3rd Workshop on the Representation and Processing of Sign Languages: Construction and Exploitation of Sign Language Corpora. Marrakech, Morocco.
- Leeson, Lorraine, Brian Nolan and John Bosco Conoma. 2009. *Towards blended learning for Deaf Studies at third level in Ireland*. Conference Proceedings of EDULEARN2009: the International Conference on Education and New Learning Technologies, Barcelona Spain
- Liddell, S.K. (2003) *Grammar, Gesture, and Meaning in American Sign Language*, CUP, Cambridge.
- Matthews, Patrick A. (1996). *The Irish Deaf Community- Volume 1*, ITE, Dublin.
- McDonnell, Patrick (1996). *Verb Categories in Irish Sign Language*, Unpublished Doctoral Dissertation, Centre for Language and Communication Studies, University of Dublin, Trinity College.
- McDonnell, Patrick and Helena Saunders (1993): *Sit on Your Hands: Strategies to Prevent Signing*. In Fischer, R. and Lane, H. (eds.) *Looking Back: A Reader on the History of Deaf Communities and their Sign Languages*. Hamburg: Signum. 255-260.
- Nolan, Brian and Lorraine Leeson. 2009a. *Signs of access in a digital world: online delivery of Deaf*

- Studies curricula in Ireland at third level*. Conference Proceedings of INTED2009: International Technology, Education and Development Conference. Valencia, Spain
- Nolan, Brian and Lorraine Leeson. 2009b. *Online delivery of Deaf Studies Curricula in Ireland at Third Level: Working towards blended learning*. Conference Proceedings of Multilingualism, Regional & Minority Languages: Paradigms for Languages of the Wider World Conference. School of Oriental and African Studies (SOAS). London England
- O'Baoill, Donal and Patrick A. Matthews (2000). *The Irish Deaf Community, Volume 2: The Linguistics of ISL*, ITE, Dublin.
- Schembri, A. (2003) Rethinking 'Classifiers' in Signed Languages, In K. Emmorey (ed), *Perspectives on Classifier Constructions in Sign Languages*, Lawrence Erlbaum and Associates, New Jersey, pp. 3-34.
- Sheikh, H. (2009) Video Guidelines for the SIGNALL II Project. Dublin: Interresource Group (Ireland) Limited.
- Skutnabb-Kangas, T. (2000): *Linguistic genocide in education or worldwide diversity and human rights?* Mahwah, NJ: Erlbaum .
- Stokoe, W. C.(2001), *Language in Hand: Why Sign Came Before Speech*, Gallaudet University Press, Washington DC.
- Sutton-Spence, R. and B. Woll (1999) *The Linguistics of British Sign Language*, CUP, Cambridge.
- Timmerman, N. (2005): *The Status of Sign Languages in Europe*. Strasbourg: Council of Europe. *United Nations Convention on the Rights of Persons with Disabilities (2006): A/61/611 Distr.:* General 6 December 2006. <http://www.un.org/esa/socdev/enable/rights/convtexte.htm>
- UNESCO (1994): *Salamanca Statement and Framework for Action on Special Needs Education World Conference on Special Needs Education: Access And Quality*. Salamanca, Spain, 7-10 June 1994 <http://www.ecdgroup.com/download/gnlssfai.pdf>
- Vermeerbergen, M. and E. Demey (2007). Sign + Gesture = Speech + Gesture? Comparing Aspects of Simultaneity in Flemish Sign Language to Instances of Concurrent Speech and Gesture. In Vermeerbergen, M., L. Leeson and O. Crasborn (eds.), *Simultaneous Constructions in Signed Languages – Form and Function*, John Benjamins, Amsterdam.

The Schematic Organisation of Irish Prepositions

Molly Manning
Trinity College Dublin,
mollyxmanning@gmail.com

Abstract

The image schema model proposes that basic sensory-motor concepts are the prelinguistic building blocks upon which more abstract concepts are grown. Spatial particles such as prepositions encode basic information linked to embodied human experience and tend to be highly polysemous, existing in both basic and abstract domains of experience. They are therefore useful for studying the schematic properties of language across different conceptual domains, and for understanding how abstract concepts are grounded in basic experiential knowledge.

In this paper we demonstrate the usefulness of an image schema approach to the analysis of Irish prepositions, illustrating how the radial structure organisation of polysemous meaning senses schematically links basic perceptual concepts with non-perceptual abstract concepts. We thus argue that the image schema model illustrates the fundamental grounding of language in sensory-motor concepts, and how our understanding of abstract concepts is possible only as a result of the embodied nature of the human mind.

List of Abbreviations

1sg: 1st person singular, **1pl:** 1st person plural, **3pl:** 3rd person plural, **acc:** accusative, **ADJ:** adjective, **ADV:** adverb, **CON:** conjugator, **COND:** conditional, **dat:** dative, **DEM:** demonstrative particle, **DET:** determiner, **em:** emphatic suffix, **gen:** genitive, **IMPS:** impersonal passive, **INT:** interrogative pronoun, **NEG:** negative verb particle, **nom:** nominative, **NP:** noun phrase, **pl:** plural, **PN:** pronoun, **POS:** possessive adjective, **PP:** prepositional phrase, **PPc:** compound preposition, **PR:** present tense, **PT:** past tense, **VN:** verbal noun

1. Image Schemas and the Embodied Mind

The image schema concept was introduced simultaneously by Mark Johnson (1987) and George Lakoff (1987) in order to explain how the embodied human mind is able to understand and reason abstractly. Now one of the central concepts in the field of Cognitive Linguistics, the image schema model proposes that basic concepts are organised schematically across languages because they are common to our basic embodied human experiences. It enables us to see how more abstract concepts are ‘grown’ from concepts that are common to our sensory-motor experiences, and how the basic and abstract concepts are schematically linked via metaphorical and polysemous radial structures, which underpin and organise the lexicon.

Prepositions tend to be highly polysemous in nature and so are particularly suitable for examining the schematic nature of spatial concepts across basic and abstract domains. In this paper we draw on our image schema analysis of an Irish prepositional corpus (Manning, 2009) to illustrate how abstract concepts in Irish are grounded in experientially basic ones, and furthermore how the perceptual and metaphorical meaning senses of polysemous Irish prepositions, are connected radially from central basic senses to extended abstract senses.

In section 2 we define image schemas for the purpose of our analysis, and specify two other types of schema, the response schema and the focus schema, which will be relevant for our investigation of Irish prepositions. We then show how the image schema model is used to provide a unified account of polysemous prepositional

meaning senses. In section 3 we discuss the prepositions of the Irish language and our corpus development approach in Manning (2009), from which our data and analysis is drawn. In section 4 we present a selection of prepositions analysed within an image schema framework in Manning (2009), identifying each preposition's meaning senses, illustrating how they are radially organised, and providing an image schema profile which specifies the schemas and metaphors underpinning the range of meaning senses. In section 5 we discuss and conclude our investigation into the usefulness of image schema analysis of Irish prepositions.

2. Introduction to the Image Schema Model

In this section we justify our choice of the image schema model in Manning (2009) for the investigation into the behaviour and organisation of Irish prepositions. In section 2.1 we define image schemas for the purpose of our analysis, distinguishing basic experiential image schemas from basic non-perceptual response schemas, and also proposing a focus of attention schema, the focus schema. These schema types are utilised in section 4 to create a schematic profile for a preposition, thus demonstrating the underlying schematic organisation underpinning the polysemous meaning senses. In section 2.2 we explore further how the image schema model unifies these meaning senses and illustrates their radial organisation from central to extended senses, which shows how abstract senses are 'grown' from more basic ones.

2.2 Types of Image Schema

One of the main challenges facing image schema research is the lack of clarity regarding the exact definition of an image schema (Hampe 2005; Grady 2005). Grady argues that the concept of image schema originated as "representations...of perceptual, including kinetic, experience" which "reflects the "anchoring" function of perception in cognitive experience, and in conceptual structure"; thus an image schema containing non-perceptual information is essentially anachronistic. In reality however, many definitions and examples of image schemas (including several of the schemas proposed by Johnson (1987) and Lakoff (1987)) incorporate elements which are arguably non-perceptual, for example [cycle], [iteration], and [scale], (all from Johnson (1987: 126)).

Grady (2005) offers a path through the confusion. He distinguishes between schemas that are perceptual (image schemas), and those that are non-perceptual (response schemas). He argues that response schemas are essentially metaphorical extensions of image schemas, however they are not necessarily less basic than image schemas experientially. Image schemas are the 'source concepts' and response schemas are the 'target concepts' for what he terms 'primary metaphors', (i.e. those relating basic sensory-motor experience to non-perceptual concepts), for example the [path] schema is the source concept for the [scale] response schema.

In section 4 we provide schematic profiles which distinguish between image and response schemas, and in addition we include a third schema type, introduced in Manning (2009), the focus schema, which links basic image schemas such as [path] or response schemas such as [collection], to our natural ability to focus on one aspect of that schema, (i.e. [source focus], [endpoint focus], [group member focus]).

2.2 Image Schemas and Polysemy

Lakoff and Johnson (1980) note that there is a systematic link between our basic sensory-motor experiences and other more abstract domains of experience, which enables us to metaphorically ground our abstract concepts and experiences in perceptual basic ones. Under the image schema model, the abstract or extended meaning senses of a polysemous preposition are radially connected to a central, more basic meaning sense. Connections and similarities between polysemous meaning senses (in terms of the schematic specification for the relationship between trajector (tr) and landmark (lm) nominals following Langacker (1987)) are clearly illustrated.

The examples below illustrate the polysemy of the Irish preposition *ar* ‘on’ across basic and abstract domains of experience. In 1a, we see the central spatial meaning sense of *ar*, which entails the [support] schema (the table physically supports the book); and in 1b-d, *ar* is used in various metaphorical settings, including the psych-verb construction in 1c in which we see the metaphor [body as support for emotion], proposed in Manning (2009).

- (1) a. *tá an leabhar ar an mbord*
 is:V-PR DET book:NP on:PP DET table:NP
 ‘the book is on the table’
- b. *táim ar cipíní*
 am:V-PR-1sg on:PP little sticks (tenterhooks):NP-pl
 (I’m on tenterhooks)
 ‘I’m excited’
- c. *tá áthas orm*
 is:V-PR happiness:NP on:PP+me:PN-1sg
 (happiness is on me)
 ‘I’m happy’
- d. *tá mé ar muin na muice*
 am:V-PR I:PN-1sg on:PP back:NP DET-gen pig:NP-gen
 (I am on the pig’s back)
 ‘I’m really really happy’

In Manning (2009) we follow Tyler and Evans (2003) principled polysemy approach to identifying distinct meaning senses of polysemous prepositions. They propose that approaches such as Lakoff’s radial structure presentation of ‘over’ (Lakoff, 1987), are too fine-grained, and exaggerate the number of distinct meaning senses of a preposition. They argue that instances of a preposition which differ only with respect to individual characteristics of the landmark or trajector nominal do not yield an additional meaning sense since they are filled in by speaker / listener pragmatic knowledge of the nominals involved. In our analysis of Irish prepositions we therefore specify that landmark and trajector characteristics (such as contact between lm and tr, dimensionality, multiplex or mass status), are not schematically specified, but are filled in by pragmatic context. Thus we identify only the fundamental and necessary meaning senses (both central and extended) for each preposition. Of the transformation links between meaning senses identified by Lakoff (1987), we propose that the reflexive↔non-reflexive transformation alone provides additional semantic meaning which is not directly inferred from context, and thus the Irish prepositional corpus is examined for instances of this transformation in its radial structures (Manning, 2009).

2.3 Summary

In this section we have highlighted the need for a rigorous definition of image schema in order to provide a meaningful account of certain language phenomena under this model, and identified image schemas, response schemas and focus schemas as being relevant for our analysis of Irish prepositions in Manning (2009). In addition we have illustrated how the polysemous meaning senses of Irish may be unified schematically in a radial structure, which links central basic meaning senses to extended metaphorical instances. In section 3 we explore the various types of Irish prepositions, and in section 4 we present a sample of the Irish prepositional analysis using an image schema approach given in Manning (2009).

3. Irish Prepositions

There exist two basic categories of Irish preposition, simple and compound, and furthermore many simple Irish prepositions synthesise with personal pronouns yielding prepositional pronouns. These prepositional pronouns play a strong role in the structure of the Irish language, and are one of the reasons why Irish relies more heavily on prepositions than many other languages such as English. A summary of the main types of Irish preposition is given in section 3.1 and a discussion of our corpus development in Manning (2009) is given in section 3.2, from which our section 4 examples and analysis is drawn.

3.1 Overview of Irish prepositions

In this section we summarise the main morphosyntactic features of Irish prepositional types, including simple and compound varieties (3.1.1) and prepositional pronouns (3.1.2), focussing on the prepositions *ag* ‘at’, *faoi* ‘under / about’ and *i* ‘in’, along with their prepositional pronoun paradigms, which are analysed in an image schema framework in section 4.

3.1.1 Simple and Compound Prepositions

Simple prepositions are grouped according to the case they specify for noun phrases which follow them, either nominative (type a), dative (type b) or genitive (type c) as shown respectively in 2a-c below:

- (2)
- | | | | | |
|----|---------------------------|-----------|--------------------|------------|
| a. | <i>seachas</i> | <i>na</i> | <i>páistí</i> | |
| | other than:PP | DET-pl | children:NP-nom-pl | |
| | ‘other than the children’ | | | |
| b. | <i>ar</i> | <i>an</i> | <i>teilifís</i> | |
| | on:PP | DET | television:NP-dat | |
| | ‘on the television’ | | | |
| c. | <i>fearacht</i> | <i>na</i> | <i>cathrach</i> | <i>seo</i> |
| | like:PP | DET-gen | city:NP-gen | this:DEM |
| | ‘like this city’ | | | |

Compound prepositions consist of a simple preposition plus another element such as a noun. They generally take the genitive case, with a few exceptions such as *go dtí* ‘to, towards’, and *maidir le* ‘regarding’, which both take the nominative case. Some

examples of compound prepositions formed with the prepositions *faoi* ‘under / about’ and *i* ‘in’ are shown in 3 below:

- (3) a. *tá sí ag dul faoi choinne píonta*
 is:V:PR she:PN at:PP go:VN in order to:PPc pint:NP-gen
 ‘she is going for a pint’
- b. *chonaic mé na paistí i rith an lae*
 saw:V-PT I:PN DET children during:PPc DET-gen day:NP-gen
 ‘I saw the children during the day’

3.1.2 Prepositional Pronouns

As per Ó Siadhail, (1991: 340), when a personal pronoun in Irish is the object of a preposition (generally type b), they synthesise to form a prepositional pronoun inflected for person and number. Prepositional pronouns encode information on semantic roles and relationships to the predicate, such as subject, direct / indirect object, instrument etc. The prepositional pronoun paradigms for *ag*, *faoi* and *i* along with the subject pronouns in Irish are given in table 3.1 below. In Irish there is no pronoun translating as ‘it’, since all singular entities are either masculine or feminine.

PN	<i>ag</i> ‘at’	<i>faoi</i> ‘under / about’	<i>i</i> ‘in’
<i>mé</i>	<i>agam</i> ‘at me’	<i>fúm</i> ‘under me’	<i>ionam</i> ‘in me’
<i>tú</i>	<i>agat</i> ‘at you’	<i>fút</i> ‘under you’	<i>ionat</i> ‘in you’
<i>sé</i>	<i>aige</i> ‘at him, it’	<i>faoi</i> ‘under him, it’	<i>ann</i> ‘in him, it’
<i>sí</i>	<i>aici</i> ‘at her, it’	<i>fúithi</i> ‘under her, it’	<i>inti</i> ‘in her, it’
<i>muid / sinn</i>	<i>againn</i> ‘at us’	<i>fúinn</i> ‘under us’	<i>ionainn</i> ‘in us’
<i>sibh</i>	<i>agaibh</i> ‘at you-pl’	<i>fúibh</i> ‘under you-pl’	<i>ionaibh</i> ‘in you-pl’
<i>siad</i>	<i>acu</i> ‘at them’	<i>fúthu</i> ‘under them’	<i>iontu</i> ‘in them’

Table 3.1: Prepositional Pronoun Paradigms for *ag*, *faoi* and *i*

An interesting feature of Irish is that prepositional pronouns are generally used in ‘psych’-verb structures, i.e. those that describe emotional states, (feelings, perceptions etc.). Thus in Irish, emotional and mental states are coded using locative spatial prepositional pronouns. Indeed it is not possible in Irish to describe states such as being happy, having knowledge and so forth without using prepositional forms. In the following examples, based on Discover Irish Resource (2009), the prepositional pronoun in 4a, *aici* ‘at her’ codes the experiencer (i.e. the subject); in 4b the prepositional pronoun *air* ‘on him’ codes the object of experience (i.e. the indirect object); and in 4c the prepositional pronoun *faoi* ‘about him’ codes the object of mockery (i.e. the direct object):

- (4) a. *tá tinneas cinn aici*
 is:V-PR soreness:NP head:NP-gen at:PP+her:PN
 (soreness of head is at her)
 ‘she has a headache’

- b. *theip* *an* *plean* *air*
 failed:V-PT DET plan:NP on:PP+him:PN
 (the plan failed on him)
 ‘the plan failed’
- c. *rinneadh* *magadh* *faoi*
 made:V-PT-IMPS mockery:NP about:PP+him:PN
 (there was made (a) mockery about him)
 ‘people were mocking him’

3.2 Corpus Approach

Our corpus of Irish prepositions prepared in Manning (2009) includes samples of authentic language use taken from a range of materials such as dictionaries, grammar books, literature, newspapers and online learning resources. By and large, the material includes language use from the three main dialects, that is Ulster, Connaught and Munster Irish, and also from the Official Standard, which was established since 1945 (Ó Siadhail, 2000: vii). The sources drawn upon by these materials include samples of Modern Irish dating back to start of the 20th century, which gives us a rich and varied data set covering the full range of simple and compound prepositions and the prepositional pronouns for analysis within an image schematic paradigm. In section 4 below we present a selection of our image schema analysis for the prepositions *ag*, *faoi* and *i*.

4. Analysis

In section 4.1 below we present an image schema account of a selection of Irish prepositions taken from the corpus analysis of Manning (2009), showing the range of meaning senses and the radial structure organisation underpinning them. We define for each preposition an image schematic profile, (containing image schemas, response schemas, focus schemas, conceptual metaphors and primary metaphors) in order to illustrate how the basic meaning senses are abstracted schematically across various domains of experience to yield rich polysemy in the Irish language. In section 4.2 we summarise the schemas and metaphors contained in the image schema profiles yielded by these 3 prepositions.

4.1 Image Schema Analysis

In the sections below we define the meaning senses, radial structure organisation and image schema profiles for the simple Irish prepositions *ag*, ‘at’ (4.1.1), *faoi* ‘under / about’ (4.1.2) and *i* ‘in’ (4.1.3). All examples are taken from the Irish prepositional corpus prepared in Manning (2009).

4.1.1 *Ag* ‘at’

The radial structure for the meaning senses of *ag* is shown below in figure 4.1.

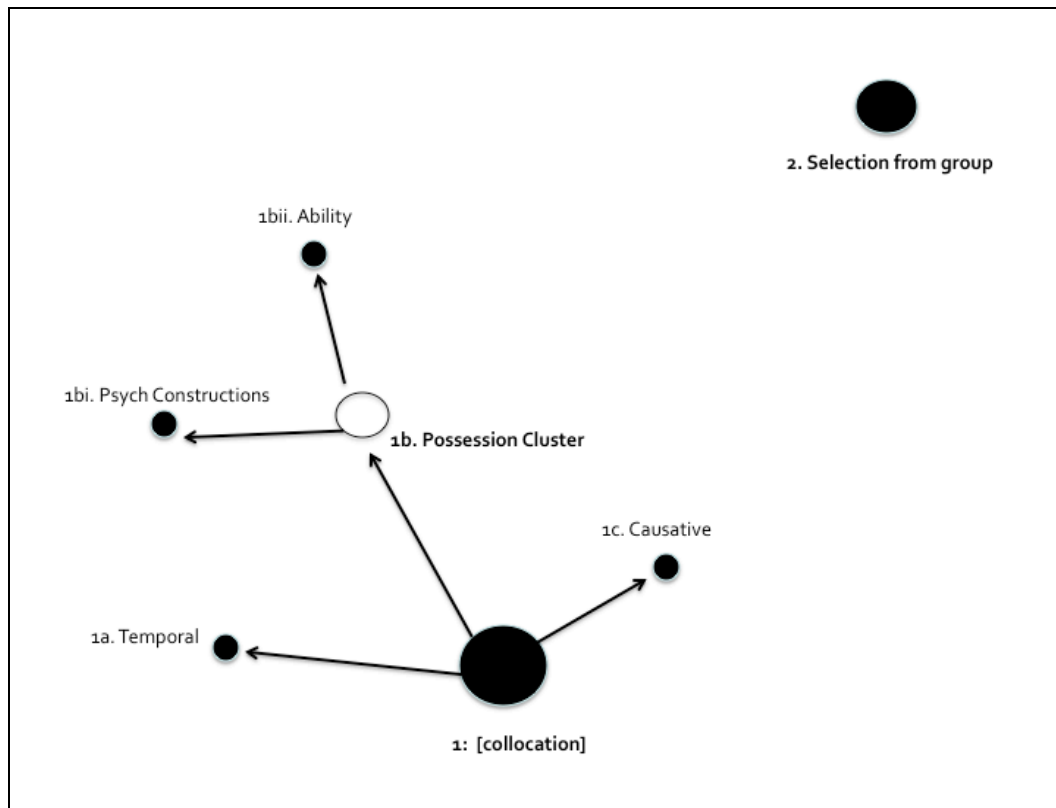
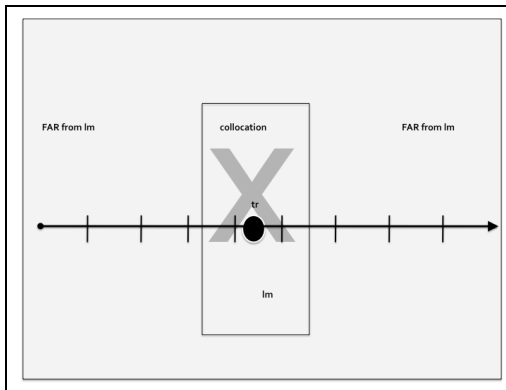
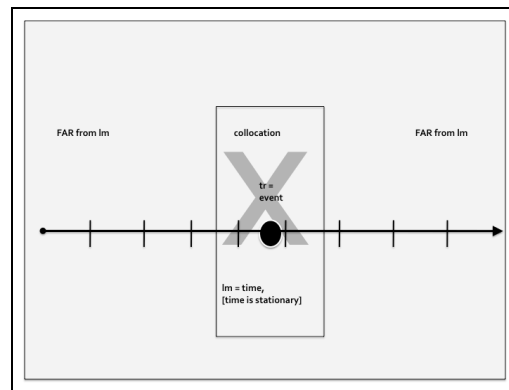


Figure 4.1: Radial Structure for *Ag*

The central schema for *ag* ‘at’ is the [collocation] focus schema (Manning, 2009), shown in figure 4.2. The [collocation] schema allows focus of attention on one aspect of what we call the [near-far-scale-path], a combination of Johnson’s image schema [path], and response schemas [near-far] and [scale], (1987).

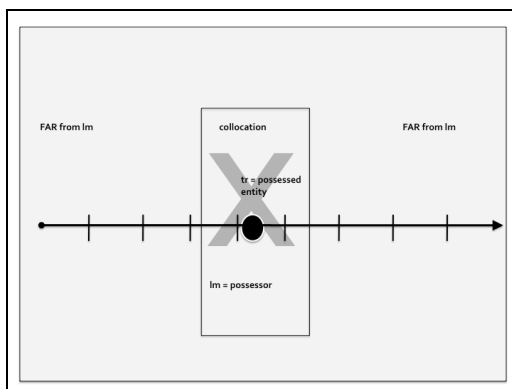
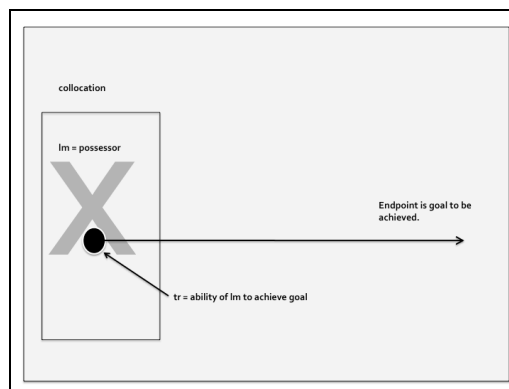
At the point of [collocation], the trajector (tr) and landmark (lm) are physically collocated at the same point, and may or may not be in contact with each other.

- (5) a. *tá* *sí* *ag* *an* *teach*
 is:V-PR she:PNat:PP DET house:NP
 ‘she is at the house’
- b. *bhí* *mé* *ag* *an* *gcóisir*
 was:V-PT I:PN-1sg at:PP DET party:NP
 ‘I was at the party’
- c. *ag* *an* *Aifreann*
 at:PP DET mass:NP
 ‘at mass’

Figure 4.2: *Ag I. [collocation] Schema*Figure 4.3: *Ag Ia. Temporal Schema*

The [collocation] sense has several non-spatial extensions. In 1a. Temporal, (figure 4.3), the *tr*, an experiencer, moves along a path towards the *lm*, a timepoint, until the two are collocated. This is an example of the [time as stationary] metaphor given by Lakoff and Johnson (1980), where the timepoint is fixed, and the *tr* experiencer moves towards it. The path metaphorically stands for the sequential path of time, which approaches a stationary timepoint, at which it is said to be *at* the event, and beyond which is *after* the event (as per the transitivity of [collocation]). Some examples are given in 6.

- (6) a. *ag a seacht a chlog*
 at:PP PART seven:ADJ of:PP clock:NP
 ‘at seven o’clock’
- b. *ag cómhraic a’ dá ráithche*
 at:PP encounter:NP DET-gen two:ADJ seasons:NP-gen
 (at the meeting of two seasons)
 ‘at the changing of the season’

Figure 4.4: *Ag 1b. Possession Schema*Figure 4.5: *Ag 1bii. Ability Schema*

In the 1b. [possession] schema cluster (see figure 4.4) we see the primary metaphor [collocation as possession], (Manning, 2009), which demonstrates how the relationship between a possessed *tr*, and the *lm* possessor is expressed locatively in Irish, via the preposition *ag*. Note that in English possession or ownership would be expressed verbally with *have* or *be*. As per Radden and Dirven, (2007), many languages such as Russian, Finnish and Japanese express possession as a locative relation between

possessor and theme. “It is easy to trace a connection between location and possession situations in which objects are always or often close to a person invite the implicature that they belong to that person; conversely, we expect that people have their possessions close to them” (2007: 279). Some examples are given in 7.

- (7) a. *tá leabhar ag Mary*
 is:V-PR book:NP at:PP Mary:NP
 (a book is at Mary)
 ‘Mary has a book’
- b. *an teach seo againne*
 DET house:NP this:DEM at:PP+us:PN-em
 ‘our house’
- c. *tá beirt mhac aige*
 is:V-PR two:ADJ son:NP at:PP+him:PN
 ‘he has two sons’

The [possession] cluster is abstracted further from the possession of material physical objects to psychological attributes, as shown in 8 below in which we see the metaphor [emotion as possessed object], (Stefanowitsch and Gries, 2006).

- (8) a. *tá spéis agam sa leabhar sin*
 is:V-PR interest:NP at:PP+me:PN in:PP+DET book-NP that:DEM
 (interest in that book is at me)
 ‘I am interested in that book’
- b. *tá cion agamsa ar Nuala*
 is:V-PR fondness:NP at:PP+me:PN-em on:PP Nuala:NP
 (fondness on Nuala is at me)
 ‘I am fond of Nuala’

In 1bii. Ability, [possession] and [collocation] are combined with the [purpose as physical goal] metaphor (Johnson, 1987), in which the endpoint physical goal or destination metaphorically represents the purpose or goal to be achieved by the tr in following its path, for which it must possess ability (figure 4.5).

- (9) a. *má théid agam air*
 if:CON notion:NP at:PP+me:PN on:PP+it:PN-3sg
 (if a notion is at me on it)
 ‘if I can help it, manage it’
- b. *is réidh agat é*
 is:COP easy:ADJ at:PP+you:PN-2sg it:PN-3sg-acc
 (is easy at you it)
 ‘it’s easy for you to say’

In 1c. Causative, (figure 4.6) [purpose as physical goal] and [collocation] are combined with the [compulsion] image schema (ibid 1987). The path is represented as a compulsion force, since it represents the direction of the caused activity towards the endpoint; and also the sequence of causation, in which the cause occurs temporally before the result.

Some examples are given in 10 below.

- (10) a. *ní thuigim focal ag glór na habhann*
 NEG understand:V-PR-1sg word:NP at:PP noise:NP DET-gen river:NP-gen
 (I can't understand a word at the noise of the river)
 'I can't hear a word because of the noise of the river'
- b. *tá an bord briste agam*
 is:V-PR DET table:NP broken:ADJ at:PP+me:PN
 'I broke the table'
- c. *caite ag an aoise*
 worn:ADJ at:PP DET age:NP
 (worn at the age)
 'worn with age'

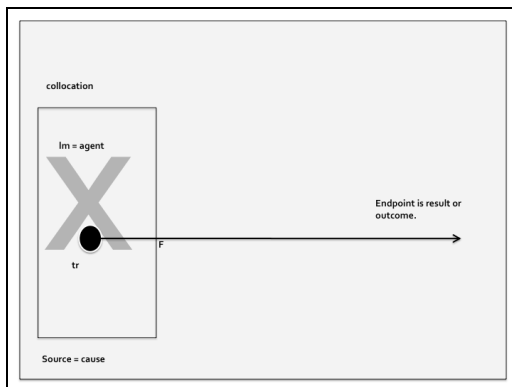


Figure 4.6: Ag 1c. Causative Schema

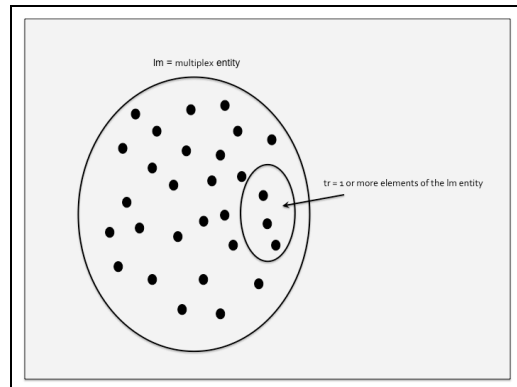


Figure 4.7: Ag 2. Selection from Group Schema

The second *ag* schema is 2. Selection from group (figure 4.7), which is the focus schema [group member focus] applied to the combination of the [collection] and [splitting] response schemas (ibid, 1987), in which the *tr* represents one or more elements selected from a *lm* multiplex entity. Some examples are given in 11 below.

- (11) a. *cá mhéad acu?*
 what:INT amount:NP at:PP+them:PN
 'how many of them?'
- b. *ní dheachaigh ann ach an bheirt acu*
 NEG go:V-PT in:PP+it:PN but:CON DET two:ADJ
 at:PP+them:PN
 (didn't go in it but the two at them)
 'only two of them went there'

4.1.2 *Faoi* 'under / about'

The radial structure for the meaning senses of *faoi* is shown below in figure 4.8. From our corpus analysis in Manning (2009), it was clear that there are two distinct meaning senses for *faoi* which cannot be reconciled, that of 'under' and 'about'. Ó Siadhail (2000: 105) notes that in the Cois Ferraige dialect, the 'about' sense of *faoi*, for example *ag caint faoi rud* 'talking about something', has replaced constructions which would formally have been constructed using the preposition *um* 'about'. As we shall see below, *faoi* has two temporal senses, that of 'by' or 'around', depending on context,

(*um Nollaig* ‘around Christmas’ is sometimes replaced with *faoi Nollaig*). In addition, Ó Baoill (1996: 92) notes that in the Ulster dialect there are two separate prepositional forms *faoi* ‘under’ and *fá*, generally ‘about’, which have become the same preposition in Standard Irish, and both were included in our corpus.

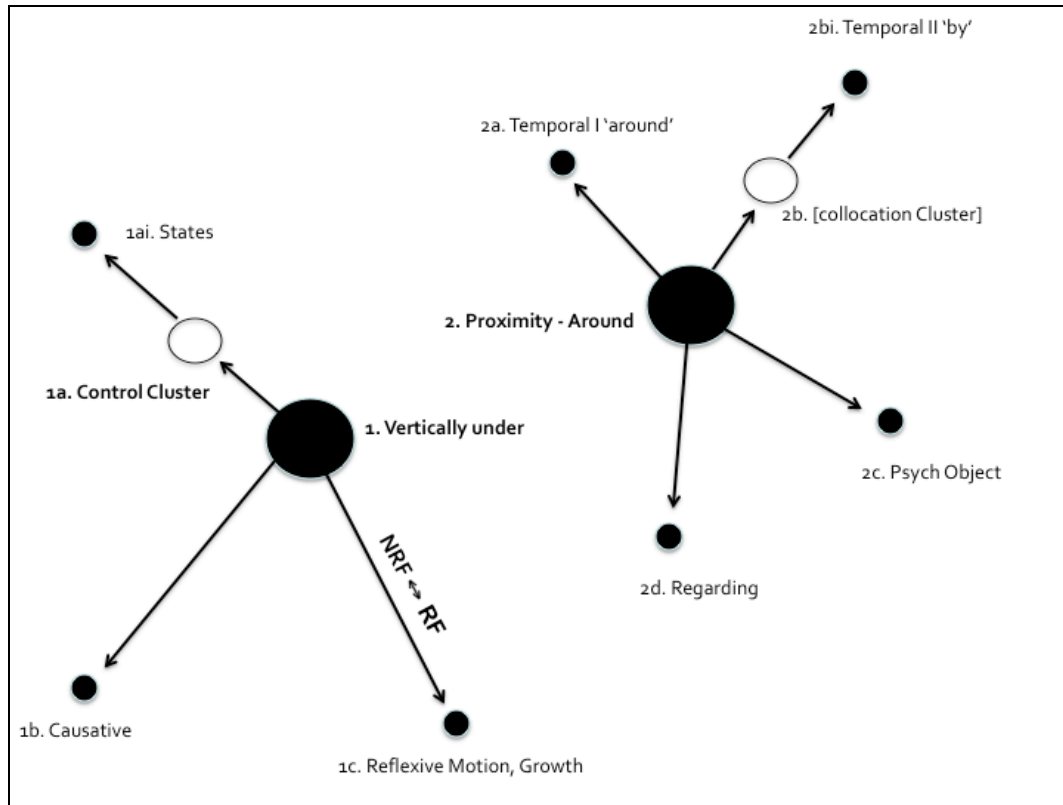


Figure 4.8: Radial Structure for *Faoi*

The first meaning sense ‘under’ is the 1. Vertically under schema, in which the tr is physically located beneath a lm on the vertical axis (figure 4.9 (a)) as per the [vertical orientation] image schema, (Lakoff, 1987). Some examples are given in 12 for both spatial instances (12c), non-spatial perceptual concepts (12a, 12b), and less basic projections (12d).

- (12) a. *tá an ghrian ag dul faoi*
 is:V-PR DET sun:NPat:PP go:VN under:PP
 (the sun is going under)
 ‘the sun’s setting’
- b. *faoi sholas an lae*
 under:PP light:NP DET-gen day:NP-gen
 ‘in the light of day’
- c. *faoi cheann an tí*
 under:PP head:NP DET-gen house:NP-gen
 (under the house’s head)
 ‘under the roof of the house’
- d. *faoi d’anáil*
 under:PP your:POS’breath:NP
 ‘under one’s breath’

In 1a., control adds the [being subject to control as down] metaphor (Lakoff and Johnson, 1980), in which the *lm* exerts a [compulsion] force on the *tr* beneath it, which causes the *tr* to follow a certain action path (figure 4.9 (b)). 13b below is another example of the *ag* 1c causative meaning sense (refer to section 2.2), where *aicí* ‘at her’ has the meaning sense of ‘because of her’.

- (13) a. *bheith faoi chois*
 be:VN under:PP foot:NP
 (to be under foot)
 ‘to be oppressed, downtrodden’
- b. *tá sé faoina cosa aici*
 is:V-PR he:PN under:PP+her-POS foot:NP at:PP+her:PN
 (he is under her foot at her / because of her)
 ‘he’s under her thumb’

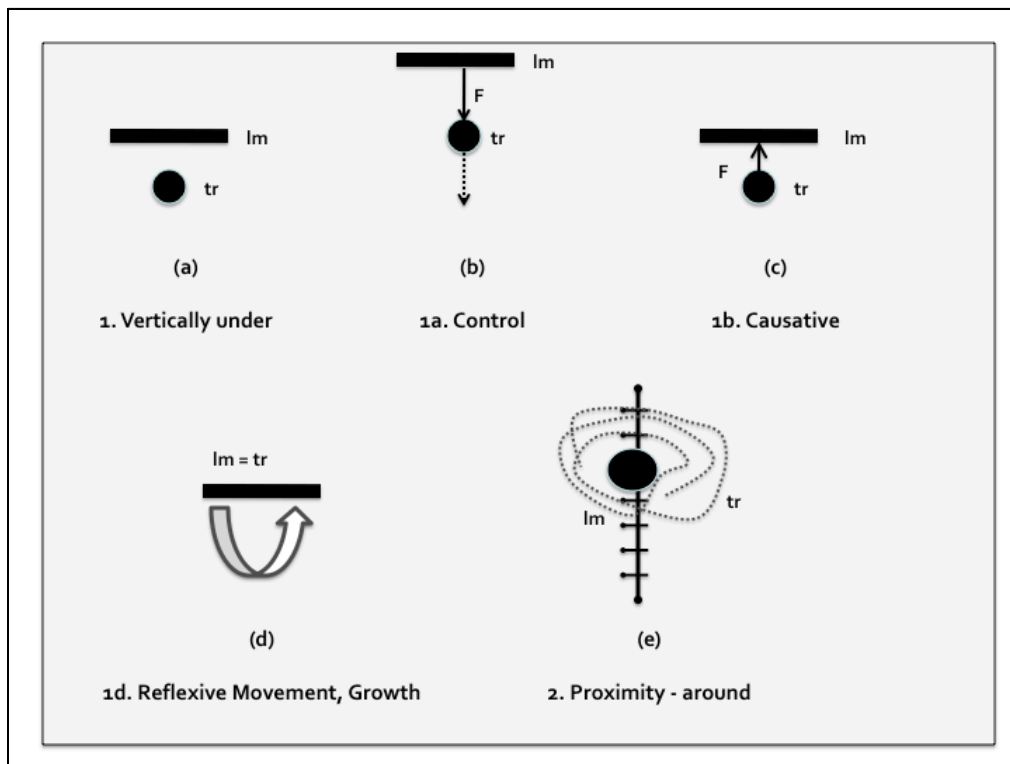


Figure 4.9: *Faoi* Schemas 1, 1a, 1b, 1c, 1d, 2

In the Control extension (1a), the *lm* is the state that exerts a force on the *tr*, metaphorically causing it to be in, or holding it in, that state as shown in 14.

- (14) a. *bheith faoi ualach*
 be:VN under:PP burden:NP
 (to be under a burden)
 ‘to be burdened’
- b. *faoi bhláth*
 under:PP flower:NP
 (under flower)
 ‘in flower’
- c. *bheith faoi gheasaibh*

be:VN under:PP spell:NP
 (to be under a spell)
 ‘to be enchanted, lead a charmed life’

In 1b. Causative (figure 4.9 (c)), the tr is the cause, motivation or intention for a lm’s action, and thus exerts a compulsive force on the landmark causing it to act in a certain way as per 15.

- (15) a. *tá fúm dul abhaile*
 is:V-PR under:PP+me:PN go:VN home:NP
 (is under me to go home)
 ‘I intend to go home’
- b. *tá fúm tusa a phósadh*
 is:V-PR under:PP+me:PN you:PN-em to:PP marry:VN
 (is under me to marry you)
 ‘I intend to marry you’
- c. *an siúl atá fút*
 DET movement:NP REL+is:V-PR under:PP+you:PN
 (the movement that is under you)
 ‘the reason, motive for one’s actions’
- d. *faoi dhéin an dochtúra*
 to meet:PPc DET-gen doctor:PN-gen
 ‘to fetch the doctor’

In 1c. Reflexive motion, growth, lm and tr are the same entity, and lm’s motion or growth is represented metaphorically as occurring under itself (figure 4.9 (d)). This is an instance of the transformational link NRF ↔ RF between the 1. vertically under central sense (with non-reflexive distinct lm and tr entities), and the 1c. reflexive motion sense.

- (16) a. *cur fút in áit*
 put:VN under:PP+you:PN in:PP place:NP
 (to put under you in a place)
 ‘to settle down somewhere’
- b. *tá fás fúthu*
 is:V-PR growth:NP under:PP+them:PN
 (there is growth under them)
 ‘they’re growing’
- c. *bhí luas faoi*
 was:V-PT speed:NP under:PP+him:PN
 (there was speed under him)
 ‘he was going fast’

The second meaning sense for *faoi*, ‘about’, shown in figure 4.9 (e), is represented by schema 2. [proximity] (Manning, 2009), [proximity] is a focus schema, which enables focus of attention on the aspect of the [near-far scale-path] at which tr is near lm.

Some examples are given in 17.

- (17) a. *fá ghiota de*
 about:PP bit:NP from:PP
 (about a bit from)
 'not far from'
- b. *bíonn dhá dtrian galair le*
 is:V-PRtwo:ADJ thirds:NP-pl sickness:NP-gen with:PP
hoidhche agus
 night:NP and:CON
dhá dtrian gaoithe fá chrannaibh
 two:ADJ thirds:NP-pl wind:NP-gen around:PP trees:NP-pl
 (there is two thirds of sickness with the night and
 two thirds of wind around the trees)
 'sickness gets worse at night, and the wind seems to blow stronger where
 there are trees'

In the first extension schema, 2a. Temporal I, we see the [time as stationary] metaphor, in which tr, the experiencer or event, traces a path around the position of a lm trajectory on a [near-far-scale-path]. As per the transitivity of the [near-far-scale-path] the tr would be *at* the lm if the two were collocated, but is *about* or *around* the lm since it metaphorically travels around it as per 18. The second extension is the 2b. [collocation] focus schema, in which the tr travels along the [near-far-scale-path] until it is physically collocated with the lm as shown in 19.

- (18) *fá Nollaig*
 around:PP Christmas:NP
 'around Christmas'
- (19) *faoin tuath*
 about:PP countryside:NP
 'in the countryside'

In its extension, 2bi. Temporal II ('by'), the tr travels along the [near-far-scale-path] and at its endpoint is collocated with the lm timepoint. This emphasises the durative path of the tr, which culminates in completing its activity path *by* the time it reaches the lm as shown in 20.

- (20) a. *faoin Aoine*
 by:PP Friday:NP
 'by Friday'
- b. *faoi seo*
 by:PP this:DEM
 'by now'

In the third extension 2c. Psych object we see the [emotion as object directed at someone] metaphor (Stefanowitsch and Gries, 2006); a broader version of Lakoff and Johnson's [emotional effect as physical contact] (1980). In this metaphor lm is the subject of ideas, opinions and emotions of an experiencer, represented by the tr, and thus the path represents the direction of the psychological constructions towards the lm entity, and thus is metaphorically *about* the lm as shown in 21.

- (21) a. *rinneadh magadh faoi*
 made:V-IMPSmockery:NP about:PP+him:PN
 (there was made a mockery of him)

- ‘people were mocking him’
- b. *tá imní orm faoi*
 is:V-PR worry:NP on:PP+me:PN about:PP+it:PN
 (there is worry on me about it)
 'I'm worried about it'
- c. *cad a cheapann tú faoi*
 what:INT REL think:V-PR you:PN about:PP
imirt rugbaí i bPáirc an Chrócaigh?
 playing:VN rugby:NP in:PP Croke Park:NP
 'what do you think about rugby being played in Croke Park?'
- d. *eadra gáire a dhéanamh faoi rud*
 long spell:NP laughter:NP-gen to:PP do:VN about:NP something:NP
 'to have a good long laugh at something'

In 2d. Regarding, *tr* is communication regarding a particular *lm* entity, and therefore metaphorically travels along a path close to the *lm* on a [near-far-path scale] as shown in 22.

- (22) *bheith ag caint faoi rud*
 be:VN at:PP talk:VN about:PP something:NP
 'to be talking about something'

4.1.3 / 'in'

The radial structure for the meaning senses of *i* is shown below in figure 4.10.

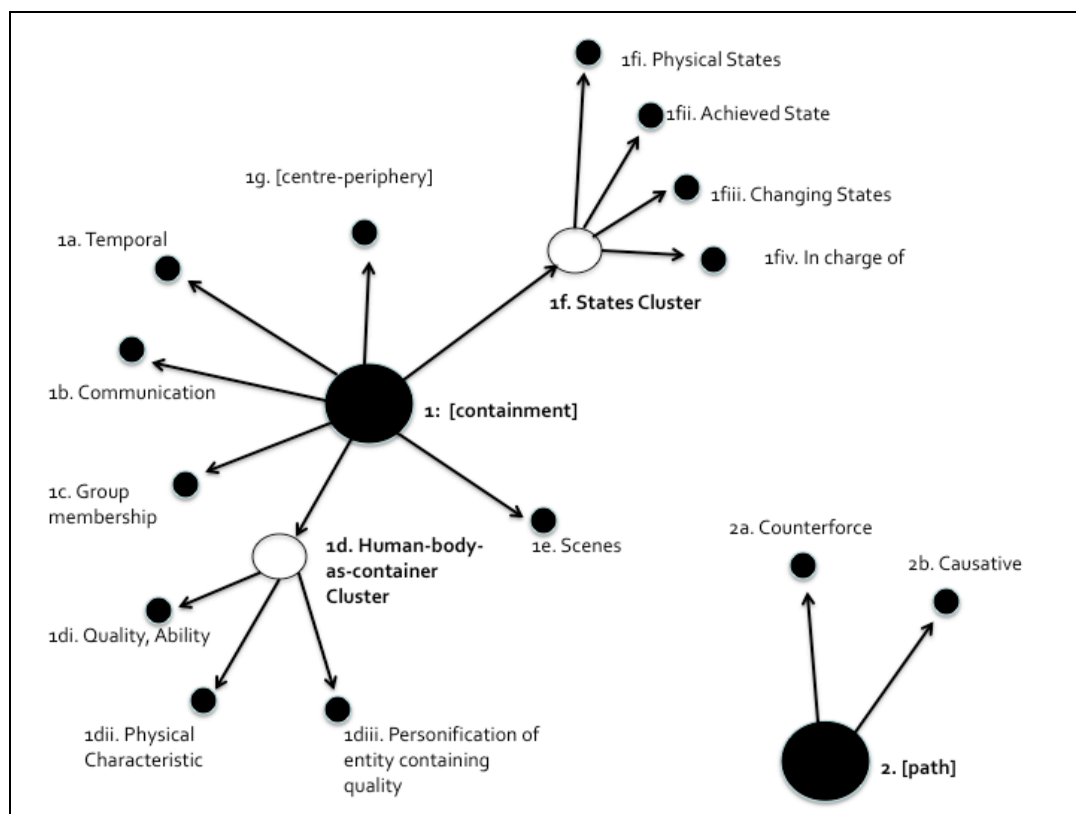


Figure 4.10: Radial Structure for *I*

The central schema of *i* 'in' is [containment] as shown in figure 4.11 (a) below. Some examples of the first central schema [containment] are shown in 23 below.

- (23) a. *in dhá áit*
 in:PP two:ADJ place:NP
 'in two places'
- b. *sa nead*
 in:PP+DET nest:NP
 'in the nest'
- c. *san uisce*
 in:PP+DET water:NP
 'in the water'
- d. *in aice le*
 beside:PPc
 'next to / beside'

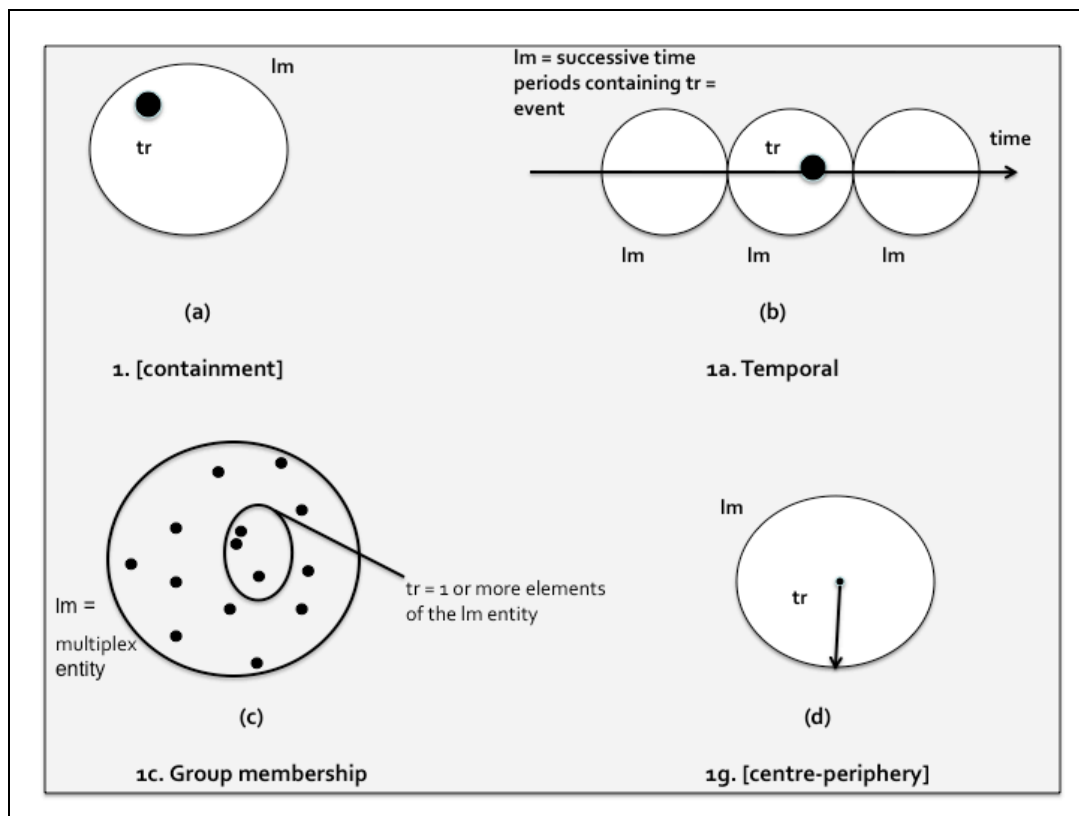


Figure 4.11: *I* [containment] Schemas 1, 1a, 1c, 1g

In 1a. temporal (figure 4.11 (b)) the [time as stationary] metaphor entails that the *tr* event or experiencer moves through successive timepoints, which are represented schematically as containers. Some examples are given in 24. In 1b. Communication, conversation or communication is represented as a container for ideas, words and expression via the [communication as conduit] metaphor (Lakoff and Johnson, 1980), as shown in 25.

- (24) a. *an Luan ina dhiaidh sin*
 DET Monday:NP in:PP+REL after:ADV
 that:DEM
 'the following Monday'
- b. *i mbliana*
 in:PP year:NP
 'this year'
- (25) *bheith beacht sa teanga*
 be:VN precise:ADJ in:PP+DET speech:NP
 'to be precise in one's speech'

In the third [containment] extension, 1c. Group membership (figure 4.11 (c)), the *lm* is a container multiplex entity, whose members form a group (as per the metaphor [category as container], Lakoff and Johnson (1980)), and any entity outside the boundary is excluded from the group. In 26a the *tr* is one or more elements selected or foregrounded from the container via the [group member focus] focus schema, (Manning, 2009).

- (26) a. *ní chuirfeá sonrú i gcruinniú inti*
 NEG put:V-COND notice:NP in:PP crowd:NP in:PP+her:PN
 'you wouldn't notice her in a crowd (she's plain)'
- b. *san arm*
 in:PP+DET army:NP
 'in the army'

In the fourth extension cluster, 1d, we see the primary metaphor [body as container] (Lakoff and Johnson, 1980), in which the body is viewed as a container as shown below (27 a-b). In 1di we see the [body as container for personal quality] metaphor (Manning, 2009), in which the body is a container for qualities and ability (27 c-d). In extension 1dii. the body contains its physical characteristics (27 e-f) (an example of the [physical state as entity within person] metaphor, Lakoff and Johnson (1980)). In 1diii. inanimate entities are personified and their qualities are seen as being contained within them (27 g-h) (as per the [inanimate entity as body] metaphor, Manning, (2009)).

- (27) a. *tá miam ann*
 is:V-PR breath:NP in:PP+him:PN
 (there is breath in him)
 'he still breathes'
- b. *chuaigh sin go cor a'chroidhe ann*
 went:V-PT that:DEM to:PP core:NP his:POS'heart:NP in:PP+him:PN
 (that went to the core of his heart in him)
 'it affected him to the very core of his being'
- c. *rud a bheith ionat*
 something:NPto:PP be:VN in:PP+you:PN
 (something to be in you)
 'to be capable of something'
- d. *tá ionam*
 is:V-PR in:PP+me:PN
 (there is in me)
 'I can, have in me, am characterised by'

- e. *bhí céim bhacaí ann*
 was:V-PT step:NP lameness:NP in:PP+him:PN
 (there was a step of lameness in him)
 'he walked with a limp'
- f. *bhí an dathamhlacht riamh ann*
 was:V-PT DET handsomeness:NP before:ADV
 in:PP+him:PN
 (there was handsomeness in him before)
 'he was always handsome'
- g. *níl maith ar bith sa leabhar seo*
 NEG good:NP on:PP any:NP in:PP+DET book:NP this:DEM
 (there is no good in this book)
 'this book isn't good'
- h. *drochlá a bhí ann*
 bad-day:NP REL was:V-PT in:PP+it:PN
 (bad-day was in it)
 'it was a bad day'

In the fifth [containment] schema 1e. Scenes, we see the [existence as container] metaphor (Manning, 2009) in which an event, timepoint or scene is represented as being a container, containing the actors or actions occurring within it as shown in 28.

- (28) a. *níor shamhlaigh sé go mbeadh sí ann*
 NEG-PT imagine:V-PT he:PN to:PP be:V-COND she:PN in:PP+it:PN
 (he didn't imagine that she would be in it)
 'he didn't imagine she'd be there'
- b. *sin a bhfuil d'airgead ann*
 that:DEM REL is:V-PR-dep of:PP'money:NP in:PP+it:PN
 'that's all the money there is'

In the 1f. States Cluster, we see the [state as container] metaphor (Lakoff and Johnson, 1980), in which a tr is physically located within a certain state (29 a-c). Its extensions include: 1fi. Physical States (29 d-f); 1fii. Achieved (or derived) State (29 g-i); 1fiii. Changing States (i.e. changing from *being in* one state to *being in* another) (29 j-l); and 1fiv. In charge of (29 m-o).

- (29) a. *duine a chur ina thost*
 person:NP to:PP put:VN in:PP+POS
 silence:NP
 'to silence, humble, chasten someone'
- b. *bheith i do shaol is i do shláinte*
 be:VN in:PP your:POS life:NPand:COP in:PP your:POS
 health:NP
 (to be in your life and in your health)
 'to be alive and well'
- c. *i n-éag*
 in:PP death:NP
 'dead'

- d. *tá mé i mo lui*
am:V-PR I:PN in:PP my:POS lying:NP
(I am in my lying)
'I am lying down'
- e. *tá mé i mo chodladh*
am:V-PR I:PN in:PP my:POS sleeping:NP
(I am in my sleep)
'I'm sleeping'
- f. *tá mé i mo sheasamh*
am:V-PR I:PN in:PP my:POS standing:NP
'I'm standing'
- g. *tá sí ina bainisteoir*
is:V-PR she:PN in:PP+her:POS manager:NP
(she is in her manager)
'she's a manager'
- h. *ag dul sna sagairt*
at:PP go:VN in:PP+DET-pl priests:NP-pl
(to go into the priests)
'joining the priesthood'
- i. *sagart atá ann*
priest:NP REL+is:V-PR in:PP+him:PN
(there is a priest in him)
'he's a priest'
- j. *cuirim i méid*
put-V-PR-1sg in:PP quantity:NP
(I put in quantity)
'I make larger'
- k. *cuirim i gcruinneas*
put-V-PR-1sg in:PP accuracy:NP
(I put in accuracy)
'I make more accurate'
- l. *téim i bhfeabhas, i bhfad, i laighead*
go-V-PR-1sg in:PP excellence:NP in:PP length:PP in:PP
smallness:NP
(I go in excellence, in length, in smallness)
'I become better, longer, smaller'
- m. *i bhfeighil an tí*
minding:PPc DET-gen house:NP-gen
'minding the house'
- n. *i gcionn*
in charge of:PPc
'in charge of'
- o. *i mbun*
in charge of:PPc
'in charge of'

In the seventh [containment] schema, 1g. [centre-periphery] (Johnson 1987), the contained tr is located at a certain distance between the lm's centre and its boundary (figure 4.11 (d)). Some examples are given in 30.

- (30) a. *i lár na habhann*
 in the middle of:PPc DET-gen river:NP-gen
 'in the middle of the river'
- b. *i lár an bhaile*
 in the middle of:PPc DET-gen town:NP-gen
 'in the middle of the town'

The second sense of *i* is represented by the 2. [path] schema (figure 4.12 (a)), in which a tr moves towards a lm along a path (31 a-c). This schema is generally used for indefinite places, and its extensions are 2a. Counterforce (31 d-e), and 2b. Causative (31f). In 2a. Counterforce (figure 4.12 (b)), the usual path of the lm is challenged or interrupted by a [counterforce] force (Johnson, 1987). In 2b. the source of the tr's path is a metaphor for the cause or reason for an action path as per [purpose as physical goal].

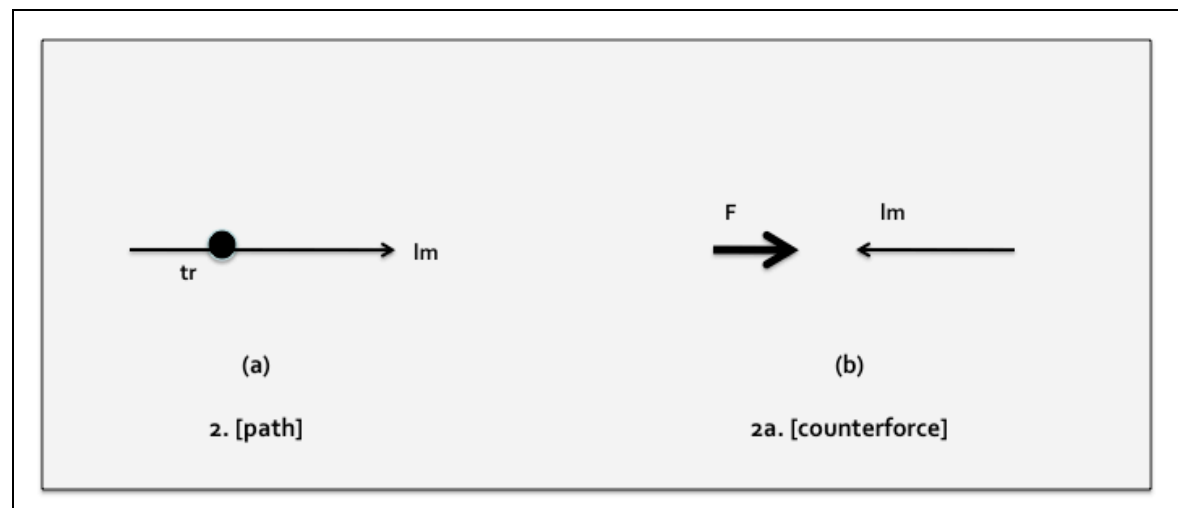


Figure 4.12: *I* [path] Schemas 2, 2a

- (31) a. *i dtreo an chúil*
 in the direction of:PPc DET-gen goal:NP-gen
 'in the direction of the goal'
- b. *ag dul in áit éigin*
 at:PP go:VN in:PP place:NP some:ADJ
 (going in some place)
 'going somewhere'
- c. *tháinig said i dtír*
 came:V-PT they:PN in:PP land:NP
 (they came in land)
 'they came ashore'
- d. *in éadan na gaoithe*
 against:PPc DET-gen wind:NP-gen
 'against the wind'
- e. *i gcoinne na Rúise*
 against:PPc DET-gen Russia:NP-gen
 'against Russia'

- f. *i ngeall ar* *an stailc*
 because of:PPc DET-gen strike:NP-gen
 'because of the strike'

4.2 Summary of Image Schema Profiles

In section 4.2.1 we presented the image schema profiles for *ag*, *faoi* and *i*, taken from an authentic Irish prepositional corpus (Manning, 2009). We found a range of image schemas and conceptual metaphors, which have been identified, in previous studies for other languages. In our analysis we followed Grady (2005) and redefining previously identified image schemas and metaphors when necessary as image schemas, response schemas, primary metaphors and metaphors. We also proposed a new category, the focus schema, which focuses attention on one aspect or stage of an image or response schema; and have proposed new schemas and metaphors for our dataset, which have not been identified previously in other studies. Table 4.1 summarises the range of schemas and metaphors we have identified for *ag*, *faoi* and *i*, with original schemas and metaphors proposed in Manning (2009) listed in bold typeface. For a complete analysis of Irish prepositions with the full range of schemas and metaphors identified, see Manning (2009).

We see in table 4.1, how basic image schemas are combined with each other and abstracted via primary and conceptual metaphor, and how certain stages of a schema may be highlighted and focused upon with a [focus schema]. For example [path] is combined with [near-far] and [scale] to give the [near-far-scale-path], which itself has focus schemas such as [collocation] and [proximity]. The basic sensory-motor [containment] schema is the source for the target basic, non-perceptual primary metaphor [body as container], in which the human body is perceived as a container; and for the target abstract, non-perceptual metaphor [body as container for personal quality], in which an experiencer's qualities or traits are perceived as being contained within their human body. We thus see how an image schema profile for polysemous prepositions identifies the chain of abstraction in the language from basic sensory-motor concepts to more complex and abstract concepts. In section 5 we discuss and conclude on the usefulness of the image schema approach applied to Irish prepositions.

Image Schemas	[compulsion], [containment], [path], [vertical orientation]
Response Schemas	[centre-periphery], [collection], [near-far], [scale], [splitting]
Focus Schemas	[collocation] , [group member focus] , [proximity]
Primary Metaphors	[body as container], [collocation as possession] , [purpose as physical goal]
Metaphors	[being subject to control as down], [body as container for personal quality] , [category as container], [communication as conduit], [emotion as possessed object], [existence as container] , [inanimate entity as body] , [physical state as entity within person], [time as stationary]

Table 4.1: Summary of schemas and metaphors for *ag*, *faoi* and *i*

5. Conclusion

We have presented the image schema analysis for the Irish prepositions *ag*, *faoi* and *i*, from our earlier corpus analysis in Manning (2009). From the corpus dataset for each preposition we identified the full range of their meaning senses following the principled polysemy approach of Tyler and Evans (2003), in which additional meaning senses are specified only when they provide new semantic information which may not be inferred from context. These polysemous meaning senses were then presented in a radial structure organisation, illustrating how a central basic sense is schematically linked to extended abstract senses. We then identified the image schema profile for each preposition, giving insight into the schematic organisation of meaning senses across the polysemous radial structure.

In our presentation of the image schema profiles, we followed Grady's approach in his rigorous definition of image schema as that which is basic and sensory-motor, and also followed his definition of response schemas and primary metaphors (Grady, 2005). In addition we included the focus schema, proposed in Manning (2009) to clearly identify when there is focus of attention on certain stages of image schemas and response schemas. We thus have presented a clear image schema profile for each of the prepositions, with the range of schemas and metaphors summarised in table 4.1 (including original schemas and metaphors yielded by our Irish dataset); and have shown transparently how non-perceptual and abstract concepts are grounded in sensory-motor basic concepts.

In this paper we have shown that the image schematic profiles for the Irish prepositions *ag*, *faoi* and *i* account for the range of their meaning senses, demonstrating clearly how the polysemous meaning senses are composed of various schemas and metaphors, and how the radial structure organisation connects abstract concepts schematically with more basic pre-conceptual structures (see Manning, 2009 for a full presentation of research for Irish prepositions). We thus argue that the image schema model illustrates the fundamental grounding of language in sensory-motor concepts, and how our understanding of abstract concepts is possible only as a result of the embodied nature of the human mind.

References

- Discover Irish Resource. (2009). At <http://www.uni-due.de/DI/Prepositions.htm> [Ref: June 2009]
- Grady, Joseph E. (2005). *Image schemas and perception: Refining a definition*. In Hampe, Beate (ed.) 2005. *From Perception to Meaning. Image Schemas in Cognitive Linguistics*. Cognitive Linguistics Research 29, pps. 35-55. Berlin: Mouton de Gruyter.
- Hampe, Beate. (2005). *Image schemas in Cognitive Linguistics: Introduction*. In Hampe, Beate (ed.) 2005. *From Perception to Meaning. Image Schemas in Cognitive Linguistics*. Cognitive Linguistics Research 29, pps. 1-12. Berlin: Mouton de Gruyter.
- Johnson, Mark. (1987). *The Body in the Mind. The Bodily Basis of Meaning, Imagination, and Reason*. London: University of Chicago Press.
- Lakoff, George. (1987). *Women, Fire, and Dangerous Things. What Categories Reveal about the Mind*. London: University of Chicago Press.
- Lakoff, George and Mark Johnson. (1980). *Metaphors we live by*. London: The University of Chicago Press.
- Langacker, Ronald. (1987). *Foundations of Cognitive Grammar: Theoretical Prerequisites*. Volume I. London: Stanford University Press.
- Manning, Molly. (2009). *An Image Schema Account of Irish Prepositions*. Unpublished M Phil dissertation, Trinity College Dublin.
- Ó Baoill, Dónaill. (1996). *An Teanga Bheo. Gaeilge Uladh*. Baile Átha Cliath: Institiúid Teangeolaíochta Éireann.

- Ó Siadhail, Mícheál. (1991). *Modern Irish. Grammatical Structure and Dialectal Variation*. Cambridge: Cambridge University Press.
- Ó Siadhail, Mícheál. (2000). *Learning Irish*. Bath: The Bath Press.
- Radden, Günter and René Dirven. (2007). *Cognitive English Grammar. Cognitive linguistics in practice*. Volume 2. Amsterdam: John Benjamins Publishing.
- Stefanowitsch, Anatol and Stefan Thomas Gries. (2006). *Corpus-based approaches to metaphor and metonymy*. Berlin: Mouton de Gruyter.
- Talmy, Leonard. (2000a). *Toward a Cognitive Semantics: Concept Structuring Systems*. Volume 1. London: MIT Press.
- Talmy, Leonard. (2000b). *Toward a Cognitive Semantics: Typology and Process in Concept Structuring*. Volume 2. London: MIT Press.
- Tyler, Andrea and Vyvyan Evans. (2003). *The Semantics of English Prepositions. Spatial Scenes, Embodied Meaning and Cognition*. Cambridge: Cambridge University Press.

Polysemy and homonymy and their importance for the study of word meaning

Amanda McCaughren

Centre for Language and Communication Studies

Trinity College Dublin

Abstract

In this article we examine the concepts of polysemy and homonymy. After a broad overview of the topic we focus on the treatment of several examples in dictionaries and indicate how listing problems can arise. We look at how polysemy and homonymy are dealt with in Chinese - a language rich in ambiguous words full of connotations and associations and we look at some of the ensuing problems facing Chinese dictionary writers and suggest a user friendly model for ambiguous lexical entries. We explore how several English words such as the polysemous preposition 'over' can be dealt with in terms of image schemas and how this indicates a structured system in the mental lexicon. Vyvyan Evans' treatment of 'time' is also examined, his argument as to how it might be arranged in semantic memory and his conclusions about the lexicon having systematic semantic structure. We conclude by conceding that more work is required before the issues addressed in this paper can be unambiguously resolved.

1. Introduction

The aims of this paper are to examine the notions of homonymy and polysemy and their importance in regard to word meaning. *"If I accomplish nothing else in this story, I hope I will persuade you that human language is so vague and ambiguous that only a very clever brain could possibly understand it"* (Miller 2001, p.1) The hope of resolving the issue of how to deal with ambiguous words and their polysemous or homonymous nature in Miller's article while enthraling the reader disappoints at the end as he concludes with the notion that in fact more study on the subject is required before absolute resolution can even be approached. While context and general knowledge are useful tools it would seem there is no single clear cut way of resolving the issues without further study and research.

I propose to introduce and give a broad outline of the topic of polysemy and homonymy with some background information; discuss how polysemy and homonymy are sometimes dealt with in Chinese and indicate a theoretical model for lexicographers which tries to clarify meaning; examine how polysemy and homonymy are dealt with in English specifically the preposition *over* and explore Evans' approach to polysemy and the lexeme *time* and conclude with some suggestions for further exploration. I will now clarify and give examples of homonyms and polysemes and indicate how problems can arise and how examples of some of these words are listed in dictionaries. The word *bank* as in *a river bank* and *Bank of Ireland* are two semantically unrelated words and are known as homonyms. However, if we look at the word *mole* as in *the mole burrowed into the ground* and *MI5 found the mole* we can see that there might be a semantic link. *Mole* in these two phrases is an example of polysemy.

In French, for example *seul* means both alone and lonely, a case of polysemy. *Voler*, on the other hand means *fly* and *steal*, an example of a homonym. However, although they are listed as different words in the dictionary, they both derive from the Latin word *volare*. This last example suggests potential problems in deciding whether a word is a case of polysemy or homonymy. This is not a problem we encounter in everyday communication as we know which sense is being referred to by contextual clues, it is

however, a problem for dictionary compilers. “[...] *polysemy poses a problem in semantic theory and in semantic applications, such as translation or lexicography*” (Ravin & Leacock 2002, p.1). Generally polysemes are listed under a single entry whereas homonyms are listed under several entries. However, there can be differences from one dictionary to another. Languages are also constantly changing. Word meanings change over time and new uses and meanings replace old ones. The word *gay* in English or *gaio, gai, guei, gay, gaiato, gaius, alegre, alegrinho, alegrete* in Portuguese once meant *joyful, cheery, bright, lively*. Nowadays it is a neutral term in both languages for *homosexual*. Another example is the word *wan* (Old English *wann*) which originally referred to the night or darkness. In late Middle English, it developed its modern sense of *pale*. From being used to refer to the unhealthy pallor of a person’s face when ill it came to mean *livid*, then *pale*. When both meanings are almost opposites, it is inevitable that over time one meaning survives and the other does not. However, in some cases multiple meanings coexist as existing words are applied to new situations.

2. Polysemy vs homonymy - an overview

I will now give some historical background to polysemy and homonymy and briefly mention how lexicographers attempt to address problems which arise in cases of vagueness. Polysemy comes from the Greek word *πολυσημεία* which means ‘multiple meaning’. An example is where *mole*, in the introduction, refers to *a small burrowing animal* and also *a spy burrowing for information*, *mole* refers to different things but the meaning derives from the *small burrowing animal* meaning. In polysemy meanings are usually etymologically and semantically related and have often at one point been used in metaphors. In homonymy, they are etymologically unrelated. A homonym is a word that has the same pronunciation and spelling as another word but has a different meaning. An example of homonymy in English is the word *stalk* which means to follow someone around and it also refers to a part of a plant or flower. The meanings, unlike in cases of polysemy, are not related to each other in any way semantically, they are completely different.

A problem arises when etymologically related words drift apart over time and the semantic value changes in relation to the original meaning. The problem of vagueness arises too, ‘The distinction is between those aspects of meaning that correspond to multiple senses of a word versus those aspects that are manifestations of a single sense.’ (Ravin & Leacock 2002, p.2). In spite of logical tests, linguistic tests and definitional tests being proposed by Geeraerts (1993, pp.223-272) to attempt to solve this problem of vagueness, the nature of their unsatisfactory results have raised questions about how we view meaning and lexical semantics. Ravin and Leacock (2002, p5) suggest ‘Meanings may not be fixed entities, but rather different overlapping subsets of semantic components...[...]’.

According to Lyons (1977, p.550) lexicographers generally apply two important criteria to lexemes when deciding polysemy and homonymy. One is the ‘historical derivation of words’ (Lyons 1977, p.550) and the other ‘in drawing the distinction between homonymy and polysemy is unrelatedness vs. relatedness of meaning’ (Lyons 1977, p.551). Ahrens, Chang, Chen & Huang (1998) offer an alternative model for lexicographers of Chinese.

2.1 Homonymy and polysemy in Chinese

I will now look at how polysemy and homonymy are dealt with in Chinese - ambiguity; problems the written and spoken systems present; and a suggested model for lexical entries. Homonyms are widespread in the Chinese language. Many homonyms can have positive or indeed taboo connotations and associations.

- (1) Qín is the word for celery
- (2) Qínláo is the word for industrious

There is a belief in Chinese culture that eating celery will make you industrious. On the other hand the word for *four* is *sì*. The word for *die* is also *sǐ*. Some people refuse to live on the fourth floor of a building or buy an apartment numbered 4. The Chinese also believe that it is inappropriate to give a clock as a gift as the word for *clock* - *zhōng* is the same as the word for *end* - *zhōng* and it is believed that a gift of a clock will bring death – the end of a life. Jordan (2006) remarks ‘A restricted syllable inventory and syllable-level semanticity, tend in combination to generate homonyms. The tendency of spoken language to favour bisyllabic compounds, which reaches even to synonym compounds, has the effect of disambiguating those homonyms’ (Jordan 2006, p.5)

He illustrates this point with the following example :

- (3) biān = edge; whip; compile; bat; to pierce with a stone probe
- (4) fú = prop up; prisoner; fall; not; thus; bat; happiness; float

“In isolation, the syllable biān is ambiguous because of this homonymy. The same thing is true of the syllable fú. But the combination biānfú can mean only "bat." (Similarly yīfú can mean only clothing.) Although we can say that biānfú is the only "word" that colloquially means "bat," that is a bit misleading, for biān or fú alone can suffice if it happens to enter into another bisyllabic compound. Thus we can combine either element with "wing" yì to make biānyì or fúyì "bat wings." (Jordan 2006). Examples of polysemy in Chinese are: The word ‘magazine’ in Chinese ‘zazhi’ can refer to the physical object itself, the information in it or the publisher. Here the word has several related meanings.

- (5) “ta shou shang na le ben zazhi
he hand on hold asp. CL magazine
‘He is holding one magazine in his hand’
- (6) women cong zazhi zhong dedao xuduo baoguide ziliao
we from magazine within obtain many precious data
‘We have obtained a lot of precious data from magazines’
- (7) meiguo ge da zazhi wubu wakong xinsi zhengqu caifang jihui
America every big magazine do dig-empty mind fight for interview chance
‘Major American Magazines fight for interview opportunities’.”
(Ahrens, Chang, Chen and Huang 1998, p.47)

Some problems also arise between the writing and spoken systems of Chinese. The writing system is independent of sounds, it is a generic system, so all dialects can use it, but equally it represents no particular dialect. Secondly, the two systems differ from each other as written Chinese does not have the same syntax as the spoken language where multiple syllables are ‘critical to disambiguating homonyms’ (Jordan 2006).

There is a separate morphology and grammar between what is read/written and what is spoken. The writing system is so different to the spoken system that what is written has to be ‘translated’ before it is spoken. This has presented dictionary writers of Chinese with a constantly changing and enlarging lexicon so Chinese lexicographers are faced with similar challenges to their English speaking counterparts when it comes to polysemy and homonymy. Ahrens, Chang, Chen & Huang (1998, p.59) suggest a model which links ‘meaning facets’ for dealing with ambiguity and vagueness and suggest a model for lexical entries:

[...] our account postulates multiple senses and structured ways of linking additional meaning facets to the senses so that the information is all listed in the representation, and therefore easier to access. Our proposal is to have not only the different senses of a word listed, but also its different meaning facets. We claim that there are conceptual or logical relationships between the facets and their senses[....]’

Their model is essentially user friendly and ‘Conceptually it is as explanatory as a theory where all the meaning links are structurally represented’. (Ahrens, Chang, Chen & Huang 1998, p.59) They suggest an example of how this might work (8) – (9). In (10) we give an example of a word with four different senses, of which one has three different meaning facets.

(8) --Sense1: **MEIHUA plum flower**

-- meaning facet1: *physical object: the blossom*

-- meaning facet2: *the whole plant contains the blossom*

(9) --Sense1: **BAICAI Chinese cabbage**

-- meaning facet1: *physical object: the vegetable*

-- meaning facet2: *the cooked form of it*

(10) --Sense1: **TIAN sky** -- meaning facet1: *sky as a physical object (that can be viewed)*

-- meaning facet2: *God/heaven*

-- meaning facet3: *weather*

--Sense2: **TIAN time**

--Sense3: **TIAN day**

--Sense4 : **TIAN nature** (Ahrens, Chang, Chen & Huang 1998, p.53)

Their system for deciding on if a meaning is a sense or a meaning facet is derived from their theory that a meaning facet has three properties. These are: “1) *it can appear in the same context as other meaning facets*, 2) *it is an extension from a core sense or from another meaning facet (unless it is the core sense)*, 3) *nouns of the same semantic classes will have similar sense extensions to related meaning facets*. Individual senses, on the other hand, 1) *cannot appear in the same context (unless the complexity is triggered)*, 2) *have no core sense from which it is extended, or it is very hard to concisely define what the core sense would be*, and 3) *no logical/conceptual links can be established between two senses, nor can the link between two senses be inherited by class of nouns*.” (Ahrens, Chang, Chen & Huang 1998 p53). By using their system they ensure that only one sense can occur in any given context.

2.2 Polysemy and homonymy in English

In this section, I will discuss polysemy and homonymy in English with particular reference to the polysemous preposition *over*. I will go on to discuss the idea of polysemous words being expressed in terms of image schemas and show how senses of

a particular word are linked in a structural way and how this should ease the task of the lexicographer. The polysemous proposition *over* appears in the Merriam-Webster Online dictionary as having 78 entries. The first five are expressed thus :

(11) Main Entry: ¹**over**

Pronunciation: 'O-v&r

Function: *adverb*

Etymology: Middle English, adverb & preposition, from Old English *ofer*; akin to Old High German *ubar* (preposition) above, beyond, over, Latin *super*, Greek *hyper*

1 a : across a barrier or intervening space; *especially* : across the goal line in football **b** : forward beyond an edge or brink and often down <wandered too near the cliff and fell *over*> **c** : across the brim <soup boiled *over*> **d** : so as to bring the underside up <turned his cards *over*> **e** : from a vertical to a prone or inclined position <knocked the lamp *over*> **f** : from one person or side to another <hand it *over*> **g** : ACROSS <got his point *over*> **h** : to one's home <invite some friends *over*> **i** : on the other side of an intervening space <the next town *over*> **j** : to agreement or concord <won them *over*>

2 a (1) : beyond some quantity, limit, or norm often by a specified amount or to a specified degree <show ran a minute *over*> (2) : in an excessive manner : INORDINATELY **b** : till a later time (as the next day) : OVERNIGHT <stay *over*> <sleep *over*>

3 a : ABOVE **b** : so as to cover the whole surface <windows boarded *over*>

4 -- used on a two-way radio circuit to indicate that a message is complete and a reply is expected

5 a : THROUGH <read it *over*>; *also* : in an intensive or comprehensive manner **b** : once more : AGAIN <do it *over*>

Source : <http://www.m-w.com/dictionary/over>

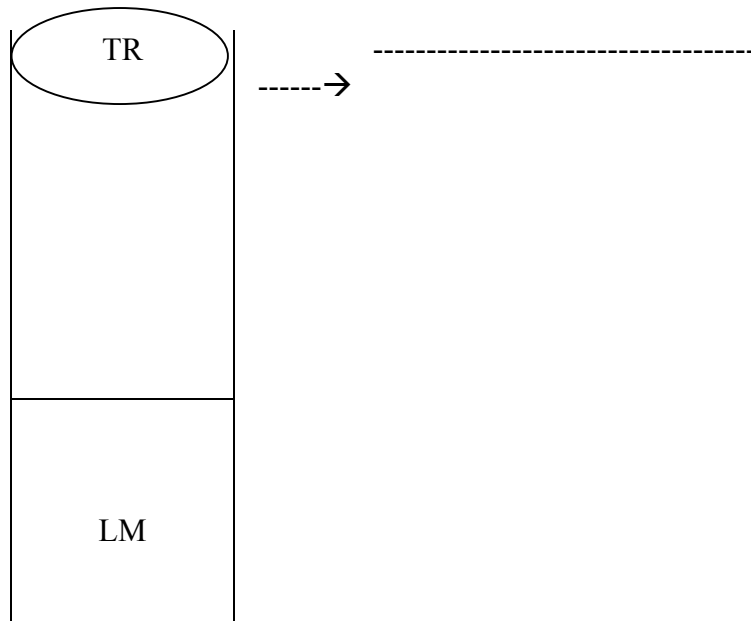
Language which displays polysemy can be expressed in terms of image schemas. According to Saeed (2003, p357), 'G. Lakoff (1987) uses the term **radical category** for the characteristic pattern produced by the metaphorical extension of meanings from a central origin'. Prepositions are an example of this in English. Topographical or containment approaches may be used in the description of polysemy of prepositions. The former approach can be taken in the following examples proffered by Brugman & Lakoff 1988, where the preposition *over* is explored :

- (12) The plane is flying over the hill.
- (13) Sam walked over the hill.
- (14) The bird flew over the yard
- (15) The bird flew over the hill.
- (16) Sam lives over the hill.
- (17) The painting is over the mantel.
- (18) The board is over the hole
- (19) She spread the tablecloth over the table.
- (20) The city clouded over.
- (21) The guards were posted all over the hill.
- (22) Harry still hasn't gotten over his divorce

Saeed (2003, p.359) refers to a 'Path image schema' by way of illustration, using the term 'trajector' (TR) to refer to the 'moving entity' and the term 'landmark' (LM) to refer to 'the background against which movement occurs'. An example of how this Path schema might work is from Brugman and Lakoff (1988, p.482).

It shows the above-across sense of over as in (12a) from above:

(12a) The plane is flying over the hill.



'The relationship between the different sense groups of *over* is structured and 'the processes which extend senses from a central prototype to form a radial category are systematic and widespread and not arbitrary' (Saeed 2003, p361).

3. Evans' Approach to the Polysemy of Time

In this section I will discuss Vyvyan Evans' treatment of *time* and how it is arranged in semantic memory and in particular his proposal for identifying *time* as a distinct sense and his conclusions about the lexicon having systematic semantic structure. Vyvyan Evans (2005) argues that 'time constitutes a lexical category of distinct senses instantiated in semantic memory' (Evans 2005, p. 33). He sees the senses of *time* organised into a network centred around a central sense which he calls the 'sanctioning sense'. The central sense interacts with structuring, conceptual processing and context to produce different senses associated with *time*. Similar to Saeed's view, Evans in his model, suggests that the lexicon is not arranged arbitrarily but in a structured system. He has devised three criteria for establishing what constitutes these distinct senses: a) a meaning criterion, b) an elaboration criterion, and c) a grammatical criterion. His approach is at odds with the generative approach of Pustejovsky (1995) who argues for 'a single meaning approach to polysemy'. The idea of a rule-governed lexicon can be linked to Chomsky who understands the lexicon 'in a traditional sense : as a list of "exceptions", whatever does not follow from general principles' (Jackendoff 1997, p4) also viewing the lexicon as 'a finite set of [discrete] memorised units of meaning'. However, this position cannot account for the fact that there is a systematic relation between some forms. Also it doesn't address the semantic complexity of even simple sentences nor is meaning finite as is suggested here. Evans believes that Pustejovsky's 1995 approach suggests an inaccurately over simplified representation of word meaning and his approach cannot be applied to complex abstract concepts like *time* as it is harder to relate *time* to something concrete in reality.

Evans takes a different approach which represents semantic meaning at the conceptual level. He says '[...], the fact that a lexeme such as *time* appears to be polysemous in linguistic terms follows from, and reflects, the way it is organised at the conceptual level'. (Evans 2005, p.36). Like Langacker (1987), Evans treats lexemes as 'points of access' (Langacker 1987) 'into a rich network of encyclopaedic meaning'. (Evans 2005, p.37) He regards the senses associated with a lexical item as a 'continuum of meaning', with the senses of the lexeme organised as a network around the central sense. While much work has been done on image-schema representations of, for example, polysemy of prepositions, much less has been done on a polysemous noun concept like *time*. Evans refers to 'principled polysemy' in which 'lexical concepts are treated as being mutable and dynamic in nature'. (Evans 2005, p.38) Principled polysemy recognises that not all senses of a lexeme (such as they are and such as they may change over time) 'are recognised by the language user as being related at the synchronic level' (Evans 2005) and this, he suggests, accounts for the polysemy of *time*. His principled polysemy approach suggests the senses of *time* are derived from a historical sense; synchronically the senses can be related semantically and also linked with the old historical senses. Evans proposes 'three criteria for determining whether a particular instance of 'time' counts as a distinct sense'. (Evans 2005, p.41) They are: a) Meaning criterion – whereby lexical concepts must have a distinct meaning; b) Concept Elaboration Criterion and c) Grammatical Criterion whereby lexical concept has distinct structural dependencies. His 'criteria for determining the appropriate Sanctioning Sense for *time* include linguistic evidence combined with empirical evidence, more specifically: 1) historically earliest attested meaning, 2) predominance in the semantic network, in the sense of type-frequency, 3) predictability regarding other senses, and 4) a sense which relates to lived human experience of time, i.e. experience at the phenomenological level. (Evans 2005, p.44). An example of an earliest sense of time may be in relation to duration eg :

(23) I recovered after a short time

A later sense that has developed in *time is running out* is often associated with disaster situations where rescue attempts are made and there is a finite length of *time* within which the rescue must take place. Here the sense has changed from duration to *time* being a finite sense. *Time* is now becoming an entity and this can be seen with the later usage *time is money*. It is now a valuable and finite entity. *Time* as a commodity can now 'be bought and sold'. (Evans 2005, p.47). While cognitive linguistic research shows that word senses are context dependent, context dependent senses are 'mutable' (Langacker 1987). Evans, however, focuses on the more 'stable' senses when discussing *time* and suggests that establishing generalised criteria for determining stable aspects will have to be developed along with how they combine with context in order to produce novel meanings. Evans concludes in agreement with Lakoff 1987 and Saeed 2003 that the lexicon is systematically structured. He employs three criteria to establish what constitutes a distinct sense. He also claims that there exists a certain 'redundancy' in the lexicon '*This [...] is at odds with 'single-meaning' approaches to polysemy which posit highly underspecified lexical meta-entries, such as the derivational approach of Pustejovsky (1995)*' (Evans 2005, p.72).

In this section I have discussed Evans' treatment of *time*, the criteria he applies to an instance of time to discover if it is a distinct sense; the criteria he applies to find the appropriate 'Sanctioning Sense' for *time* and his conclusions that the lexicon is

arranged in semantic memory as a systematic structure. In terms of the job of the lexicographer, the arrangement of the written English lexicon would perhaps best serve the reader by reflecting the system found in semantic memory.

4. Conclusions

There is a grey area where concepts of polysemy and homonymy meet. When a word (eg old English *wann*) develops a new meaning it sometimes loses the old one or can end up having two contradictory meanings. There is no doubt that polysemy makes communication easier but then confusion can arise when senses shift. Dictionaries also differ in their decisions whether to list a word as a polysemous entry or as an homonymous one. George Lakoff's findings are based on the results of various researchers' studies on image-schematic analysis of French, for example, and research on prepositions (as we have seen in *over*). I agree with his suggestion that most research in these areas concludes the following:

- (24) a. The word *over* and other examples in the research are polysemous and can't be represented by a single meaning that represents all the senses
- b. Image schemas can be used to express these words
- c. Image schemas provide a structure by which each sense of a meaning can be represented
- d. The less obvious senses while not directly linked to the central sense provide a type of linked structure to the central meaning

When a polysemous word occurs in everyday communication, we have the ability to select the context-related meaning very rapidly. It would seem that the meaning chosen forms a part of a mental representation of what is going. Perhaps it is a result of using mental representations or schema to select the correct meaning. If two meanings fit the criteria, however, then ambiguity arises. Problems can also arise when two people's mental representations are not the same and this is possible where there are cultural differences say between a Chinese person speaking English and a native English speaker in conversation (where, for example, ideas of spatial configuration/image schemas differ). Misunderstanding can thus take place as people have different mental representations of what is being said. Ahrens, Chang, Chen & Huang's model for dealing with lexical ambiguity and vagueness offers one solution to the problem and allows for a simplified organisation of lexical entries. Evans suggests that the polysemous noun '*time* constitutes a lexical category of distinct senses instantiated in semantic memory' (Evans 2005, p.33) The senses associated with *time* interact between a central Sanctioning Sense, conceptual processing, structuring and context. 'Hence, semantic representations, cognitive mechanisms, and situated language use are appealed to in accounting for the polysemy associated with *time*' (Evans 2005 p33) The model he uses is principled polysemy and concludes that the lexicon is not an arbitrary collection of unrelated lexemes but rather a complex organised system of senses in the semantic memory. While earlier examples of polysemy in this paper included the preposition '*over*', an examination of the lexeme *time* shows that *time* as an abstract concept is a member of a very different type of lexical class and its polysemous nature shows systematicity between its senses. Thus, it is fair to conclude as I began that '[...] human language is so vague and ambiguous that only a very clever mind could possibly understand it' (Miller 2001) and clearly more work is required before such complex issues as homonymy and polysemy are clearly and unambiguously resolved.

5. References

- Ahrens, K., Chang, L., Chen, K., Huang, C., 1998: *Meaning Representation and Meaning Instantiation for Chinese Nominals*, in *Computational Linguistics and Chinese Language Processing*. Vol. 3, No. 1, pp.45-60
- Brugman, C., & Lakoff, G., 1988: Cognitive Topology & Lexical Networks, in S. Small, G. Cottrell and M. Tananhaus (eds) *Lexical Ambiguity Resolution : Perspectives from Psycholinguistics, Neuropsychology and Artificial Intelligence*, pp. 477-508. San Mateo, CA : Morgan Kaufmann.
- Evans, V., 2005: *The Meaning of Time : Polysemy, the Lexicon and Conceptual Structure*, in *Journal of Linguistics*, 41 pp.33-75. CUP
- Geeraerts, D., 1993: Vagueness's Puzzles, Polysemy's Vagaries, in *Cognitive Linguistics* 4(3), pp223-72 . Oxford.
- Geeraerts, D., 1994: Polysemy in R.E. Asher and J.M.Y. Simpson (eds), *The Encyclopedia of Language and Linguistics*. Oxford and New York Pergamon.
- Jackendoff, R., 1997: *The Architecture of the Language Faculty*. Cambridge, MA : MIT Press
- Jordan, D.K., 2006: The Chinese Language, in *Jordan's China Handbook*.
<http://weber.ucsd.edu/~dkjordan/chin/hbchilang-u.html>
- Lakoff, G., 1987: *Women, Fire and Dangerous Things : What categories reveal about the mind*. Chicago: University of Chicago Press.
- Langacker, R., 1987: *Foundations of Cognitive Grammar* (Vol. 1) Stanford, CA : Stanford University Press.
- Lyons, J., 1977: *Semantics* Vol 2. Cambridge University Press.
- Merriam-Webster Online Dictionary. <http://www.m-w.com/dictionary/over>
- Miller, A. G., 2001: *Ambiguous Words*. Originally published March 2001 in *Impacts Magazine*. Published on kurweil.ai.net May 15 2001.
- Pustejovsky, J., 1995: *The Generative Lexicon*. Cambridge, MA : MIT Press.
- Ravin, Y. & Leacock, C., 2002: Polysemy : An Overview, in *Polysemy, Theoretical and Computational Approaches*. Oxford Linguistics.
- Saeed, J., 2003: *Semantics*. Second Edition. Blackwell Publishing.

ITB Journal



<http://www.itb.ie/ResearchatITB/itbjournal.html>