ITB Journal

Issue Number 21, May 2011

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The academic journal of the Institute of Technology Blanchardstown
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Editorial

I am delighted to introduce the **21st edition of the ITB Journal**, the academic journal of the Institute of Technology Blanchardstown.

The first paper by **Ruth Harris**, '*Participation in Third Level Education: Issues for Non-Native Speakers of English*', reports on research carried out as part of a SIF (Strategic Innovation Funding) project on *Widening Participation in Third Level Education*, under the DRHEA (Dublin Regional Higher Education Alliance). For the conduct of this project, the Institute of Technology in Blanchardstown received funding to investigate issues relating to English language literacy levels and access to and achievement at third level education. The overall aim of the project was to evaluate the issues, develop effective interventions and provide guidelines for best practice with a view to increasing the participation of diverse groups in third level education. Non-native speakers of English were identified as a primary group whose participation and success in third level education was considered contingent on acquiring appropriate English language skills. This paper reports on the project and its concerns with the design of an effective intervention. It examines the context of the project and second language proficiency development plus identity and second language acquisition. Additionally it seeks to define second language literacy issues relevant to third level education.

The second paper by **Judith Gottschalk** of the Ruhr-Universität Bochum, Germany is a linguistic study called 'The precore slot in Icelandic: A topological analysis of V2-clause structure within Role and Reference Grammar'. Specifically, this paper presents an analysis of the precore slot [PrCS] in Icelandic within the theory of Role and Reference Grammar. Based on the analysis of the PrCS in German by Diedrichsen (2008), an analysis of simple main declarative active voice sentences in Icelandic is presented. The topological model of Danish sentence structure developed by Diderichsen (1945, 1964), which was adopted for Icelandic in Thráinsson (2007), is used to analyze the layered structure of the clause [LSC] in Icelandic. In Icelandic, different readings of modal verbs indicate the position before the finite verb should be regarded as core-external position due to the operator scope.

In the third paper, '*Towards a Linguistically Motivated Irish Sign Language Conversational Avatar'*, **Irene Murtagh** discusses recent preliminary research work in progress in the development of an avatar for Irish Sign Language understood as an embodied conversational agent. Her plan is to use Role and Reference Grammar as the linguistic 'engine' in this development for Irish Sign Language. This paper discusses the work in progress in the development of an embodied conversational agent to encode gesture, while also discussing the use of Role and Reference Grammar, a functional model of grammar, in the development of a parser/generator for sign language.

The final paper, by **Richard Brophy**, entitled '*Autonomy of a Rebrand: How Aviva came to Ireland'* charts the rebranding of the Hibernian Group companies in Ireland to Aviva in a manner that kept business as usual, without harming the rich tradition and brand heritage crafted over 100 years. This interesting paper examines the progression of Hibernian to Aviva through academic literature and the course that

Aviva pursued in Ireland to rename an established insurance brand cherished by both the industry and public alike.

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

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Participation in Third Level Education: Issues for Non-Native Speakers of English

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1. Introduction

In 2008, as part of a SIF (Strategic Innovation Funding) project on *Widening Participation in Third Level Education*, under the DRHEA (Dublin Regional Higher Education Alliance), the Institute of Technology in Blanchardstown received funding to investigate issues relating to English language literacy levels and access to and achievement at third level education. The overall aim of the project was to evaluate the issues, develop effective interventions and provide guidelines for best practice with a view to increasing the participation of diverse groups in third level education. Non-native speakers of English were identified as a primary group whose participation and success in third level education was considered contingent on acquiring appropriate English language skills.

Initially non-native speakers of English identified as needing such support fell into three main categories. Firstly students from migrant backgrounds[1]who had already entered third level education but were found to be underachieving or at risk of failing due to inadequate language skills. Secondly, newcomer[2]students whose first language is not English at the upper end of second level education aiming to go on to third level education whose grades may not reflect the full extent of their subject knowledge, but rather their competence in English. This is a deficit these students are likely to bring with them into third level education. A third group identified consisted of adult migrants in the community who may be interested in pursuing third level studies but see language as a potential barrier. These may be people who have never studied at third level and feel ill-equipped to deal with the demands of academic content through a second language. Others may already have third level qualifications from other countries which they now wish to add to or validate through the attainment of qualifications in Ireland, but lack the competence in English to transfer their first language knowledge to a second language context.

This paper reports on the first phase of the project which was concerned primarily with identifying the issues to be considered before progressing to the design of an effective intervention. Initially it will examinethe context within which the project is being carried out, it will then look at issues relating to second language proficiency development. Perspectives on second language learning relevant to the context will be explored, as will issues relating to identity and second language acquisition. Finally it will seek to define second language literacy issues relevant to third level education.

[1]The HEA uses the terms 'Irish' and 'non-Irish' students in referring to students at third level. This terminology does not allow for distinguishing between native and non-native speakers of English, or between 'international' fee-paying or Erasmus students, and students from migrant backgrounds. This paper will address primarily issues relating to students from migrant backgrounds who are non-native speakers of English.

[2]'Newcomer' is the term preferred by the Department of Education and Skills and is used extensively in their policy and curricular documents at primary and post-primary level. Some newcomer children may already speak English fluently, and certain newcomer children may in fact have been in Ireland for many years, some since birth. If these children have been raised in families where English is not the first language, they may have similar language difficulties to those who have recently arrived.

2. Context

There are a number of reasons why the Institute of Technology in Blanchardstown was a particularly appropriate location from which to carry out this research. The Dublin 15 area is seen to have a higher proportion of migrants than most other parts of Ireland. According to the 2006 national census, 10% of the general population in Ireland were classified as non-Irish nationals (CSO, 2006), the figure for Dublin 15 was double that at 21% (Ryan, 2009, p.28). The breakdown of nationalities is re-produced below.

Table 1Nationality Groups in the Greater Blanchardstown Area (CSO, 2006)

Nationality	*Population*
Irish	**71,179**
Nigerian	**2,407**
Polish	**1,815**
UK	**1,456**
Lithuanian	**1,425**
Romanian	**1,275**
Not stated	**1,149**
Other Nationalities	**9,337**

These percentages are also reflected in the numbers in education. In Ireland in general, 10% of students in primary schools and 8% of students in post-primary schools have nationalities other than Irish (Taguma et al., 2009, p.18). In 2007 in Dublin 15, 21% of children in primary schools were receiving language support (McGorman&Sugrue, 2007, p.50); the overall figure for newcomer children could be considerably higher than that if one is to also include those who already spoke English on arrival.

2.1 Students from Migrant Backgrounds in Higher Education

It is estimated that in higher education, 10 % of students are originally from outside the state (HEA, 2008, p.37), which is considerably lower than the figures for the 2008 intake of students to ITB, where 25% of students coming into first year courses had nationalities other than Irish. This high proportion reflects the demographics of the Dublin 15 area as a whole, however other factors have also been identified which are worthy of consideration.

The IOT sector may take in more students from migrant backgrounds, particularly students from non-English speaking backgrounds, than the universities simply because it is more difficult for them to attain the points required for university courses. The OECD policy review group in a fact-finding visit to Ireland noted the 'privilege of fee-paying schools in feeding universities' (OECD, 2008, p.4) and that given the low level of immigrant students attending private schools, this would in turn affect their access to university education. In this regard they refer to the *Irish Independent* report which claims that '15 of the top feeder schools for the universities are fee-paying or grind schools… By contrast the vast majority of the top 60 feeder schools for the institutes of technology are non-fee-paying.' (Walshe& Donnelly, 2006).As access to third level studies in Ireland is determined primarily on the basis of performance on written examinations, where the result in each subject is converted into a number of points, any slight educational disadvantage will impact negatively on a student's final result. Nowhere is this more obvious, perhaps, than where a student has to answer examination questions in a language which is not his or her first language.

2.2 Language and Equity of Access to Higher Education

Many educationalists would agree that students whose first language is not English may be under-achieving at Leaving Certificate level.Keogh & Whyte (2003) interviewed teachers at second level and reported a number of issues. Initially, they established a link between

language and achievement 'due to language difficulties, some immigrant students were not able to show their ability or achieve their potential' (p.48). This took on even greater importance in the area of formal assessment: 'teachers mentioned how examinations seem to test students' language skills rather than their ability or their knowledge of subject areas' (p.49). Language support[3] teachers interviewed argued strongly in favour of some form of preferential treatment: 'the assessment of students who have English as a second language, could be made somewhat fairer by giving them exemption from being penalised for grammar and spelling mistakes' (p.49). Other suggestions made included having a translator or reader in exams, or allowing students to use a dictionary in exams. To date no such concessions have been made, or are likely to be made for non-native speakers of English.

In a study by Lyons & Little (2009, p.62), teachers interviewed highlighted two significant challenges associated with examination preparation: firstly, 'Because of their structure and format, the failure of examinations to assess the abilities of ESL learners adequately'; and secondly, 'the literacy level / readability of examination papers'. Once again the issue arises that in some cases students from migrant backgrounds may therefore find themselves in Institutes of Technology rather than Universities because the points they achieve in the Irish Leaving Certificate fall short of those required for the University courses they would have selected according to their natural ability, if they had been in a first rather than second language environment.

2.3 The Choice of Institutes of Technology

In other cases, studying at an Institute of Technology is not necessarily a second choice for students from migrant backgrounds, and there are a variety of reasons why an Institute of Technology may be their first choice. It may be a more cost-effective choice; students may choose between two, three and four year courses, providing flexibility in terms of both the monetary and time commitment they are in a position to make. Students who have been in Ireland for a number of years may be entitled to pay fees closer to those of EU residents than non-EU residents. The difference in fees for courses at NQAI[4] levels 6, 7 and 8 at ITB as in other institutes is significant, as can be seen in the table below.

In a study of retention by the HEA, they note that at levels 6 and 7, non-Irish students are more likely to progress to the following year than Irish students, which might be the opposite of what one would expect given the fact that they are studying through a second language and coming from different cultural, and in some cases educational, backgrounds.

Table 2 Undergraduate EU fees for 2010 - 2011 (www.itb.ie)

Undergraduate Award EU Fees	Tuition Fee 2010/11	Student Service Charge 2010/11	Total
Higher Certificate (level 6)	€1,368	€1,500	€2,868
Ordinary Degree (level 7)	€1,454	€1,500	€2,954
Engineering Honours Degree (level 8)	€2,950	€1,500	€4,450

[3] Newcomer children at both primary and post-primary level are entitled to up to two years of language support from language support teachers. Language support is provided on the basis of withdrawal from the mainstream classroom during certain hours of the week. The funding for teachers allocated to language support has been reduced in the budgets of 2009 and 2010.

[4]The National Qualifications Authority of Ireland has established a National Qualifications Framework which provides for three levels of undergraduate courses: level 6 which normally takes 2 years of study, level 7 which normally takes three years of study, and level 8 which normally takes 4 years of study. The number of years of study may vary depending on the discipline and the awarding body.

Other Honours Degree (level 8)	€2,319	€1,500	€3,819

The report comments: 'The total cost of shorter-duration courses compared to longer-duration courses may explain their enhanced appeal to non-Irish students' (HEA, 2010, p.38). While these progression rates may suggest that migrant students are doing well at level 6 and 7 courses, these figures need to be looked at in the context of relatively poor retention rates in the IT sector as a whole. At level 8 across both the IT and University sectors, non-Irish students perform slightly less well than Irish students, although overall levels of retention are much better than at levels 6 and 7.

Table 3 Progression rates for Irish and non-Irish students (adapted from HEA, 2010, p.38)

	Progression rate for Irish students	Progressions rate for non-Irish students
Level 6 (IT sector)	75%	79%
Level 7 (IT sector)	74%	78%
Level 8 (IT and University sectors combined)	89%	88%

The institutes of technology may also attract migrant students preciselybecause of the fact that they are different to the universities. With a longer history of migration, some interesting patterns and trends have emerged in the UK. Keogh & Whyte (2003, p.9) report on research which found that:

> Former polytechnic institutions in large urban areas and subjects with a more vocational focus have a greater concentration of ethnic minority students… this may be because such students positively decide to attend institutions which they perceive to be more 'friendly' as well as being nearer family and other support networks… these universities accept greater numbers of students with non-standard entry qualifications, and ethnic minority groups are more likely to fall into this category.

As ITB has as part of its stated mission a commitment to ensure that a high proportion of its students are 'special category entrants', including mature students, non-standard entrants, students with disabilities and students from disadvantaged socio-economic backgrounds, it is well placed to look at the specific needs of migrant groups.

2.4 National Plan for Equity of Access to Higher Education

As noted previously, the Department of Education and Skills (DES) provides two years of language support for each newcomer child whose first language is not English. The NCCA (National Council for Curriculum and Assessment) has produced guidelines for schools such as *English as an Additional Language in Irish Primary Schools: Guidelines for Teachers* (2006) and *Inter-cultural Education* for primary (2005) and for secondary (2006) levels. No equivalent approach has been taken to supporting students from migrant backgrounds at third level. The HEA includes immigrant students as a group to be considered in its *National Plan for Equity of Access to Higher Education 2008 – 2013*. As they did not have data at the time when drawing up the plan, they identify key challenges, but do not propose any specific action:

> We need to have special regard to the needs of recent immigrants. Immigration is a key emerging challenge in the context of equality in education... There are a number of complex issues around the provision of higher educational opportunities to immigrants, which can include the differential level of fees charged by institutions, language barriers and the recognition of prior qualifications.

> This plan does not include specific action points relating to ethnicity. Nevertheless, this important dimension of equality will feature centrally in the evaluations of the progress in widening participation that will be undertaken over the period of this plan. During 2008, the National Access Office will focus on building good relations with representatives of minority ethnic groups. This will ensure that channels of communication are established and maintained. An assessment of trends in participation by ethnicity will be included in the mid-term review of this plan in 2010. (HEA, 2008, p.37)

In the absence of an overall strategy for addressing the issues affecting migrant students with regard to engaging in third level education, an exploration of the issues relating specifically to language barriers may serve to inform future initiatives in third level colleges. In a study entitled *Migrants and Higher Education*, Linehan& Hogan (2008) note 'the majority of those interviewed identified the lack of spoken and written English language skills as a major barrier to entering higher education and a fundamental barrier against fuller integration' (p.106).A lack of any systematic or integrated approach tolanguage support at third level has been identified. Following a small-scale study of English language support at third level colleges in Ireland, Ní Chonaill (2010) concludes:

> If the HEA's aim is to promote equality of opportunity in higher education, the question of language support for migrant students, and indeed all non-native speakers, needs to be addressed. The deficit that remains in terms of students progressing to postgraduate study, and beyond that to employment, was highlighted.

3. Second Language Acquisition

In the context of envisaging appropriate supports for learners of English as a Second Language, it is useful initially to consider issues relating to the acquisition of a second language and the acquisition of English in particular. An overview of terminology and measurements of proficiency will allow for defining the specific issues relating to the acquisition of the language necessary for engagement with third level studies.

3.1 Definition of Terms

Rod Ellis defines Second Language Acquisition as 'the way in which people learn a language other than their mother tongue, inside or outside of a classroom' (Ellis, 1997, p.3). For many migrants, English may be a third or fourth language, but for the purpose of this study, they will all be referred to as second language learners (or L2 learners). The term most commonly used in primary and secondary education currently is EAL, (English as an Additional Language), which emphasises the additive nature of learning a second language. In Adult Education the term ESOL (English for Speakers of Other Languages) is most commonly used, and is the term used by the VECs to refer to their language programmes for migrants. TEFL (Teaching of English as a Foreign Language) is a familiar term to most people but its connotations and approaches are more suited to the teaching of English to people who are still in their own countries or have come to an English speaking for a short time to learn English, rather than people who have taken up residence in an English speaking country and find themselves in an immersion setting. The term EAP (English for Academic Purposes) is used to describe the language needed to engage with third level studies, but in reality elements of academic language figure in secondary, and to a lesser extent, primary educational contexts as well. This will be explored further in the final section.

3.2 Defining Second Language Proficiency

The Council of Europe has been instrumental in defining levels of language proficiency with a view to encouraging plurilingualism, the aim being that citizens of EU countries would speak their mother tongue and at least two other languages. Inherent in the concept of plurilingualism is the validation of different levels of competence; the Council of Europe's*Common European Framework of Reference for Languages*plots language proficiency at 6 levels from basic to proficient user. This framework has been used widely as a means of gauging proficiency levels of learners at various stages. The descriptors have been adapted to suit the needs of different age groups and contexts. The table below reproduces the

global scale, more detailed scales focusing on different skills and self-assessment versions are also available.

Table 4 Common Reference Levels: Global Scale (Council of Europe, 2001, p.24)

Proficient User	**C2**	Can understand with ease virtually everything heard or read. Can summarise information from different spoken and written sources, reconstructing arguments and accounts in a coherent presentation. Can express him/herself spontaneously, very fluently and precisely, differentiating finer shades of meaning even in more complex situations.
	C1	Can understand a wide range of demanding, longer texts, and recognise implicit meaning. Can express him/herself fluently and spontaneously without much obvious searching for expressions. Can use language flexibly and effectively for social, academic and professional purposes. Can produce clear, well-structured, detailed text on complex subjects, showing controlled use of organisational patterns, connectors and cohesive devices.
Independent User	**B2**	Can understand the main ideas of complex text on both concrete and abstract topics, including technical discussions in his/her field of specialisation. Can interact with a degree of fluency and spontaneity that makes regular interaction with native speakers quite possible without strain for either party. Can produce clear, detailed text on a wide range of subjects and explain a viewpoint on a topical issue giving the advantages and disadvantages of various options.
	B1	Can understand the main points of clear standard input on familiar matters regularly encountered in work, school, leisure, etc. Can deal with most situations likely to arise whilst travelling in an area where the language is spoken. Can produce simple connected text on topics which are familiar or of personal interest. Can describe experiences and events, dreams, hopes and ambitions and briefly give reasons and explanations for opinions and plans.
Basic User	**A2**	Can understand sentences and frequently used expressions related to areas of most immediate relevance (e.g. very basic personal and family information, shopping, local geography, employment). Can communicate in simple and routine tasks requiring a simple and direct exchange of information on familiar and routine matters. Can describe in simple terms aspects of his/her background, immediate environment and matters in areas of immediate need.
	A1	Can understand and use familiar everyday expressions and very basic phrases aimed at the satisfaction of needs of a concrete type. Can introduce him/herself and others and can ask and answer questions about personal details such as where he/she lives, people he/she knows and things he/she has. Can interact in a simple way provided the other person talks slowly and clearly and is prepared to help.

IILT (Integrate Ireland Language & Training) was set up as a campus company of Trinity College Dublin in 2001 and was tasked by the DES with analysing the linguistic demands of the primary and post-primary curricula. This work led to the establishment of English language proficiency benchmarks based on the Council of Europe Framework for learners at primary and post-primary level covering levels A1, A2 and B1. The benchmarks could in turn be used for tracking learner progress using specially designed Language Portfolios and for designing appropriate learner materials. It also became the basis for the Assessment Toolkit which determines the level of students at the end of each year of language support. It was estimated that a student who had reached level B1 in the skills of speaking, listening, reading and writing no longer needed language support and would be able to cope with the demands of the mainstream classroom.

3.3 Language Proficiency for Educational Achievement

The Trinity Immigration Initiative, building on the work carried out at post-primary level by the IILT, has been working on the development of a fourth benchmark at level B2. The rationale for this is that 'in order to meet the demands of the public examinations students must develop the skills specified for B2, which include the ability to read extensively and develop effective written argument' (Lyons & Little, 2009, p.4). Level B2 has long been

identified as the minimum requirement for completion of second level studies, corresponding to an IELTS (International English Language Testing System) score of 5.0 – 6.0. There is no specific language support to help learners achieve this level B2 and while the Trinity Immigration Initiative aims to develop materials to support this, the goodwill and buy-in of mainstream teachers is essential if this deficit is to be made up.

A score of 6.0 is the usual requirement for third level studies, with some of the universities such as DCU requiring a score of 6.5, and some of the institutes of technology allowing a slightly lower score for less literacy based courses. Waterford Institute of Technology has a requirement of 6.0 for Business and Humanities programmes and 5.5 for Science and Engineering programmes. However, most students gain entry on the basis of other forms of certification in English upon which admissions offices make an informed judgement. Students coming through the Leaving Certificate route only have to meet the minimum entry requirement for English i.e. Grade D on Ordinary Level Leaving Certificate English. Some language support teachers would contend that a well-prepared student could achieve this grade while having a general level of English as low as A2 on the Common European Framework (Thompson, 2010). Students entering third level studies in Ireland may therefore have very variable levels of language competence.

The situation for adults in the community may be even more difficult. According to a report on English Language Training in Fingal (Collier Broderick Management Consultants, 2008, p.22) 'most of the funded provision is at A1 / A2 level and there are insufficient public funds available to provide training up to B1 / B2 level'. In particular, this was considered inadequate to bring people to the level required to integrate into the local community or to access skills training, employment and self-employment. They outline an estimated number of hours required to bring a learner to the various levels (although this will depend on individual factors such as age, motivation, prior study, time spent in individual study).

Table 5Breakdown of levels (Collier Broderick Management Consultants, 2008)

Level	Number of hours of instruction required	Functional	Examples of employment opportunities at each level
A1	90 - 100	Citizen English	Insufficient level for employment
A2	180 - 200	Citizen English	Machine operator / clerical assistant
B1	350 - 400	Pre-vocational	Sales assistant
B2	500 - 600	Vocational	Manager

As can be seen from the table above, the number of hours of instruction required to bring a beginner to level B2 is extremely high and the cost would be prohibitive. Having established the measures of language proficiency and the capabilities of learners at various levels, the next section will look at some of the more theoretical aspects of proficiency development.

4. Perspectives onSecond Language Learning

It is useful to approach the issue of how languages are learned from a number of perspectives in order to understand the processes involved in the acquisition of a second language and how learners make progress from one level of proficiency to the next. Two approaches will be outlined briefly below: a cognitive approach coming from a psychological perspective and socio-cultural theory which has both a psychological and sociological dimension. The issue of age will also be considered.

4.1 Cognitive perspective

A cognitive approach to language and literacy development considers primarily what happens inside the learner's mind and focuses on how input becomes output. Current theories include *information-processing* models such as those put forward by Segalowitz (2003) which

considers second language acquisition to be the gradual building up of language knowledge. Over time the speaker can access this knowledge more automatically to produce language more spontaneously. A *connectionist* viewpoint emphasises the connections learners make between words, which co-occur, gradually building up knowledge of chunks of language. (Ellis, 2005)

A framework such as that put forward by Gass (1988) shows how second language input, having been processed in a number of different ways, becomes language output.

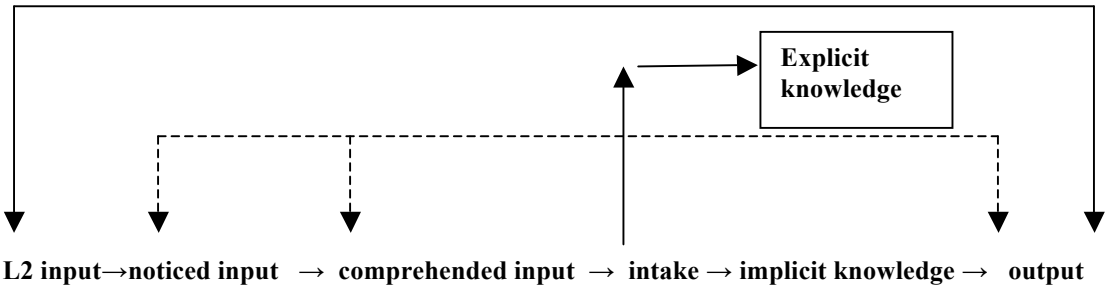

Figure 1 A framework for investigating L2 acquisition (Ellis, 1994, p.349 based on Gass, 1988)

The cognitive approach implies an active learner, where input needs to be noticed in order to be processed. The *noticing hypothesis* has been developed further by Schmidt (1990, 2001). Once noticed the input needs to be comprehended and this may entail teacher explanations,or dictionary lookups. Input can also be made comprehensible through *negotiation of meaning* with a native speaker or teacher, this is a view supported by researchers such as Hatch (1978) and Long (1983, 1996) who put forward the *interaction hypothesis*. Subsequent to being comprehended the input needs to become intake, where the language the learner has taken in is stored either as implicit knowledge or explicit knowledge. In the case of implicit knowledge, language is ready to use in future language events, in the case of explicit knowledge information about the language item in terms of spelling, grammatical features and usage is stored, but the learner will use the item deliberately rather than spontaneously in a future language event, and may use a feature wrongly for quite a while. The importance of the output phase as an opportunity for trying out language that has been stored as intake has been developed by Swain (1985).

4.2 The Age Factor in Second Language Acquisition

Many studies of the age factor in second language acquisition (Patkowski, 1980; Johnson & Newport, 1989; De Keyser, 2000) have shown that migrants who arrive into a country at a young age are more likely to achieve native-like levels of language than those who arrive at a later age. Singleton & Ryan (2004, p.115) provide evidence for the hypothesis that 'those who begin learning an L2 in childhood in the longrun generally achieve higher levels of proficiency than those who begin later in life'.

Many migrants currently wishing to engage in third level studies in Ireland may have arrived in Ireland during or after their secondary school studies, in which case they are at a disadvantage compared to those currently in our primary schools who will have had the opportunity to begin to learn English at a younger age. The difference is not merely in terms of the length of their stay, but of plasticity of the brain and according to a recent OECD report

> The "critical period hypothesis" in second language acquisition and brain research suggests that students who arrive in Ireland when they are of post-primary school age will have more difficulties in acquiring a second language than students commencing their education when they are of primary school age (Taguma et al., 2009, p.27).

The link between academic success and language is very strong for these older students 'Perceived language difficulties are a strong predictor of academic difficulties for newcomer students, and the effect of language difficulties on academic difficulties is bigger in post-primary schools than in primary schools' (p.27). These difficulties at second level have implications for students moving on into third level. In the case of migrants who have completed second level studies in their own country and have not had the opportunity to build the English language competence associated with schooling, the problems may be considerably greater; this may be compounded by the learners having passed the 'critical period' for the naturalistic type of language learning which takes place in early childhood.

4.3 Socio-cultural perspective

A cognitive approach to second language acquisition sees the mind as an object which constructs knowledge and this is very useful in helping us to understand how language knowledge is stored and retrieved. However as language is communication which happens not just in the mind of the individual but in interaction with other individuals, a socio-cultural approach takes account of other dimensions of language learning.

Socio-cultural theory has evolved from the work ofRussian psychologist Lev Vygotsky (1896-1934) which only became known and popular in the west in the second half of the 20th century. In terms of human development, Vygotsky (1978) assumed that abilities such as thought, language and reasoning processes develop through social interactions with others, so that cognitive abilities grow out of interactions with othersin culturally meaningful settings. With regard to language, Lantolf& Thorne (2006, p.1) remark:

> Language use and development are at the core of this objective characterization of culture both at the level of social interaction (actual communicative activity) as well as that of society and the nation state in arenas such as language policy and ideology, and public education as mass social intervention.

Table 6 Components of Language Competence (Bachman 1990, reproduced by Pawlikoska, 2002, p.9)

Organisational competence	Pragmatic competence
Linguistic Competence • Grammar rules at sentence level: Syntax Semantics Lexicon Morphology Phonology Graphology	**Functional Competence** • Interpreting and expressing intentions through utterances: • Macro-functions (ideational, manipulative, heuristic, imaginative) • Conventions of language use in a society / culture
Textual Competence • Rules for longer text and discourse levels Cohesion Coherence Rhetorical organisation Conversational structures	**Socio-cultural competence** • Knowledge of Social contexts Rules of appropriateness Rules of politeness Cultural knowledge / references Language variation Non-verbal communication Figurative language and idiom

The whole issue of language learning is therefore something which happens at a local level for the individual, but also has wider implications as the second language learner is involved in a process which has significant sociological and even political dimensions.

Looking initially at the basic level of learning, Vygotsky, (1981, p.163) sees learning takes place first of all on an inter-psychological level, i.e. it is socially mediated, and then on an

intra-psychological, where the learning is internalised and the learner moves towards self-regulation. In the context of cognitive approaches, the interaction hypothesis puts forward the benefits for language acquisition of interacting with a native speaker or teacher insofar as they make input comprehensible and give the learner an opportunity for producing output. The socio-cultural view posits that such an interaction may take place in a Zone of Proximal Development 'The ZPD defines these functions that have not yet matured but are in the process of maturation, functions that will mature tomorrow but are currently in an embryonic state' (Vygotsky, 1978, p.86). In the area of second language acquisition, therefore language learning can be seen as skill building; the native speaker or teacher provides scaffolding for the learning to take place, and the feedback provided by the native speaker or teacher becomes an opportunity for the learner to move towards self-regulation.

As language consists not only of form but also of function, the interaction between language learner and native speaker provides an opportunity for acquiring language but also the norms of communication in a particular culture and society. Bachman's (1990) breakdown of the components of language competence provides insights into its complexity.

5. Identity and Second Language Acquisition

Language acquisition may be seen therefore to entail far more than learning a database of vocabulary and rules for combining words into sentences. A language learning situation is never one that is neutral but always one where an individual comes with his own linguistic and cultural background to encounter a new language and culture, new ways of seeing the world and new modes of behaviour. This necessarily requires some reconfiguring of identity, and reflects Guiora's hypothesis that learning a new language is dependent on 'ego permeability... the extent to which the individual is psychologically capable of stepping into a new communication system' (Guiora et al., 1972, p.422).

5.1 Motivations for Language Learning in a Migrant Context

The second language learning context of migrants may be very different to that of people learning a foreign language for recreational purposes. A person who is learning French because they have bought a second home in France for example, may have developed an affinity with the people and culture of the area, and a desire to become part of that community. As migration is driven primarily by economic rather than affective factors, people may choose to go to a particular country because of work opportunities, not because of an affinity with the people living there, or a love of the language which is spoken there. In a study of young migrants in Ireland carried out in the context of the Trinity Immigration Initiative at TCD, it is noted that young migrants were seen to have optimistic expectations of Ireland reflecting parental motivations for migrating: 'Ireland was imagined as a country that will provide better employment and educational opportunities and an improvement in lifestyle' (Gilligan et al., 2010, p.9). In the case of refugees, they may have had little choice with regard to the country which agreed to accept them, and find themselves in a country they have very little prior knowledge of.

The concept of 'ego permeability' ties in with motivations for language learning identified by Gardner & Lambert (1972). They saw motivation as being a key factor in successful language learning and distinguished between instrumental motivation where a learner wishes to learn a language for a purpose such as better job opportunities or higher salary, and integrative motivation where the learner identifies with the people and country of the target language. Oxford (1995, p.5) sees integrative motivation as being essential for people learning to live in a new culture and community, and Dörnyei (2001) considers that this type of motivation may be necessary to go beyond an intermediate level of language competence. However he sees instrumental motivation as being of value in a different way, in that it is closely associated with goal setting and a more dynamic view of motivation where motivation can change over time and can be influenced by the learning environment and learner success.

For migrant students, where integrative motivation and identification with the target culture is not a given, instrumental motivation may be effective. This utilitarian rather than affective motivation needs to be respected as valid in a globalised society which is increasingly mobile. Critics of materials designed for the TEFL market would contend that they are designed for a stereotypical, ideal learner who is healthy, happy, youthful, affluent, and enthusiastic about embracing an English language culture. They do not take account of the needs of other types of learners:

> While this suited publishers producing courses for an affluent global market, it often disempowered certain types of learner. The potential for other cultures to have an impact on English, or for learners to develop separate identities within it, was neglected. Little heed was taken for example of the needs of immigrants and ethnic minorities who might wish, quite legitimately, both to belong to their new society and to maintain their original identity (Cook, 2003, p.47).

5.2 Acculturation and Second Language Learning

While integrative motivation was seen above to have considerable benefits in terms of successful language learning, it was also seen to be controversial to expect people to want to acculturate to a country in which they find themselves living for a variety of reasons. The issue of acculturation, i.e. the process of adopting another culture, was studied at length by Schumann and remains a point of reference for later research. He makes clear the link between acculturation and language learning: 'the degree to which a learner acculturates to a TL [Target Language] group will control the degree to which he acquires the target language' (Schumann 1978, p.385).

According to Schumann (1986), one of the effects of a failure to acculturate may be where a learner acquires a sufficient level of the language to communicate for basic purposes, but this form of the second language is very much marked by the phonology and grammar of the first language, and changes very little over subsequent years. This 'pidginisation' is in fact a sign of 'fossilisation' of the language system in the learner's brain and is a feature of adult rather than child learners. He sees 'social distance' as being the main reason why learners do not acculturate. Language learning is impeded where the learner is from a group which is socially dominant but also where the group is socially subordinate. Equality of status is the optimal condition for reducing social distance and means more contact between groups and the sharing of social institutions such as schools, churches, workplaces and clubs. This infers more opportunities for communication and mutual valuing of others. This presumes however the sharing of similar cultural backgrounds and assumes similar behaviours which may not be the case for many cultures.

Schumann maintains that the best conditions for L2 acquisition are where an L2 group wishes to assimilate, is relatively small and therefore easily absorbed, and is not cohesive which means there are few efforts to maintain social and linguistic contacts among themselves. While these may be optimal conditions for second language learning, they may be detrimental to the well-being of the individuals concerned as they may entail loss of mother tongue and heritage. They are in direct contradiction with an intercultural philosophy, or the concept of a multicultural society. Recent researchers such as Cummins (2000), put forward significant positive effects of maintaining a mother tongue and the target language culture, and this has been taken up in the recent DES report Intercultural Education Strategy, 2010 – 2015 which recommends 'Migrant students should be encouraged to maintain a connection with their mother culture / language to assist with their proficiency in the language of instruction and support the development of their identity and self-esteem' (DES, 2010, p.40)

5.3 The Status of English as a Global Language

In the Irish context, the fact that English is the language which is to be acquired also needs consideration. With globalisation, English has acquired the status of a majority language which is associated with power and wealth. In general, people tend to be more motivated to

learn majority languages than minority languages because of the benefits ensuing. However many linguists and sociologists would question whether this spread of English is 'natural, neutral and beneficial' (Pennycook, 1994, p.257), and also consider negative effects: 'the main negative effects of the spread of English involve the threat to existing languages, the influence on cultural identity, and the association of the language with an economic elite' (McKay, 2002, p.20).

Many migrants in Ireland may be coming therefore from a mother tongue which is a minority language, or in some cases a dialect, and acquiring a majority language. While on the one hand there may appear to be immediate benefits in terms of access to wider communities, educational and professional opportunities, there are significant issues of identity to be considered. Gatbonton et al (2005) report how migrants may fear a loss of identity in taking on a new language and culture. If they are living in an ethnic community, there may also be pressure from the community to resist acculturation. There may be a lack of mutual esteem: while the migrant may be willing to engage with the language and culture of the host country, the indigenous Irish may show little appreciation of or interest in the mother tongue or culture of the individual who is trying to take this step.

Norton Pierce (1995, p.15 - 16) who carried out research among adult learners of English in Canada puts forward the view that learning a second language in a migration situation demands 'investment' and the willingness to impose their right to be heard, to be 'subject of' rather than just 'subject to' the host community. This runs counter to an assimilationist perspective and instead validates the migrant's right to construct an identity which may be 'multiple and contradictory'. Motivation comes from a belief that this investment is worthwhile and will allow that migrant to increase their 'cultural capital'.

Norton Pierce's reference to Bourdieu's (1986) notion of cultural capital should be seen in a context where the migrant has already acquired considerable cultural capital in their native country, which may not be valued or may not allow for taking one's place fully in the host society. According to Bourdieu (1986, p.47) acquiring new forms of cultural capital entails three dimensions: acquiring new 'dispositions of the mind and body' which encompasses modes of thought, language and behaviour, new 'cultural goods' which carry the history of the culture and new 'institutionalised' forms of cultural capital which in the form of education and qualifications allow the migrant to acquire a form of cultural capital which may be converted into economic capital. In a study by Devine (2009) on children in Irish schools, acquiring English was seen as significant for building social capital through friendships, and some children also saw the acquisition of the Irish language as a marker of 'being Irish' with migrant children commenting 'I think it is really good – like English is from England so Irish comes from Ireland' and 'I don't have to do it but it's my choice cos I want to be Irish' (Devine, 2009, p.529). The opportunity to live and receive an education in Ireland was very much about acquiring cultural and social capital in line with parental expectations. She found attitudes to learning in school to be 'strategic and pragmatic, oriented to the acquisition of cultural capital that consolidated their class trajectories in Ireland, as well as in their country of origin, should they return home' (Devine, 2009, p.529).

Having considered some of the complexities of language acquisition in a migrant context, and the acquisition of a majority language such as English in particular, the next section will look more closely at how inadequate English language skills can be a barrier to third level education and more specifically at the specific English language needed for engaging with third level studies.

6. Language Competencies and Higher Education

6.1 Second Language Literacy

While any study of the literacy needed for accessing third level education is necessarily at the high end of a scale of literacy, it is nonetheless worth considering current definitions of literacy in order to better understand the various dimensions of second language literacy. In a recent NALA (National Adult Literacy Agency) publication, literacy is defined thus:

> Literacy involves listening and speaking, reading, writing, numeracy and using everyday technology to communicate and handle information. It includes more than the technical skills of communication: it also has personal, social and economic dimensions. (Derbyshire et al., 2005, p.9)

This reflects a recognition of what has been termed 'literacy as social practice' (Street, 1985) which has gained ground in the last number of decades. It stands in contrast to 'functional literacy' which seeks to prescribe set standards that need to be reached by individuals in order to function in society. While the polemic on the various merits of these approaches is beyond the scope of this paper, its very existence serves to warn against an overly reductionist or prescriptive view of literacy, whether in first or second language contexts. Literacy for migrant students therefore is a situated literacy which encompasses many dimensions of social and cultural contexts. As a social practice, it entails taking on not just the language but the manner in which things are done and appropriate behaviours in educational contexts in Ireland.

This issue of inadequate language competence being a barrier to accessing and succeeding in higher education is well documented. Cork Institute of Technology carried out an extensive study collecting the views of 160 migrants, ACCESS and Admissions officers in six institutes of technology and two universities, and representatives of employment bodies in Ireland. One of its major conclusions is: 'low levels of English language competence were identified by all three groups as a major barrier to third-level education. All interviewees identified English language proficiency as essential to accessing third-level education and for social inclusion and integration into society' (Linehan & Hogan, 2008, p.3).

6.2 Language Issues identified

The issue of language proficiency may appear obvious, but in the context of third level education the type of language needed for engagement in third level studies is identified as being something other than the language needed for general communication purposes:

> Many participants with a good level of language proficiency in English identified the need for more specialised English language provision. A common finding from most of the focus groups was that general English classes are not sufficient to provide them with the capacity and confidence to pursue third-level education through English.... some of the Athlone-based participants proposed the provision of technical English classes or other English classes dealing with particular areas, for example English for accounting students, English for science students. (Linehan & Hogan, 2008, p.45)

ACCESS and Admissions officers in the third level colleges echoed these concerns, but also highlight difficulties in pinpointing exactly what was needed:

> Confidence and competency in English was consistently referred to by all interviewees as crucial for academic success for migrants. Even where students present with the necessary qualifications and standards, as demonstrated through tests such as IELTS, the demands of academic English were seen to be very challenging for any student for whom English was not his / her mother tongue. (p.75)

Another issue relevant to the many migrants who come from former British colonies such as Nigeria was identified by the director of an immigrant support centre 'they may competently

speak a version of English in their home countries but still struggle with a different standard of English here' (p.92).

6.3 Academic Language Proficiency

An early definition of *English for Academic Purposes* provides a simple explanation: 'EAP is concerned with those communication skills in English which are required for study purposes in formal education systems' (ETIC, 1975). It can be considered to be a subset of English for Specific Purposes, with two elements: the first most significant component is *English for General Academic Purposes* which is generic for students of any discipline; the second is *English for Specific Academic Purposes* which is discipline specific such as for medicine, engineering, or economics. (Blue, 1988, cited in Jordan 1997, p.4).

It was noted in the Linehan and Hogan report (2008) that many interviewees believed that in order to engage in third level studies, what they lacked and needed was specialised language in the areas of business and science for example. This would correspond to the *English for Specific Academic Purposes* outlined above. In reality, such knowledge could be developed by collating definitions and glossaries of academic terms. However Jordan (1997) sees *English for General Academic Purposes* as being more significant, and as it is generic to students in all disciplines, it may be a more useful starting point in developing academic language proficiency. We may need to be cautious of students' perceptions of what they really need. While they may see vocabulary as being the main problem, in reality they might be better able to cope with the demands of unfamiliar vocabulary if their general ability to comprehend academic language was such that it allowed them to understand the structures of sentences and discern meaning from context usingcontextual cues. A more in-depth consideration of the features of academic literacy can shed light on what is a fundamentally more complex issue than vocabulary knowledge.

Considerable research has been carried out in the US and Canada on the acquisition of English for success in education. American Linguist Stephen Krashen and colleague Brown (2007)in considering the nature of academic language proficiency distinguish between *Knowledge of Specialised Subject Matter* and *Knowledge of Academic Language*. They define the latter:

> This is knowledge of the special language used in school and the professions. In school, it is the language of story problems in math, social science, and politics. Studies show that there are differences in the specific academic languages used in different areas, but similarities do exist. (Krashen&Brown, 2007, p.1)

Cook Hirai et al. (2010, p.2) remark 'many educators consider the term academic language to mean the vocabulary of their discipline, when in reality it encompasses social and academic discourse, content-area reading and types of writing discourse'. This view allows for moving towards an understanding of academic language as being something other than subject specific vocabulary, and having common features across different disciplines. Another important area of research has been in determining how academic language differs from the language we use for general communication in our everyday lives.

6.4 BICS and CALP levels at entry to Third Level education

Jim Cummins, originally a native of Dublin, has worked extensively in the area of educational psychology in Canada, focusing in particular on the issues facing migrants learning English as a second language. In an early paper (1979) he made a distinction between BICS (Basic Interpersonal Communication Skills) and CALP (Cognitive Academic Language Proficiency), and this continues to be a useful if sometimes controversial approach to defining the language needed for educational purposes. He considers how even at primary and secondary school level these two dimensions to language proficiency come into play. Cummins (1984a) contends that while BICS will be acquired by a migrant child immersed in

a school setting with language support in approximately two years, it may take between five and seven years for a child to acquire CALP. This distinction is supported by US based researchers Thomas & Collier (1997) who argue that it may even take ten years to acquire CALP, and that even for native speakers there is on-going acquisition of new vocabulary and language at every stage of education.

The standard two years of language support offered to newcomer children in most countries including Ireland, may in effect serve primarily the purpose of helping the child acquire communicative skills, but lay little foundation for the acquisition of more academic literacy based skills. While these communicative skills are indeed essential for the child in order to socialise and gain an understanding of the day to day workings of a classroom, the belief that language support is no longer needed once communicative competence has been acquired may be erroneous. Both Cummins and Thomas & Collier observe that many newcomer children end up in learning support classes which wrongly presumes the child has a learning difficulty when in fact the child has a language difficulty, and the manner in which the issue is dealt with may be inappropriate to the child's real needs. It may also have the effect of labelling the child at a time when integration with peer groups is important.

Another area of concern is in regard to the second level students referred to previously by the 2009 OECD report. Already at a disadvantage because of the age at which they are trying to acquire English, they may scarcely have time to acquire basic communicative skills when they find themselves faced with third level studies where they have to deal with more academic language. Migrants with English as a second language who have already completed second level studies in their own countries may find themselves with similar deficits in language. If these studies have been done through English, they may have a similar level of academic language to indigenous Irish students; however if their studies have been done through another language with English as a single examination subject, they may once again find they have adequate communicative skills but a lower level of academic language skills. In terms of the Common European Framework, these language learners may still only be at level B1, and well below level B2 and the IELTS standard for entry to third level which according to the Linehan& Hogan report (2008) may still leave students struggling.

It would therefore appear that in practice, students from migrant backgrounds may have significant deficits in language proficiency which may not be apparent in general conversational situations but which become evident when they come to engage in academic work. The following section will consider some of the features of academic language which distinguish it from more generic language skills.

7. Features of Academic Language

An overview of differences between everyday English and Academic English in a school context provided by Xu (2010) focuses on the level of formality, the types of vocabulary, and structures associated with each. It also highlights how contextual cues, settings and tasks will be very different. These differences already noted in relation to primary and post-primary educational settings, will be even more significant in third level settings.

While a holistic approach to the development of language proficiency is advised in general, this is not to say that there are not single identifiable components which can be analysed, and that a better understanding of these components can lead to more effective interventions. Language knowledge is seen to be made up of three main components: Phonology, Vocabulary and Grammar / Structure. Pragmatic knowledge regarding how language is used in context may be seen to overlay these forms of knowledge (Celce-Murcia & Olshtain, 2000, p.13). A closer study of issues relating to vocabulary and grammar in the context of academic language may be useful in order to evaluate some of the difficulties.

Table 7 Differences between Everyday English and Academic English (Xu, 2010, p.15)

Category	Everyday English	Academic English
Forms	Informal	Formal
Diction	• High-frequency • Single or two-syllable words • From Anglo-Saxon lexicon (e.g. pull together)	• Low-frequency • Multi-syllabic, discipline specific words (e.g. math, science) • Many derivational words (e.g. illustrate, illustration, illustrative, illustrated, illustrating) • From Greek or Latin roots (e.g. assemble)
Structure	• Mostly simple sentence • Some compound and complex sentences • Acceptable fragments (e.g. *quickly, quickly*) • Basic use of punctuation marks	• Mostly compound and complex sentences • Frequent presence of phrasal structures (e.g. present and past participles, infinitive) • Advanced use of punctuation marks (e.g. :, ;, -)
Contextual cues	• Gestures • Body Language (e.g. facial expressions, and tone of voice) • Opportunities for a listener to ask for clarification, explanations etc	• Words in the previous or following sections • Readers' knowledge of the topic • No opportunities to ask an author for clarification, explanations etc
Setting	• Less formal (e.g. playground, school cafeteria, parking lot)	• More formal (e.g. classroom, science lab)
Task	• Interpersonal communications (e.g. asking for directions, telling a joke)	• Academic communications (e.g. presenting a book report, conducting an interview)

7.1 Phonology

Issues relating to the phonology of English touch on a number of areas. At the level of receptive skills, students may have difficulty understanding lecturers because of local accent and in some cases jargon. At the other end of the spectrum, the level of language and the speed at which high level information is delivered can be daunting for students. At the level of production, as seen previously, the degree to which learners are willing to acculturate may impact on their willingness to acquire a native-like accent, some may acquire a local accent while others may wish to acquire a more standard type of English. If the learners' priority is to use the English language as a tool for acquiring knowledge, qualifications and career opportunities their approach may be functional rather than affective, and sounding like a native speaker may seem irrelevant. Where learners come from countries such as India or Nigeria where a variety of English is spoken widely, learners may have acquired partially or fully that particular standard of English, which might not match the features of English as it is used in Ireland. Given all of these factors, comprehensibility needs to the goal of any academic language programme, with respect shown for variation in how English is spoken by non-native speaking students.

A further issue relating to phonology is that of appropriate register; learners may have a acquired everyday spoken language skills but may have difficulty moving to the production of more formal academic levels of language. In this regard, spoken production overlaps with written production and issues relating to vocabulary and structure will be dealt with below.

7.2 Vocabulary of Academic Language

A significant difference in the language used for general communication and that used for academic purposes relates specifically to English and would not be a feature of academic registers in other languages. English was originally a Germanic language and many of the words we use in everyday speech derive from these Anglo-Saxon origins. However the English language also has a very high proportion of words of French origin (which in turn had come from Latin) brought to Britain by the invading Normans, and a significant amount of words of Latin and Greek origin have become common-place in the English language. Of the first 50 words in the Academic Word List created by Coxhead (2000), almost all are of Latin or Greek origin.

Table 8 First 50 of 570 words from Coxhead's Academic Word List

analyse	Constitute	establish	indicate	occur	role
approach	Context	estimate	individual	percent	section
area	Contract	evident	interpret	period	sector
assess	Create	export	involve	policy	significant
assume	Data	factor	issue	principle	similar
authority	Define	finance	labour	proceed	source
available	derive	formula	legal	process	specific
benefit	Distribute	function	legislate	require	structure
concept	Economy	identify	major	research	theory
consist	Environment	income	method	respond	vary

We perceive a sentence to be more academic when we replace words of Anglo-Saxon origin with words of Graeco-Latin origin. In addition to this, academic vocabulary often has prefixes and suffixes, also of Graeco-Latin origin, and these need to be understood, for example *pre-existing*; *cooperative*; *unintentional*; *antiestablishment*. While the word 'industry' might be known to a student, there is also a need to know what the forms *industrial* / *industrialise* / *industrialisation* / *industrious* mean; the concepts of *pre-industrial* and *post-industrial* may bring contextual as well as linguistic challenges. The longest word in the English language *antidisestablishmentarianism* is a good example of how a single word *establish* can become a complex word through the addition of morphological elements.

Dutro and Moran (2003) distinguish between words which form the 'bricks' and those which form the 'mortar' in sentences to differentiate between content specific vocabulary and general academic language.

Table 9 Examples of Brick and Mortar terms in different content areas (Zwiers, 2008, p.23)

	Bricks	**Mortar**
Language Arts	Imagery, alliteration, theme, metaphor, plot	That is, implies, contains, leads us to believe, teaches a message
History	Revolution, emancipation, rights, oligarchy	Therefore, as a result, consequently, consist of
Maths	Reciprocal, balance, proof, hypotenuse, obtuse, matrix	If…then, end up with, derive, take care of, thus, suppose
Science	Mitosis, gravity, force, sublimation	Hypothesis, variable, infer, results, dependent.

Zwiers makes the point that academic language may be perceived to be made up mostly of 'bricks', as would be the case with students who believe they need primarily the specialist vocabulary relating to a domain, when in fact the 'mortar' words are what students need 'to create coherent and logical sentences and paragraphs... are often needed to describe higher-order thinking skills ... these are the often untaught, yet integral, words that hold complex ideas together' (Zwiers, 2008, p.22).

A further issue worth considering in the area of vocabulary is that of vocabulary thresholds, i.e. the amount of vocabulary required to understand a text. An educated native speaker is estimated to have approximately 20,000 words by the age of 20. Nation (2001) notes that mastery of the first 1,000 words of English (as defined in Michael West's 1953 General Service List of English Words) will give a non-native speaker coverage of 84% of conversational language, but only 75.6% of a journalistic text. The next 2,000 words will bring coverage to 90.3% of conversational language and 80.3% for journalistic articles. While 80% might seem quite high, it equates to a reader having difficulty with 4 out of every 20 words, and according to Nation, this should be 95% or one in every 20 words if a learner is to have ease in reading and be able to guess words from context. Coxhead's Academic Word List was designed to provide learners with a shortcut to academic texts by learning the meaning of 570 words which frequently occur in academic texts.

According to Nation (2001, p.147), a vocabulary threshold of 4,000 word families made up of 2,000 high frequency general service words, the 570 words from the Academic Word List and 1,000 or more technical words would provide the non-native speaker with 95% text coverage for materials within his area of study. The challenge is to provide learners with the correct blend of general, academic and technical language so that the 4,000 words strategically learned will give the learners an almost equivalent understanding of specialist academic texts to that of the native speaker with 20,000 words.

7.3 Structures in Academic Language

Academic language is marked by more complex structures which often do not occur frequently in spoken language, examples are provided below. Having considered some of the specific features related to the vocabulary and grammar of academic English, the more cognitive dimensions now need some consideration.

Table 10 Examples of structures found in Academic Language based on Xu (2010)

Feature	Everyday Spoken language	Academic language
Active V. Passive	The banks raised interest rates.	Interest rates were raised by the banks.
Nominalisation of verbs	The earthquake destroyed many buildings making a lot of people homeless.	The destruction of many buildings by the earthquake caused a significant amount of homelessness
Relative clauses	The prime minister met the cabinet this morning and sacked the minister for finance, his policies were useless	The prime minister who met the cabinet this morning dismissed the minister for finance whose policies were ineffective
Conditional constructions	They should have pulled out of the Middle East last year. We'd have peace by now.	If they had withdrawn from the Middle East last year, we would have had peace by now.
Present participles	When he arrived at the airport the press approached him and he gave a short statement on the purpose of his visit.	Having arrived at the airport and being approached by the press, he gave a short statement on the purpose of his visit
Past Participles	They abandoned the project because of current circumstances and future problems.	Given the current circumstances, and future problems having been considered, the project was abandoned.
Complex relations between elements	He sold the company and he didn't really want to, but he felt he had to.	In spite of not wishing to sell the company, he felt he had not alternative but to do so.

7.4 Cognitive and Contextual Features

Chamot (2009, p.39) in proposing her Cognitive Academic Language Learning Approach (CALLA) poses the question 'What is Difficult about Academic Language?' She identifies five features which reflect those identified by Xu (2010):

- Less contextualised than social language
- Used for cognitively demanding tasks
- Uses language specific to texts and tasks in the content areas
- Used for academic language functions
- Requires both lower-order and higher-order thinking skills

The difficulty of academic language can be seen therefore to be a function of complexity of language and complexity of context and task. Cook Hirai et al. (2010, p.7) make the point that engaging with academic language means working with the skills outlined in Bloom's taxonomy (1956):

- Reporting and describing information
- Presenting arguments
- Organising and elaborating on information
- Interpreting and presenting data
- Comparing and classifying information
- Providing solutions to hypothesised problems

Cook Hirai et al (2010) in defining academic literacy note:

> Academic language literacy can be divided into two categories – receptive language and expressive language. Receptive language can also be described as deconstructing language, and expressive language as constructing language. (Cook Hirai et al, 2010, p.31)

They propose a model of academic literacy which encompasses two dimensions and connects it to the cognitive model of language development with input and output phases.

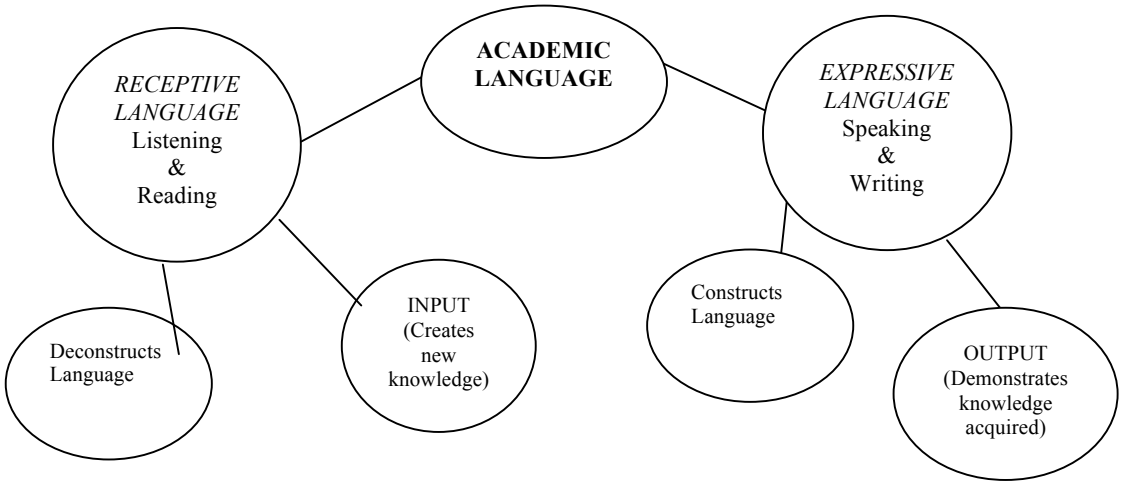

Figure 2 The relationship between - and functions of - the receptive and expressive attributes of academic language including the four domains of language (Cook Hirai et al, 2010, p.32)

7.5 Cognition and Context in Academic Language

Academic language is difficult therefore not only because of components of the language but also because of what a student has to bring to the task cognitively in understanding academic

language provided in texts or lectures, or in producing a piece of academic writing. This is also the basis for Cummins' (1984b) theoretical framework where he contrasts conversational language (BICS) which is mostly undemanding cognitively with academic language (CALP) which is cognitively demanding. He combines these elements with the notion of the language or task occurring in concrete or abstract situations. The more abstract and context-reduced the situation, the more cognitively challenging it will be for students.

Both Cummins and Chamot recommend strongly that teachers need to ensure that input for students is presented in context-embedded forms as much as possible while competence in academic language is being acquired. Visual aids, examples and linkages with prior knowledge can all create context for the learner, and such scaffolds operate within the Vygotskian paradigm of the Zone of Proximal Development. A socio-cultural approach places the lecturer in a key position in facilitating learning and in making academic content and texts accessible to the learner. The learner in turn interacts with the input in terms of both language and content and in successfully acquiring new knowledge, also builds competence in understanding academic input which can be used in future learning events.

CONCRETE	Cognitively Undemanding (BICS)		ABSTRACT
	A Non-academic and Context-embedded	C Non-academic and Context-reduced	
	B Academic and Context-embedded	D Academic and Context-reduced	
	Cognitively Demanding (CALP)		

Figure 3 Cummins' Theoretical Framework of BICS and CALP (1984b)

It is evident therefore, that acquiring academic language is a complex multi-layered process which involves not only the acquisition of component elements of language in terms of different types of vocabulary and structure, but also the ability to use language in higher-order processes.

8. Conclusion

This paper considered a number of different issues relating to the acquisition of English language skills by non-native speakers wishing to engage in third level studies. In terms of the context, non-native speakers currently constitute a significant proportion of the student cohort at third level and this is likely to continue to be the case. In addition, a significant proportion of the migrant population would benefit from access to third level education if they had the language skills to do so. Although the tide of immigration to Ireland has slowed, children born into families where English is not the first language will continue to need support in the acquisition of Academic English. Institutes of Technology are likely to remain attractive to students from migrant backgrounds because they are more accessible for students achieving lower points and looking for a more flexible and in some cases cost-effective education. The issue of under-achievement due to language difficulties tends to carry through from second level into third level, the lack of specific interventions in our education system to target learners beyond level B1 remains an issue which has not been addressed to any great extent at second level, or indeed at third level. Access to third level education and career opportunities are essential for integration:

> There is an urgent need to provide adequate and additional resources through VEC / IILT to provide a consistent supply or package of services including training in English, if future generations are not to become welfare clients. (Collier Broderick Management Consultants, 2008, p.6)

This is echoed by Lucy Gaffney, Chair of the National Plan against Racism when she remarks:

> Education is the strongest weapon in the government's arsenal to prevent racism and promote integration. More people – whether of Irish or non-Irish birth – will become vulnerable as the economy shrinks and competition for jobs grows. Education alone can play a crucial part in preventing intolerance, jealousy and hatred in a harsher economic and social climate' (Gaffney, 2008, p.13)

The challenge of providing programmes in academic language at an appropriate level, which take on board the needs of learners from diverse backgrounds, with varying motivations and aspirations remains the remit of education providers who are taking in these students, and to a broader extent that of governmental agencies responsible for creating greater opportunities for migrants to avail of third level education.

Academic language can be seen to be more than just specialist academic vocabulary, but also the development of general language proficiency, and the development of skills in academic language which draw on a more formal register of language, more complex language structures, and more complex thought processes. It also includes the situated literacy of knowing how to function in terms of gaining access to courses and general college information, and communicating with peers, lecturers and support staff in a third level environment in Ireland.

While education providers need to address the issue of provision of English for Academic Purposes in order to maximise the opportunities for success of students from our migrant populations, it is incumbent also on our lecturing staff to become aware of the issues facing a diverse student population and to actively create learning environments which are fit for purpose. A key conclusion of the DES *Intercultural Education Strategy 2010 – 2015* is the need for mainstream teachers to take on board the needs of non-native speakers of English, and this may also apply to lecturers at third level. The report concludes

> All educators must be aware that they are all teachers of language and have a key role to play in developing and enhancing the language competence of all learners. This is not to be regarded as the sole remit of EAL teachers (DES, 2010, p.39).

In the same year the DES (2010) produced *A Draft National Plan to Improve Literacy and Numeracy in Young People*, targeting the language and numeracy skills of all students at primary and second level. It is timely therefore perhaps to consider the role lecturers have to play not just in transmitting subject content, but also in facilitating the acquisition of the literacy skills needed to understand, reflect and comment on that content.

This SIF project envisaged a number of outputs in terms of providing appropriate interventions for non-native speakers of English wishing to engage in third level studies. The final output is to be the provision of a Training of Trainers type course for lecturers in other educational establishments. This two-pronged approach aims to tackle the issue from two different angles and create opportunities for not just supporting a current cohort of students, but also creating more inclusive and effective educational environments for the future.

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The precore slot in Icelandic: A topological analysis of V2-clause structure within Role and Reference Grammar

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Abstract [5] [6]

This paper aims to present an analysis of the precore slot [PrCS] in Icelandic within the theory of Role and Reference Grammar [RRG] (cf. Van Valin 2005). Based on the analysis of the PrCS in German by Diedrichsen (2008), an analysis of simple main declarative active voice sentences in Icelandic will be presented. The topological model of Danish sentence structure developed by Diderichsen (1945, 1964), which was adopted for Icelandic in Thráinsson (2007), will be used to analyze the layered structure of the clause [LSC] in Icelandic. It will be shown that the PrCS in V2-languages, such as Icelandic, has a special status and certain important aspects of the V2-phenomenon in Icelandic will be investigated. As will become clear during the course of this paper, the front position in these sentences can be equated with the RRG-notion of the PrCS. In Icelandic, different readings of modal verbs indicate the position before the finite verb should be regarded as core-external position due to the operator scope. It will therefore be assumed that an PrCS is obligatory in main declarative sentences in Icelandic.

0 Introduction

Diderichsen (1945, 1964) has developed a topological model of Danish very similar to the 'Stellungsfeldermodell' Drach (1937) developed for German. Diedrichen's (2008) work on the PrCS in German is based on this model. Thráinsson has modified Diderichsen's model for Icelandic. A simplified fashion of this is illustrated in (1) (cf. Thráinsson 2007: 19):

(1) (cf. Thráinsson 2007: 19f)[7]

subord.		k	n	v	a		?	V	N
main	F	v	n		a	?		V	N
a.	Strákurinn bókina	hefur			aldrei			lesið	
	the boy	had			never			read	the book
b.	Það bókina	hefur			aldrei	stákurinn		lesið	
	there	had			never	the boy		read	the book
c.		hvort	María	hefði	ekki			lesið	
	bókina								
		whether	María	had	not			read	the book
d.	Bókina	hefur	María		ekki			lesið	
	the book	has	María		not			read	

[5] In memory of my grandpa Karlheinz Spanknebel. I will always remember your slogan: 'Joke must be!'

[6] I would like to thank Claudius Gottschalk, Maximilian Gottschalk, Volker Gottschalk, Kim Hülsewede, Lars Inderelst, Àsa Sylvia Magnúsdóttir and Brian Nolan. for comments on earlier drafts and insightful discussions.

[7] Translation and glossing for (1a, d)

(a) Strák-ur-inn hefur aldrei les-ið bók-i-na.
boy-MsgNOM-DET have.3sgPRES never read-3sgPSPT book.FsgACC-DET
'The boy has never read the book.'

(d) Bók-i-na hefur Marí-a ekki les-ið.
book.FsgACC-DET have.3sgPRES María-NOM not read-3sgPSPT
'The book, María has never read.'

Labels are adopted from Diderichsen, except for the question mark. Their meaning is given in the following: (cf. Tráinsson 2007: 20):

(2) (Thráinsson 2007: 20)

F = front position	v = finite verb position	k = conjunction position
n = subject position	V = non-finite verb	a = clausal adverbial
N = complement position		

The positions in (1) are the same Diderichsen has assumed for Danish. However, there are two exceptions. Diderichsen does not have an alternative position for the subject, which in (1) is marked by a question mark. Diderichsen assumes that the order of position is not the same for the finite and the sentence adverb in embedded clauses. These differences are due to the fact Diderichsen has analyzed Danish. Danish is rather different from Icelandic, where in embedded clauses both the finite verb and the sentence adverb remain in the same position as in main clauses. Danish also does not have a transitive expletive construction like (1b). Hence, there is less evidence for this additional position in Danish than there is in Icelandic (cf. Thráinsson 2007: 20).

In this topological model for Icelandic, the elements in the F-position, the n-position and the N-position can move relatively freely, although there is a rather strict word order within the reference phrases [RPs]. Example (1d) shows that Icelandic has a brace construction. While in both main clauses and embedded clauses the non-finite part of the main verb is in the V-position, here, the finite auxiliary verb in the V2-position does not stand adjacent to the non-finite part of the main verb. In Icelandic, the F-position has to be occupied. The verb remains in its v-position even in cases of topicalization. In addition, with topicalization the finite verb remains in the second position of the clause in Germanic languages. This is referred to as the V2-phenomenon. The V2-phenomenon can be found in almost all modern Germanic languages except for English.

Except for the two positions F and v, none of the positions in (1) needs to be obligatorily filled in Icelandic main declarative sentences. In cases of periphrastic tense forms with intransitive verbs in Icelandic the finite auxiliary verb and the main verb which is non-finite stand adjacent to each other.

As will be shown in (3), Icelandic does not exhibit the topicalization pattern found in English. This is due to the fact that Icelandic, like German, is a V2-language:

(3) (cf. Van Valin 2005: 118)

*Sigg-u,	lögregl-a-n	fann.
Sigga-FsgACC	police-FsgNOM-DEF	find.FsgPAST

'Sigga, the police found.'

If the undergoer (the direct object in traditional terms) of the construction should be topicalized, the verb needs to stay in its V2-position, while the undergoer occurs in the F-position as shown in (4):

(4) (cf. Van Valin 2005: 118)

Sigg-u	fann	lögregl-a-n.
Sigga-FsgACC	find.FsgPAST	police-FsgNOM

'Sigga, the police found.'

The topological model for Icelandic described above, which Thráinsson (2007: 20) adopted for Danish, is very similar to Drach's (1937) 'Stellungsfeldermodell' for German. It is also a topological model, except for the fact that Tháinsson's model is much more finely grained. Diedrichsen bases her analysis on Drach's (1937) model. She refers to Drach's 'Vorfeld' (prefield) as the F-position. In her paper 'Where is the precore slot? – Mapping the layered

structure of the clause and German sentence topology', Diedrichsen (2008) argues that the F-position in main declarative sentences equals the notion of the PrCS in RRG-terms. Since the Vorfeld or F-position has to be occupied in German sentences just as in Icelandic, German has an obligatory PrCS in main declarative sentences. In case of Icelandic, where the F-position always needs to be occupied, too, the situation is very similar. In what follows I will argue for an obligatory PrCS in Icelandic. Diedrichsen (2008) based her observation of an obligatory PrCS on the fact that some German modal verbs exhibit an ambiguity between an epistemic and a deontic reading which remains an obligatory PrCS as highly reasonable. I will further show that the situation in Icelandic is almost the same. Here, too, some modal verbs are ambiguous between an epistemic and a deontic reading.

The discussion of this paper is organized as follows: In section 1.0 and its subsections, I will give a short overview of RRG and introduce the layered structure of the clause as well as the PrCS, the semantic representation used in RRG. I will also show how the operator projection works. Section 2.0 and its subsections contain a descriptive overview of clause structure in simple main declarative active voice sentences in Icelandic. I will also describe how topicalization works in Icelandic. In section 3.0, modal verbs in Icelandic are characterized and Diedrichsen's (2008) approach of an obligatory PrCS in German is introduced. Furthermore I will develop a semantic test for the extra-core postion in Icelandic and give structural reasons for the assumption of an obligatory PrCS in Icelandic. In section 4, an RRG-analysis of Icelandic follows. I will also develop a linking algorithm from semantics-to-syntax for Icelandic to show how an RRG-analysis with an obligatory PrCS works. Additionally, theory internal reasons for the assumption of an obligatory PrCS will be given. Later on in this section a sample of three Icelandic sentences will be analyzed and their linking will be described. This paper ends with a conclusion in section 5 containing future questions regarding V2-languages and the notion of the PrCS in RRG

1.0 An overview of Role and Reference Grammar

Role and Reference Grammar [RRG] is a monostratal functionalist theory. RRG uses a single syntactic description which is semantically motivated. It does not assume abstract underlying levels of syntactic representations as they are used in Government and Binding Theory and Relational grammar (cf. Van Valin 1991: 154; cf. Van Valin 2005: 1). Also, RRG employs a semantic representation based on Aktionsarten as they are developed by Vendler (1969) and Dowty (1979). For this correspondence, RRG uses a linking algorithm, which directly links the semantic representation of the clause with its syntactic representation (cf. Van Valin 2005). Based on this, RRG is both a lexicalist and a functionalist theory (cf. Van Valin 1991: 154). Also, RRG uses a representation of information structure to account for the communicative function of the utterance (cf. Van Valin 2005: 1). Figure 1 gives a summary of the RRG linking algorithm.

As can be seen in this figure, the arrow of the linking algorithm is double-headed. This is because the linking system in RRG maps the semantic representation with the syntactic representation and vice versa (cf. Van Valin 2005: 1)

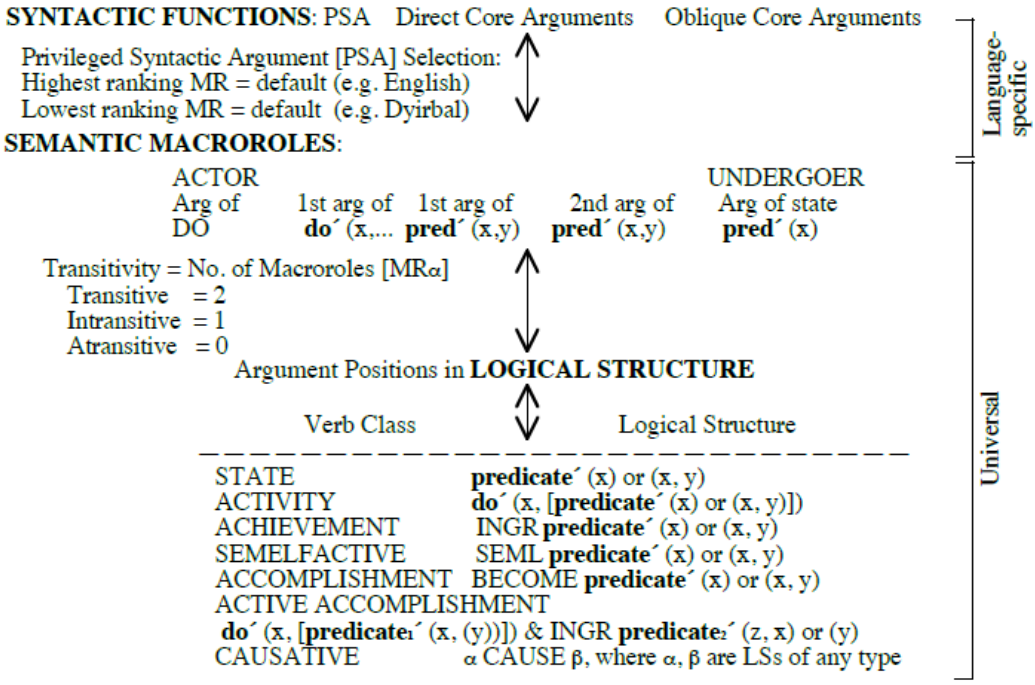

Figure 1. The architecture of RRG (Van Valin 2005: 129)

1.1 The layered structure of the clause and the PrCS

To describe word order regularities, RRG proposes clause structure has to be represented in terms of the layered structure of the clause [LSC]. The LSC is semantically motivated and contains components which every human language has (cf. Van Valin 2005: 4). The semantic units which underlie the syntactic units of the LCS are summarized in table 1

Table 1. Semantic units underlying the syntactic units of the LSC (Van Valin 2005: 5)

Semantic element(s)	Syntactic unit
Predicate	Nucleus
Argument in semantic representation of predicate	Core argument
Non-arguments	Periphery:
Predicate + Arguments	Core
Predicate + Arguments + Non-arguments	Clause (= Core + Periphery)

Although the LSC is semantically motivated, these units are nevertheless syntactic units (cf. Van Valin 2005: 8). Apart from these syntactic units, RRG also assumes additional elements which occur in a single-clause sentence. One of these elements is the precore slot [PrCS]. In languages where question words do not occur *in situ,* this is the place for them to occur. However, the PrCS is also the place where fronted elements occur, as in *Soccer, I like* (cf. Van Valin 2005: 5). The PrCS is not attested in every language. In languages which do have it, Van Valin (2005: 8) proposes it to be pragmatically motivated. As can be seen in figure 1 the PrCS is inside the clause but it is not part of the core (cf. Diedrichsen 2008: 204).

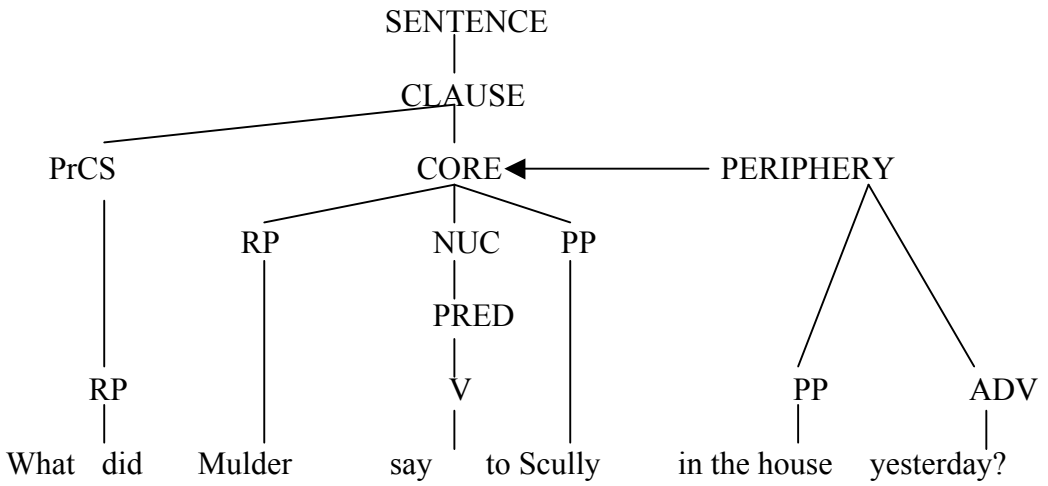

Figure 2. The LCS of an English clause (cf. Van Valin 2005: 7)

Figure 2 shows that the question word *what* occurs in the PrCS, as it is typical for languages like English, since here the question word does not occur *in situ* (cf. Van Valin 2005: 5). The verb *say* forms the Nucleus, which is the heart of both the semantic and the syntactic representation of the clause. The reference phrases [RP] *Mulder* is a direct core argument and *Scully* is an oblique core argument. This is due to the fact that is has an oblique case and is marked by a preposition. The PP *in the house* and the adverb *yesterday* from the periphery which modifies the core (cf. Van Valin 2005: 7).

1.1 Operator projection in RRG

In RRG, grammatical categories like tense, aspect and modality are not part of the LSC. Rather, they are operators modifying different layers of the LSC. Each clause layer may be modified by one or more operators (cf. Van Valin 2005: 8). These operators are introduced in table 1:

***Table 2 operators in the* LCS (Van Valin 2005: 9)**

Nuclear operators:
Aspect
Negation
Directionals (only those modifying orientation of action or event without reference to participants)
Core operators:
Directionals (only those expressind the orientation or motion of one participant with reference to another participant or to the speaker)
Event quantification
Modality (root modals, e.g. ability, permission, obligation)
Internal (narrow scope) negation
Clausal operators:
Status (epistemic modals, external negation)
Tense
Evidentials
Illocutionary force

The idea behind these different types of operators is that nuclear operators modify the nucleus. They can modify the action, event or state itself and make no reference to the participants. Core operators on the other hand modify the relation between a core argument, which is normally the actor, and the action itself, while clausal operators modify the whole clause. Clausal operators fall into two classes. The first class contains tense and status and the

other class contains evidentials and illocutionary force (cf. Van Valin 2005: 9). Van Valin (2005: 11) notes that there is an ordering of operators with respect to the position of the verb. Nuclear operators have scope only over the verb and are close to the verb, while core operators are further away from the verb and have scope over nuclear operators. Clause operators have the widest scope and are the furthest away from the verb. Cross-linguistically, morphemes expressing aspect are usually closer to the nucleus than clausal operators, like status or tense. In Foley and Van Valin (1984), a large number of languages have been surveyed and no exceptions to the operator orderings in table 2 have been found (cf. Van Valin 2005: 11).

As can also be seen in table 2, status and modality, which are of interest for an analysis of the PrCS in Icelandic, are operators modifying two different layers of the LCS. I will use the term *modality* to refer to the root or deontic sense of modal verbs. This category is used to describe strong obligation, permission and weak obligation. Modality describes the relationship between a referent of the subject RP and the action in question. Modality is a core operator. The operator 'status' is used to describe epistemic modality (cf. Van Valin and LaPolla 1997: 41). As will be shown in section 3.0, for Icelandic and German epistemic modality and deontic modality share the same modal forms in some verbs, but have different meanings both semantically and syntactically. While deontic modality operates on the core layer of the operator projection, epistemic modality operates on the clause layer (cf. Van Valin and LaPolla 1997: 41). As will be shown later on, this has major consequences for the analysis of the LCS of Icelandic main declarative sentences. With respect to the formal representation of the operator projection in RRG, Van Valin (2005: 11- 2) notes that operators are technically not part of the LCS. Instead, they modify nucleus, core and clause and should be represented separately. Johnson (1987) developed a formalization of the LCS and the operator projection. This kind of formalization is called a 'projection grammar' and is shown in figure 2 (cf. Van Valin 2005: 12):

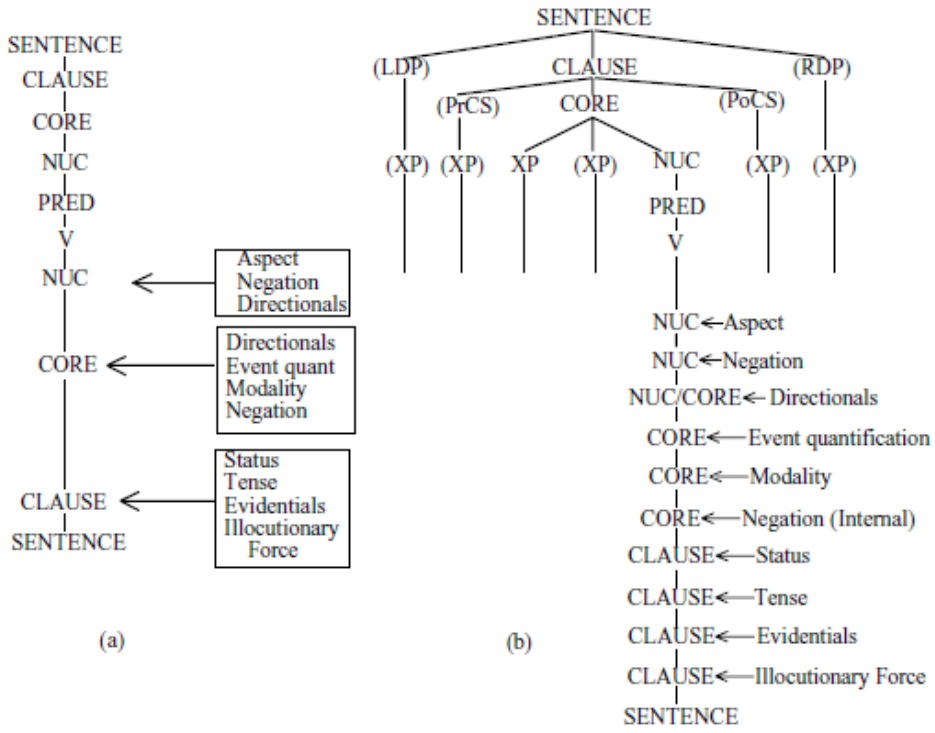

Figure 3. LSC and operator projection (Van Valin 2005: 12)

The part on top of the figure is called the 'constituent projection' and the part on the bottom of the figure is called the 'operator projection'. As can be seen in figure 3, the operator projection is connected with the constituent projection via the nucleus. This is because the nucleus is the central element of the clause and the scope of operators is defined based on their position to the nucleus (cf. Van Valin 2005: 12). This means nucleus operators are operators which are adjacent to the nucleus of the clause, while a core operator is further away from the nucleus.

1.2 The semantic representation in RRG and the use of semantic roles

RRG uses a semantic representation of clauses based on the Aktionsart classification adapted from Vendler (1967) (cf. Van Valin 2005: 31). This classification divides sentences into states, achievements, accomplishments and activities (cf. Gottschalk 2010: 21). To construct logical structures from which the LCS is projected, RRG uses an extended representation of Dowty's (1979) semantic representations of Aktionsarten (cf. Van Valin 2005: 31). However, RRG also uses several non-Vendlerian Aktionsarten. These are Semelfactives, Active Accomplishments and Process. Smith (1997) first assumed the Aktionsart Semelfactive exists and Gottschalk (2010) shows that besides the standard RRG-Aktionsarten also the Aktionsart Process exists. Except for State, each RRG-Aktionsart has a causative counterpart which describes semantic differences in which a cause, for example a change in condition, can be identified (cf. Gottschalk 2010: 21). Aktionsarten in RRG are described along the lines of the following binary features:

(5) (Gottschalk 2010: 21)

State:	[+ static], [- dynamic], [- telic], [- punctual]
Activity:	[- static], [+ dynamic], [- telic], [- punctual]
Achievement:	[- static], [± dynamic], [+ telic], [+ punctual]
Semelfactive:	[- static], [± dynamic], [- telic], [+ punctual]
Process:	[- static], [- dynamic], [- telic], [- punctual]
Accomplishment:	[- static], [- dynamic], [+ telic], [- punctual]
Active Accomplishment:	[- static], [+ dynamic], [+ telic], [- punctual]

In RRG, a number of syntactic and semantic tests are used to determine the Aktionsart of a verb. The lexical representations used in RRG are adapted from Dowty (1979). These lexical representations deliver semantic processes, which are described by the Aktionsarten. The semantic representations used in RRG are called logical structures [LSs]. An overview is given in (6):

(6) (Gottschalk 2010: 22)

State	**predicate´**(x) or (x, y)
Activity	**do´**(x, [**predicate´**(x) or (x, y)])
Achievement	INGR **predicate´**(x) or (x, y) or INGR **do´**(x, [**predicate´**(x) or (x, y)])
Semelfactive	SEML **predicate´**(x) or (x, y) or SEML **do´**(x, [**predicate´**(x) or (x, y)])
Process	PROC **predicate´**(x) or (x, y)
Accomplishment	PROC **predicate´**(x, (y)) & INGR **predicate´**((z), y)
Active Accomplishment	**do´**(x, [**predicate´**(x, (y)))]) & INGR **predicate´**((z), y)
Causative	α CAUSE β where α, β, are LSs of any type

The semantic representation of the clause is based on the LSs given in (6) (cf. Van Valin 2004: 11). In RRG, the LSCs of specific languages are stored as syntactic templates in the syntactic inventory (cf. Van Valin 2005: 15). The principle governing the selection of syntactic templates is given in (4) (cf. Van Valin 2004: 11):

(7) Syntactic template selection principle (Van Valin 2004: 11)

> The number of syntactic slots for arguments within the core is equal to the number of distinct specified argument positions in the semantic representation of the core

As Van Valin (2004: 11) notes, there are several language-specific and construction-specific restrictions on this principle. However, this projection determines which syntactic template is chosen adequately.

In RRG semantic roles are also of crucial importance. These are the semantic marcroroles actor and undergoer, which are the two primary arguments of transitive verbs. Intransitive verbs take either an actor or an undergoer as macrorole (cf. Van Valin 2005: 60-2). An example of actor and undergoer is given in (8)

(8) (cf. Van Valin 2004: 12-3)
a. Mulder [Actor] beat Krycek [Undergoer].
b. Krycek [Undergoer] is beaten by Mulder [Actor].
c. Mulder [Actor] is writing.
d. The cigarette-smoking-man [Undergoer] died.

As Van Valin (2004: 12) notes, the selection of actor and undergoer in LSs is governed by a general principle called the actor-undergoer-hierarchy [AUH], which is given in figure 4:

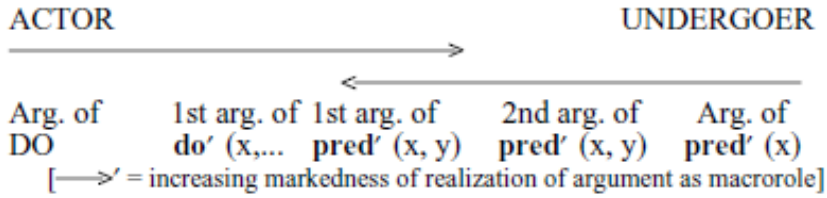

Figure 4. Actor-Undergoer-Hierarchy (Van Valin 2005: 61)

The AUH simply states that in an LS of a transitive verb, the leftmost argument in this LS will be the actor while the rightmost argument will be the undergoer (cf. Van Valin 2005: 12).

In syntactically accusative languages like Icelandic, German or English, the default choice for the subject - which in RRG-terms is the privileged syntactic argument [PSA] - is the actor with transitive verbs, while in passive constructions the undergoer functions as PSA (cf. Van Valin 2004: 14). As noted in Van Valin (2005: 115), there is no syntactic relation corresponding to direct or indirect objects in RRG. Instead, these positions are referred to as marcroroles. This will be important for the analysis of Icelandic clauses in section 2.

1.6 The privileged syntactic argument

In Van Valin (2005: 89) it is noted that grammatical relations like subject, direct object and indirect object, as they are proposed in the traditional generative literature, are not universal. Therefore, RRG uses the notion of the 'privileged syntactic argument' [PSA] to refer to restricted neutralizations of semantic roles and pragmatic functions for syntactic purposes (cf. Van Valin 2005: 89). The PSA is construction specific, since in some languages, like Jakaltek and Sama, there are several PSAs for the major grammatical constructions (cf. Van Valin: 94). Languages have a privileged syntactic argument selection hierarchy and privileged syntactic argument selection principles which are given in (9) and (10):

(9)
Privileged syntactic argument selection hierarchy (Van Valin 2005: 100):
arg. of DO > 1st arg. of **do**′ > 1st arg. of **pred**′(x, y) > 2nd arg. of **pred**′(x, y) > arg. of **pred**′(x)

(10) (Van Valin 2005: 100)
Accessibility to privileged syntactic argument principles
- a. Accusative constructions: highest ranking direct core argument in terms of (XX) (default)
- b. Ergative constructions: lowest ranking direct core argument in terms of (XX) (default)
- c. Restrictions on PSA in terms of macrorole status:
  1. Languages in which only macrorole arguments can be PSA: German, Italian, Dyirbal, Jakaltek, Sama, …
  2. Languages in which non-macrorole direct core arguments can be PSA: Icelandic, Georgian, Japanese, Korean, Kinyarwanda, …
- d. Restrictions on PSA in terms of coding (Bickel 2003a)
  1. Languages with case-sensitive PSAs, e.g. English, German, Nepali, Maithili …
  2. Languages with case-insensitive PSAs, e.g. Behare, Tibetian, …

Van Valin (2005: 100) notes that the privileged syntactic argument hierarchy is very similar to the AUH in that it refers to the same argument positions in the LSs. However, one important difference is that it is unilateral and takes agent, which is an argument of DO, as the highest ranking and patient, which is an argument of **pred´**(x), as the lowest ranking semantic role. If a verb is M-transitive and takes both actor and undergoer, then the actor will be the highest argument in terms of the privileged syntactic argument selection hierarchy in (9). Since the actor is the highest-ranking argument in the AUH, it is also the highest ranking argument in the privileged syntactic argument selection hierarchy. With M-intransitive verbs, the single macrorole is the highest ranking one or the lowest ranking one for the purposes of (10b). For the selection of the PSA this means that the single argument is the PSA (cf. Van Valin 2005: 100). Van Valin (2005: 95) characterizes PSAs functionally as controllers and pivots, as shown in (11):

(11) (cf. Van Valin 2005: 95)
a. Mulder$_i$ slapped Kryzek$_j$ and then __$_{i/*j}$ ran away.
   CONTROLLER PIVOT
a'. Kryzek$_i$ was slapped by Mulder$_i$ and then __$_{i/*j}$ ran away.
   CONTROLLER PIVOT
b. Mulder ran down to the desk and __slapped Kryzek.
   CONTROLLER PIVOT
b'. *Mulder$_i$ ran down to the desk and Kryzek slapped __$_i$.
   CONTROLLER PIVOT
b''. Mulder ran down to the desk and __ was slapped by Kryzek.
   CONTROLLER PIVOT

As noted by Van Valin (2005: 96), this construction has one PSA in each clause. First, there is the controller in the matrix clause and second there is the pivot, which is the omitted RP in the second clause. The PSA in RRG terms is equal to the subject in the traditional generative literature. As shown in (11a) it is impossible for the undergoer of the transitive verb to be the controller or the pivot as shown in (101'). Having the actor of a passive verb as the controller is also impossible, as shown in (11a') (cf. Van Valin 2005: 96).

In RRG, the two restricted neutralizations of the PSA can be characterized as follows: The neutralization of the actor of an intransitive verb and of the undergoer of an intransitive verb. Van Valin (2005: 96) cites Dixon (1972) as reference and explains that this 'intransitive subject' function is referred to as 'S' in Dixon's framework. Some languages such as Acehnese lack the S-function. Van Valin (2005: 96) also introduces 'A_T' which refers to the actor of a transitive verb, and 'U_T' which refers to the undergoer of a transitive verb. The passive verb on the other hand is a derived intransitive verb in most languages. Because of this, the single core argument of a passive verb will be referred to as 'derived-S' [d-S]. This means that the restricted neutralization in German, Icelandic and the control constructions in English can be represented by the following pattern: [S, A_T, d-S]. The semantics of this pattern is such that the single argument of an intransitive verb, for which it is not important if

it is actor or undergoer, the actor of a transitive verb, and the single argument of a transitive verb function alike in these constructions (cf. Van Valin 2005: 97).

Not all languages have neutralization patterns as German and English do. In fact, several patterns of restricted neutralization are found in human languages. These are summarized in table 2 (cf. Van Valin 2005: 98-9):

Table 3 Restricted neutralization patterns of semantic roles

	Intransitive Verbs	Transitive Verbs	Grammatical relations	PSA(s)
Acehnese	no	no	no	[A], [U]
English	yes	yes	yes	[S, A_T, d-S]
Kambera	yes	no	yes	[S, A_T]
Kalkatungu	yes	yes	yes	[S, U_T, d-S]

(Van Valin 2005: 99)

1.7 The RRG linking algorithm

The linking algorithm as described in section 1.0 is bidirectional in that it links the semantic representation with the syntactic representation and vice versa. This algorithm has often been viewed in terms of a language processing model, in which the semantics-to-syntax linking describes the production process while the syntax-to-semantics linking is an aspect of the comprehension process (cf. Van Valin 2005: 129).

The basic idea within the comprehension process is that the parser uses the input to produce a structured syntactic representation to generate a structured representation of the clause. In this representation, the elements of the LSC, cases, adpositions and all other elements which are grammatically relevant, are identified (cf. Van Valin 2005: 129). It is the task of the grammar to map the LCS and the operator projection into the semantic representation of the clause. For the interpretation of this mapping, the syntax-to-semantic linking algorithm is required (cf. Van Valin 2005: 129).

In semantics-to-syntax linking, an inheritance process within the lexicon maps the lexical elements into the LS, which is the output of the lexicon (cf. Gottschalk 2010). Once the LSs are produced, it is the task of the grammar to project the LSC and all other grammatically relevant elements from the LS in question. Both the semantics-to-syntax-linking and the syntax-to-semantics linking is governed by a general constraint which is called completeness constraint introduced in (12):

(12)
Completeness Constraint (Van Valin 2005: 130)
All of the arguments explicitly specified in the semantic representation of a sentence must be realized syntactically in the sentence, and all the referring expressions in the syntactic representation of a sentence must be linked to an argument position in a logical structure in the semantic representation of the sentence.

The completeness constraint is extremely important to guarantee a matching number of arguments in the clause and the LS of the verb. It is also crucial that the semantic representation of a sentence is built around the LS of the verb (cf. Van Valin 2005: 130). As shown in Gottschalk (2010), the LS is put together in the lexicon by inheritance. Van Valin (2005: 130) explains that the semantic representation is crucial for the semantics-to-syntax-linking. The same holds true for the selection of the syntactic templates which constitute the LSC.

The syntactic templates are stored in the syntactic inventory. There are several principles governing the selection of the appropriate core template (cf. Van Valin 2005: 130). These principles are given in (12):

(13)

Syntactic template selection principle (Van Valin 2005: 130)

a. The number of syntactic slots for arguments and argument-adjuncts within the core is equal to the number of distinct specified argument position in the semantic representation of the core.
b. Language-specific qualifications of the principle in (a):
    1. All cores in the language have a minimum syntactic valence of 1.
    2. Argument-modulation voice constructions reduce the number of core slots by 1.
    3. The occurrence of a syntactic argument the pre/postcore slot reduces the number of core slots by 1 (may override (1) above).

There is a default principle in (11a) which states that if a verb takes *n* arguments, there need to be *n* positions in the core for arguments to appear in it. This is necessary for the completeness constraint to be satisfied. However, there are also exceptions in (11b) which are language-specific. All of these constraints apply for English. English requires a dummy subject for argument-less verbs like *rain*. English also has a passive and WH-words appear in the PrCS. However, this is not the case in languages where question verbs occur *in situ* (cf. Van Valin 2005: 130).

The algorithm linking semantics to syntax is given in (14). It will be of crucial interest for the analysis of clause structure in Icelandic:

(14) (Van Valin 2005: 136)
Linking algorithm: semantics → syntax

1. Construct the semantic representation of the sentence, based on the logical structure of the predicator.
2. Determine the actor and undergoer assignments, following the actor-undergoer hierarchy […]
3. Determine the morphosyntactic coding of the arguments
    a. Select the privileged syntactic argument, based on the privileged syntactic argument selection hierarchy and principles […]
    b. Assign the arguments the appropriate case markers and/ or adpositions.
    c. Assign the agreement marking to the main or auxiliary verb, as appropriate.
4. Select the syntactic template(s) for the sentence following the syntactic template selection principle.
5. Assign arguments to positions in the syntactic representation of the sentence.
    a. Assign the [-WH] argument(s) to the appropriate positions in the clause.
    b. If there is a [+WH] argument of a logical structure,
        1. assign it to the normal position of a non-WH-argument with the same function, or
        2. assign it to the precore or postcore slot, or
        3. assign it to a position within the potential focus domain of the clause (default = the unmarked focus position).
    c. A non-WH argument may be assigned to the precore or postcore slot, subject to focus structure restrictions (opitional).
    d. Assign the [-WH] arguments(s) of a logical structure(s) other than that of the predicator in the nucleus to
        1. a periphery (default), or
        2. the precore or postcore slot, or
        3. the left- or right-detached position

The linking from syntax-to-semantics is more difficult than the linking from semantics-to-syntax. This is because it involves the interpretation of the overt morphosyntactic form of a sentence and deducing the semantic functions of the elements in the sentence from it (cf. Van Valin 2005: 149). The syntax-to-semantics linking algorithm is shown in (15):

(15) (Van Valin 2005: 149-50)
Linking algorithm: syntax → semantics

1. Determine the macrorole(s) and other core argument(s) in the clause.
    a. If the verb is intransitive, then assign the privileged syntactic argument either macrorole or direct core argument status, depending upon the language (language-specific).
    b. If the verb is transitive and the language lacks voice opposition, determine the macroroles from case marking and/or word order (language-specific).
    c. If the language has voice opposition, determine the voice of a transitive verb (language-specific):
        1. If the construction is syntactically accusative:
            a. If it is the unmarked voice, the privileged syntactic argument is actor.
            b. If it is passive, the privileged syntactic argument is not the actor of the predicate in the nucleus;
                1. the actor may appear as a direct core argument (language-specific); or
                2. the actor may appear in the periphery$_{\text{CORE}}$ marked by an adposition or an oblique case (language-specific); or
                3. if there is no actor in the core or the periphery, then replace the variable representing the highest ranking argument in the logical structure with 'Ø'
        2. If the construction is syntactically ergative:
            a. If it is the unmarked voice, the privileged syntactic argument is undergoer.
            b. If it is antipassive, the privileged syntactic argument is actor:
                1. the undergoer may appear as a direct core argument or as an oblique element (language-specific);
                2. if there is no undergoer in the core the periphery$_{\text{CORE}}$, then replace the variable representing the lowest ranking argument u the logical structure with 'Ø'-
        3. Assign macrorole status to the other direct core argument, if it is not dative or in an oblique case (language-specific).
    d. If the language is head-marking and there are independent NPs in the clause, associate each NP with a bound argument marker (language-specific).
2. Retrieve from the lexicon the logical structure of the predicate in the nucleus of the clause and with respect to it execute step 2 from (11), subject to the following provisio:
    a. If the language allows variable undergoer selection and if there is more than one choice for undergoer, do not assign undergoer to an argument in the logical structure.
    b. Determine the linking of the non-macrorole core argument:
        1. If there is a two-place state predicate in the logical structure and if the non-macrorole core argument is marked by a locative adposition or dative or a locative-type case, then link it with the first argument position in the state predicate or,
        2. If there is a two-place state predicate in the logical structure and if the non-macrorole core argument is not marked by a locative adposition or dative or a locative-type case, then link it with the second argument position in the state predicate and link the other non-actor core argument (if there is one) to the first argument position in the state predicate.
        3. Otherwise, link the animate NP with the first argument position in the state predicate in the logical structure.
3. Link the arguments determined in step 1 with the arguments determined in step 2 untul all core arguments are linked.
4. If there is a predicative adpositional adjunct, then retrieve its logical structure from the lexicon, insert the logical structure of the core as the second argument in the logical structure and the object of the adposition in the periphery as the first argument.
5. If there is an element in the pre- or postcore slot (language-specific),
    a. Assign it the remaining unlinked argument position in the semantic representation of the sentence.
    b. And if there are no unlinked argument positions in the sentence, then treat the WH-word like a predicative preposition and follow the procedure in step 4, linking the WH-word to the first argument position in the logical structure.

After this detailed overview of RRG, a topological analysis of Icelandic clause structure will follow in section 2.

2.0 Basic word order in Icelandic

Icelandic is said to be a SVO-language. However, it is also sometimes claimed that the word order is relatively free due to the rich morphology Icelandic exhibits (cf. Thráinsson 2007: 21). In Icelandic, a three-valued gender system is found, which consists of masculine [m], feminine [f] and neuter [n]. The nominal categories noun, adjective, article and pronoun have four cases: nominative [NOM], accusative [ACC], dative [DAT] and genitive [GEN]. With nouns, the inflectional paradigms vary depending on gender and inflectional class of the noun. Adjectives on the other hand modify nouns and agree with them in gender, case and number. Inflections for nouns and adjectives are realized as suffixes, which are attached to the noun or adjective stem (cf. Thráinsson 2007: 2). Articles in Icelandic are usually suffixed after the suffix used for case marking and have their own inflection for gender, number and case (cf. Thráinsson 2007: 2). Finite verbs agree with the PSA in Icelandic in person and number. The basic Icelandic perfect is a periphrastic tense form and is formed with an auxiliary and an uninflected past participle of the main verb, which is referred to as supine (cf. Thráinsson 2007: 10-1). With respect to auxiliaries in Icelandic it is important that they do not form a separate inflectional class. Thus, the verbs which are most frequently listed show rich agreement morphology like other verbs and also inflect for tense (cf. Thráinsson 2007: 10). I will refer to the occurrence of finite and non-finite verbs in section 4, when I develop a semantics to syntax linking algorithm for Icelandic.

The sentences in (16) show simple examples of PSAs and undergoers[8] occupying different positions within the topological model for Icelandic:

(16) (Tráinsson 2007: 21)

a.	Marí-a	elska-r	Harald-Ø
	María-FsgNOM	love-3sgPRES	Haraldur-MsgACC
	'Mary loves Harold.'		
b.	Harald-ur	elska-r	Marí-u
	Haraldur-MsgNOM	love-3sgPRES	María-FsgACC
	'Harold loves Mary.'		
c.	Harald-Ø	elska-r	Marí-a
	Haraldur-MsgACC	love-3sgPRES	María-FsgNOM

María is marked with nominative case. In RRG-terms it is the PSA in both (16a) and (16c). *Haraldur* is marked with accusative case in (16a) and (16c). Hence, it is the undergoer of the construction. The PSA in the F-postion in (16a) is the default word order in Icelandic, while sentences in (16c) are marked and are an example of topicalization in Icelandic (cf. Tháinsson 2007: 21).

As already said in section, 1.0 Icelandic is a V2-language. This means that even in cases of topicalization as in (16c), the finite verb needs to remain in the second position of the clause.

[8] In all these sentences the PSA is marked nominative case and no examples of quirky case is found. I will refer to the PSA selection in Icelandic in section 4 in detail. Since in all these examples sentences in the active voice are analyzed I will call the counterpart of the PSA in the examples cited in this section undergoer. This is due to the fact that the default marcrorole for the PSA in Icelandic active voice sentences is the actor which is usually marked with nominative case and the non-PSA which is identical with the traditional notion of the object usually is the undergoer. However notions like direct objects do not exist in RRG (cf. Van Valin 2005: 115). Therefore I will use the RRG-term undegoer to refer to direct objects in this section.

RPs are relatively free in occupying different positions in the topological model Thráinsson (2007: 23) suggests for Icelandic based on Diderichsen (1947, 1964). This is shown in (17):

(17) (cf. Thráinsson 2007: 21)

a. student-ar-nir höfðu aldrei séð Þessa
student-MplNOM-DET have.3plPAST never see.SUP this
mynd-Ø í fyrra.
film-MsgACC last year
'The students have never seen this film last year.'

b. Í fyrra höfðu student-ar-nir aldrei séð Þessa
last year have.3plPAST student-MplNOM-DET see.SUP this mynd-Ø
film-MsgACC
'Last year the students have never seen this film last year.'

c. Það höfðu student-ar-nir aldrei séð
Þessa there have.3plPAST student-MplNOM-DET never see.SUP this
mynd-Ø í fyrra.
film-MsgACC last year
lit. 'There had the students never seen this film last year.'

As can be seen in this example, the PSA can either occupy the F-position as in (17a), while the PP occupies the N-position or the PSA occupies the n-position, while the PP is in the F-position as in (17b). However, the F-position can also be occupied by a transitive expletive construction as in (16c). This is however not possible in Mainland Scandinavian languages (cf. Thráinsson 2007: 23). Also a shift of full undergoer RPs is possible, as will be shown in (18b). Such a construction is also not possible in Mainland Scandinavian languages (cf. Thráinsson 2007: 23):

(18) (Thráinsson 2007: 23)

a. Stúdent-ar-nir sáu aldrei Þessa mynd-Ø
student-3plACC-DET see.3plPAST never this film-MsgACC
í fyrra.
last year.
'The students never saw this film last year.'

The sentences in (17) contain the auxiliary verb *hafa* 'have' and exhibit a brace construction, where the finite auxiliary verb does not stand adjacent to the main verb which is non-finite. The example in (18) on the other hand does not have an auxiliary but a finite main verb in the V2-position. (cf. Tháinsson 2007: 23). From these examples one can conclude the following:

(19)

1. The position of the finite auxiliary and the finite main verb is always the V2-position in main declarative sentences in Icelandic.
2. The position of the non-finite verb in main declarative sentences in Icelandic is the V-position.
3. The PSA can either occur in the F-position or in the n-position
4. The position of topicalized prepositional phrases is in the F-position while they normally occur in the N-position.
5. The position of the undergoer in the accusative case can either be the ?-position or the N-position.

(cf. Tháinsson 2007: 23f)

The examples in (20) will show that the default position of time and place adverbials is usually the end of the sentence with the place adverbial preceding the time adverbial just as it is the case in English:

(20) (Thráinsson 2007: 24f)

a.	Stúdent-ar-nir	sáu	Þessa	mynd-Ø	íReykjavík
	student -MsgNOM-DET	see.3plPAST	this	film-MsgACC	in Reykjavik
	í fyrra.				
	last year				
	'The students saw this film in Reyjavik last year.'				
b.	?stúdent-ar-nir	sáu	Þessa	mynd-Ø	í fyrra
	students-MsgNOM-DET	see.3plPAST	this	film-MsgACC	last year
	í Reykjavik.				
	in Reykjavik				
	*'The students saw this film last year in Reykjavik.'				

2.1 Alternative PSA-positions

Based on Tháinsson's (2007: 26) analysis, the PSA in Icelandic can occur in one of the following positions in (21) while the different PSA-positions mentioned in (21) are exemplified in (22).

(21) PSA-positions in Icelandic sentences (cf. Thráinsson 2007: 26)
a. The F-position in main clauses (22a)
b. The n-position in embedded clauses (22b)
c. The n-position in main clauses with an undergoer in the F-position (22c).
d. the ?-position which is right after the a-position (22d).

(22) (cf. Thráinsson 2007: 19)

a.	Strák-ur-inn	hefur	aldrei	les-ið	bók-i-na	
	boy-MsgNOM	have.3sgPRES	never	read-SUP	book-FsgACC-DET	
b.	Það	hefur	aldrei	sták-ur-inn	les-ið	bók-i-na
	there	have.3sgPRES	never	boy-MsgNOM	read-SUP	book-FsgACC-DET
c.	hvort	Marí-a	hef-ði	ekki	les-ið	bók-i-na
	whether	María-NOM	have-3sgPERF	not	read-SUP	book-FsgACC-DET
d.	Bók-i-na	hefur	Mar-ía	ekki	les-ið	
	book-FsgACC-DET	have.3sgPRES	María-NOM	not	read-SUP	

The sentences in (23) will show that the PSA (in bold face) can intervene between an intransitive verb like *vera* 'be' and a locative phrase following, but, as will be shown in (24), it cannot intervene between a transitive verb like *lesa* 'read' and its undergoer (cf. Tháinsson 2007: 26).

(23) (Tháinsson 2007: 26)

a.	… hvort Það	hefur	**útlending-ur-inn**
	whether there	have.3sgPRES	foreigner-MsgNOM-DET
	ver-ið	í sumarhúsin-u.	
	be-PSPT	in summer house-FsgDAT	
	'… whether there has been some foreigner in the summer house.'		
b.	…hvort Það hefur	ver-ið **útlending-ur-inn**	í sumarhúsin-u.
	whether there have.3sgPRES	be-SUP foreigner-MsgNOM-DET	in summer houseFsgDAT
	'… whether there has been some foreigner in the summer house.'		

(24) (Tháinsson 2007: 26)

a.	… hvort Það	hefur	**útlendig-ur-inn**	
	whether	there	have.3sgPRES	foreigner-MsgNOM-DET
	les-ið	bók-Ø-ina		
	read-SUP	book-FsgACC-DET		
	'… whether some foreigner has read the book.'			
b.	*… hvort	Það	hefur	les-ið
	whether	there	have.3sgPRES	read-SUP
	útlending-ur-inn			
	foreigner-MsgNOM-DET			

However, there are some further examples which are relevant to find out more about PSA-positions in Icelandic:

(25) (Tháinsson 2007: 27)

a. Í fyrra voru í sumarhúsin-u [**gest-ir-inn**
last year be.3plPAST in the summer house-FsgDAT guest-MsgNOM-
[**gest-ir-inn** **frá** **Færey-jum].**
guest-MsgNOM-DET from Faroe Islands-NplDAT
'Last year the guest from the Faroe Islands were in the summer house.'

b. Í fyrra lásu bók-i-na [**bókmenntagagnýrend-ur-nir]**
last year read.3plPAST book-FsgACC-DAT literary critic-MplNOM-DET
'Last year the literary critics read the book.'

In the examples in (24), the PSA occurs in the N-position, while the type of the main verb plays no significant role (cf. Thráinsson 2007: 27). From these findings one can conclude that there are five PSA-positions in Icelandic main sentences: the F-position, which is the default PSA-position in Icelandic, the n-position, the ?-position and the N-position. With respect to the n-position it follows this is the position for PSAs in embedded clauses to occur (cf. Tháinsson 2007: 27). This means the PSA-positions described in (21) need to be revised as in (26):

(26) PSA-positions in Icelandic sentences (final version)
a. The F-position in main clauses (12a)
b. The n-position in embedded clauses (21b)
c. The n-position in main clauses with an undergoer in the F-position (21c).
d. the ?-position which is right after the a-position (21d).
e. the N-position in main clauses with a PP or an undergoer in the F-position (24)

2.2 Positions of finite and non-finite verbs in Icelandic

In Icelandic the finite verb always needs to occupy the V2-position. If one uses the adverb *aldrei* 'never' one can see that the finite auxiliary and the non-finite verb with periphrastic tense forms make up a brace construction where the two verbs do not stand adjacent to each other, just as it is the case in German (cf. Thráinsson 2007: 27; Diedrichsen 2008). Within Diderichsen's (1946, 1964) framework the finite auxiliary occupies the v-Position while the non finite verb in a brace construction occupies the V-position. This is shown in example (27):

(27) (Thráinsson 2007: 27)

a. Jón-Ø hefur aldrei les-ið bók-i-na.
John-NOM have.3sgPRES never read-SUP book-FsgACC-DET
'John has never read the book.'

b. Jón-Ø las aldrei bók-in-a.
John-NOM read.3sgPAST never book-FsgACC-DET
‚John never read the book.'

Typically, the finite main verb precedes the sentence adverbs like *ekki* 'not', *aldrei* 'never' due to the fact Icelandic is a V2-language where the finite verb always needs to be the second constituent in the clause. Icelandic is exceptional in that embedded clauses as well take the finite verb in the second position of the clause. This is only found in Yiddish and to a limited extent in Faroese. All other Germanic languages which are V2-language do not have such a pattern (cf. Tháinsson 2007: 27). Examples for this special Icelandic pattern are given in (28):

(28) (Tháinsson 2007: 28)

a. … hvort Jón-Ø hef-ði aldrei les-ið
whether John-NOM have-3sgPAST.SUB never read-SUP
bók-i-na.
book-FsgACC-DET

b. … hvort Jón-Ø læsi aldrei bók-i-na.
whether John read.3sgPAST.SUB never book-FsgACC-DET
'… whether John never read the book.'

As example (29) will show, in 'yes/no'-questions the finite verb can occur in the F-position in Icelandic and in other V2-languages (cf. Thráinsson 2007: 28):

(29) (Thráinsson 2007: 28)
a. Hefur Jón-Ø ekki les-ið bók-i-na?
have.3sgPRES John-NOM not read-SUP book-FsgACC-DET
'Has John not read the book?'
b. Las Jón-Ø ekki bók-i-na?
read.3sgPAST John-NOM not book-FsgACC-DET
'Did John not read the book?'

A verb-first or V1-phenomenon can be found in two kinds of sentences in Icelandic: In imperatives and in narrative V1-constructions, which are mainly found in ongoing written narratives (cf. Thráinsson 2007: 28). This is shown in example (30):

(30) (Thráinsson 2007: 29)
a. Far Þú!
go.IMP you
'Go home!'
b. Koma Þeir nú að hell-i og …
come.3plPRES they now to cave-FsgDAT and
'Then they get to a cave and …'

As will be shown later, these constructions can be analyzed perfectly within an RRG-framework which proposes an obligatory PrCS in Icelandic.Example (30) will show that sentence adverbs occur within the brace construction where the finite verb is in the v-Position while the non-finite verb is in the V-position. In cases where more than one auxiliary verb occurs, only the first auxiliary will be finite while the sentence adverb precedes the other verbs in the clause. It is not possible for a constituent to intervene between a non-finite auxiliary and a following non-finite verb (cf. Thráinsson 2007: 29). In these cases it is not important if it is an auxiliary or a main verb as will be shown in (31b):

(31) (Thráinsson 2007: 31)
a. Jón-Ø mun aldrei hafa les-ið bók-i-na.
John-NOM will.3sgFUT never have.INF read-SUP book-FsgACC-DET
'John has apparently never read the book.'
b. *Jón-Ø mun hafa aldrei les-ið bók-i-na.
John-NOM will.3sgFUT have.INF never read-SUP book-FsgACC-DET
'John has apparently never read the book.'

From this analysis one can conclude that the finite verb - be it an auxiliary or a main verb - is found in the V2-position and therefore occupies the v-position in Diderichsen's (1945, 1967) framework while the non-finite verb, which for example occurs in periphrastic tense forms, occupies the V-position.

2.3 Alternative positions for undergoers in Icelandic

An undergoer can either occupy the n-Position and thus precede a sentence adverb like *aldrei* 'never' or it can occupy the ?-position and thus follow the sentence adverb. However, this is only true if the main verb is finite and occupies the V2-position and precedes the sentence adverb (cf. Thráinsson 2007: 31). Following Tháinsson (2007: 31) this is known as Holmberg's generalization which was first suggested in Holmberg (1986). An example for Holmberg's generalization is given in example (32):

(33) (Thráinsson 2007: 31)

a.	Jón-Ø	hefur		aldrei	les-ið	bók-i-na.
	John-NOM	have.3sgPRES	never	read-SUP		book-FsgACC-DET
	'John has never read this book.'					
b.	*Jón-Ø	hefur		bók-i-na	aldrei	les-ið.
	John-NOM	have.3sgPRES	book-FsgACC-DET		never	read-3sgPSPT
c.	Jón-Ø	las	aldrei	bók-i-na.		
	John-NOM	read.3sgPAST	never	book-FsgACC-DET		
	'John never read this book.'					
d.	Jón-Ø	las		bók-i-na	aldrei.	
	John-NOM	read.3sgPAST		book-FsgACC-DET		never
	'John never read this book.'					

When the undergoer occupies the n-Position as in (33d) and is therefore in front of the sentence adverb *aldrei* 'never' this is known as Full NP Object Shift in the traditional generative literature, since it affects the full RP and not just pronouns. This is in contrast to a Pronominal Object Shift, which in Icelandic is obligatorily understood in the sense that unstressed pronominal objects cannot follow sentence adverbs (cf. Thráinsson 2007: 31). Examples of pronominal OSs are given in (34):

(34) (Thráinsson 2007: 32)

a.	Jón-Ø	hefur		aldrei	les-ið	hana
	John-NOM	have.3sgPRES	never	read-SUP		3FsgACC
b.	*Jón-Ø	hefur		hana	aldrei	les-ið.
	John-NOM	have.3sgPRES	3FsgACC		never	read-SUP
c.	*Jón-Ø	las	aldrei	hana.		
	John-NOM	read.3sgPAST n	ever	3FsgACC		
d.	Jón-Ø	las	hana		aldrei.	
	John-NOM	read.3sgPAST	3FsgACC		never	
	'John never read it.'					
e.	Jón-Ø	las		aldrei	HANA	
	John-NOM	read.3sgPAST		never	3FsgACC	
	'John never read IT (but he may have read something else).'					

All the sentences in (34) show that the shifted undergoer is always definite, since indefinite objects or undergoers in RRG-terms do not undergo OS. However, if the main verb is stressed heavily they can undergo an OS. This is also the case with sentence adverbs in such cases (cf. Thráinsson 2007: 32). Examples of this are given in (35):

(35) (Thráinsson 2007: 32)

a.	Èg	les	aldrei	bækur.	
	1sgNOM	read.1sgPRES	never	books.FplACC	
	'I never read books.'				
b.	?*Èg	les	bækur	aldrei.	
	1sgNOM	read.1sgPRES	book.FplACC	never	
c.	Èg	LES	bækur	aldrei.	
	1sgNOM	READ.1sgPRES	book.FplACC	never	
	'I never READ books (I only buy them).'				
d.	Èg	les	bækur	ALDREI.	
	1sgNOM	read.1sgPRES	book.FplACC	NEVER	
	'I NEVER read books (not only rarely so).'				

The reason why the sentences in (35c) and (35d) are acceptable might have something to do with information structure: Undergoers which are indefinite normally are the focus of the sentence. This means they contain new information. OS however is incompatible with focus and cannot refer to new information which is marked as indefinite. If however heavy stress is put on the finite main verb or on the sentence adverb an example of de-foculization is found where the indefinite undergoer becomes easier to interpret as old information. In this context old information is understood as something that has already been mentioned in the discourse

(cf. Thráinsson 2007: 33). OS can also cause differences in the semantic interpretation of sentences. This is shown in example (36):

(36) (Thráinsson 2007: 33)

a.	Èg	las	aldrei	Þrjár	bækur.	
	1sgNOM	read.1sgPAST	never	three.FplACC	book.FplACC	
	'I never read three books.'					
b.	Èg	las	Þrjár	bækur	aldrei.	
	1sgNOM	read.1sgPAST	three.FplACC	book.FplACC	never	
	'There are three books that I never read.'					

The sentence in (36a) is understood as meaning *It was never the case that I read three books* although it is also possible to mean *There are three books that I never read* (Tháinsson 2007: 33). Thráinsson explains the example in (36b) as follows:

> In the second reading the phrase *Þrjár bækur* 'three books' is specific, that is, one could continue by saying something like *namely Moby Dick, Uncle Tom's Cabin and Wuthering Heights'*. In the first reading *Þrjár bækur* 'three books' does no refer to any specific books. (Thráinsson 2007: 33)

In example (36b) the phrase *Þrjár bækur* can only entail a specific reading. This is also indicated by the English glossing. This means that OS seems to be sensitive to specificity and not simply refer to grammatical definiteness. This is indicated by the phrase *Þrjár bækur* 'three books', which is indefinite (cf. Thráinsson 2007: 33).

Following Thráinsson (2007: 33) Holmberg has pointed out that OS cannot affect PPs or objects of prepositions. This is not even the case if the pronoun in question is weakly stressed, as pointed out in Holmberg (1986: 199) and in Thráinsson (2007: 33). Examples for these circumstances are given in (37):

(37) (Thráinsson 2007: 33)

a.	Èg	tala-ði	aldrei	við	Marí-u.	
	1sgNOM	speak-1sgPAST	never	to	María-ACC	
	'I never spoke to Mary.'					
b.	*Èg	tala-ði	við	Marí-u	aldrei.	
	1sgNOM	speak-1sgPAST	to	María-ACC	never	
c.	*Èg	tala-ði	Marí-u	aldrei	við.	
	1sgNOM	speak-1sgPAST	María-ACC	never	to	
d.	Èg	tala-ði	aldrei	við	hana.	
	1sgNOM	speak-1sgPAST	never	to	3FsgACC	
	'I never spoke to her.'					
e.	*Èg	tala-ði	við	hana	aldrei.	
	1sgNOM	speak-1sgPAST	to	3FsgACC	never	
f.	*Èg	tala-ði	hana	aldrei	við.	
	1sgNOM	speak-1sgPAST	3FsgACC	never	to	

OS in Icelandic differs from scrambling, which is found in German and Dutch to some extent. It also differs from topicalization in which constituents of almost any kind can be fronted and therefore occur in the F-position (cf. Thráinsson 2007: 34). I will refer to topicalization in Icelandic in section 2.5.

Negative elements which occur in complement position show a special behavior in that the negative undergoer seems to have undergone OS and occurs in the n-position right after the finite verb (cf. Thráinsson 2007: 35). This is shown in (38):

(38) (Thráinsson 2007: 35)

Èg	hef	enga	bók-Ø	les-ið.
1sgNOM	have.1sgPRES	no	book-FsgACC	read-SUP
'I have not read any book.'				

This however would be an exception to Holmberg's Generalization in which he states that an OS can only take place when the main verb is finite. However this is not the case. A closer inspection shows that the 'shift' in (38) is not the same phenomenon (cf. Thráinsson 2007: 35). This is revealed by the fact that a sentence as in (38) is ungrammatical:

(39) (Thráinsson 2007: 35)

*Èg	hef	les-ið	enga	bók-Ø.
1sgNOM	have.1sgPRES	read-SUP	no	book-FsgACC

As is explained in Thráinsson (2007: 36) negative objects of prepositions and whole prepositional phrases which contain a negative RP undergo this process. This is shown in example (40):

(40) (Thráinsson 2007: 36)

a.	*Jón-Ø	hefur	tala-ð	við	engan.
	Jón-NOM	have.3sgPRES	speak-SUP	to	nobody
b.	Jón-Ø	hefur	engan tala-ð við.		
	Jón-NOM	have.3sgPRES	nobody speak-SUP to		
	'John has not spoken to anybody.'				
c.	*Marí-a	hefur	tala-ð um ekkert annað		
	María-NOM	have.3sgPRES	speak-SUP about nothing else		
	í en	vik-u.			
	in a	week-FsgDAT			
d.	Marí-a	hefur	um ekkert annað	tala-ð	
	María-NOM	have.3sgPRES	about nothing else	speak-SUP	
	í en	viku.			
	in a	week-FsgDAT			
	'Mary has not spoken to anybody in more than one week.'				

As Thráinsson (2007: 36) notes this phenomenon is better known in West German, where it is referred to as scrambling, and differs from Scandinavian OS. It can be noted from these findings about undergoers in Icelandic that they can occur in the n-position, the ?-position and in the N-position, although there are some restrictions with respect to these occurrences. As will be shown in section 2.5, undergoers can also occur in the F-position. This will also be relevant for the equation of the PrCS with the F-position in Icelandic.

2.4 Possible positions of adverbs in Icelandic

From the discussion on the possible positions of undergoers it can be seen that sentence adverbs like *aldrei* 'never' and the negation *ekki* 'not´ have a relatively fixed position within the clause which could be used as landmarks in describing the clause structure of Icelandic. Manner adverbs like *vandlega* 'carefully' and frequency adverbs like *oft* 'often' differ from sentence adverbs in that they normally occupy the position after the N-position which does not have a name yet (cf. Thráinsson 2007: 37). This is exemplified in example (40):

(40) (Thráinsson 2007: 37)

a.	Hún	hafði	les-ið	leiðbeining-ar-nar
	3FsgNOM	have.3sgPAST	read-SUP	instruction-FplACC-DET
	vandlega / oft.			
	carefully often			
	'She has read the instructions carefully / often.'			
b.	*Hún	hafði	les-ið	leiðbeining-ar-nar
	3FsgNOM	have.3sgPAST	read-SUP	instruction-FplACC-DET
	aldrei / ekki			
	never/ not			

As example (40) illustrates, *hún* 'she' occupies the F-position, *hafa* 'have' occupies the v-position, *lesa* 'read' occupies the V-position and *leiðbeiningarnar* 'instructions-the' occupy the N-position. Ostensibly there needs to be a further position within the topological model for Icelandic which is suggested by Thráinsson (2007: 19) and also introduced in section 1. Given the data from example (40a) I tend to introduce a further position to the topological model suggested by Tháinsson (2007: 19): The A-position which follows the N-position in Thráinsson's framework. This position is occupied by manner adverbs and frequency adverbs.

It is however also the case that adverbs like *oft* 'often' can occupy the a-position. This is exemplified in (41):

(41) (Tháinsson 2007: 37)

Hún	hafði	oft	les-ið	leiðbeining-ar-nar.
3FsgNOM	have.3sgPAST	often	read-SUP	instructions-FsgACC-DET

'She had often read the instructions.'

With respect to the adverb *oft* 'often' Thráinsson (2007: 37) notes the following regarding the meaning of this adverb:

> Note however, that the adverb *oft* does no have exactly the same meaning in the medial and the final position. In the medial position it has scope over the whole sentence (= 'It has often been the case that …') whereas in the final position it modifies the verbal action, having roughly the meaning 'over and over.' (Thráinsson 2007: 37)

This means that the position of an adverb can play a semantic role (cf. Tháinsson 2007: 37). In RRG this semantic role is realized by the fact that the adverb which is a peripheral element modifies different layers of the LSC. So as peripheral element it can either modify the nucleus, core of the clause as a whole (cf. Van Valin 2005: 20ff).

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(42) (Tháinsson 2007: 37)

*Jón-Ø	hefur	vandlega	les-ið
Jón-NOM	have.3sgPRES	carefully	read-SUP
leiðbeining-ar-nar.			
instructions-FsgACC-DET			

In the context of the semantic classification of adverbs in Icelandic Thráinsson (2007: 37f) notes the following:

> It is well known, of course, that different semantic classes of adverbs have different 'privileges of occurrence' (see e.g. Jackendoff 1972; Travis 1988 – and more recently Alexiadou 1997; Cinque 1999 among others). The syntax of Icelandic adverbs has not been investigated in great detail, but various preliminary studies and analysis of particular classes exist (see Sveinn Bergveinsson 1969; Jóhannes Gísli Jónsson 2002; Kristin M. Jóhannsdóttir 2005; Höskukdur Tháinsson 2005: 123 – 37). Thus Jóhannes Gísli Jónsson (2002) considers the following sub-classes of S-adverbs (as he calls them) in Icelandic: **speech act adverbs** (*einfaldlega* 'simply'), **evaluative adverbs** (*skilkanlega* 'understandably), **evidential adverbs** (*greinilega* 'clearly'), **modal adverbs** (*liklega* 'probably') and **conjunctive adverbs** (*samt* 'still'). This is mainly a semantic classification and the semantics of adverbs of this type (and others) is discussed by Ernst (2002), for instance. Kristin M. Jóhannsdóttir's paper (2005) presents a semantic analysis and sub-classification of temporal adverbs, showing, for instance, how they interact with different forms of the progressive construction. (Thráinsson 2007: 38f).

Thráinsson (2007: 38) suggests a classification of adverbs consisting of five subclasses, which are given in (43):

(43) (cf. Tháinsson 2007: 38)

a. Sentence adverbs: These class of adverbs typically occur in the a-position. For these adverbs it is also possible to be preposed: *aldrei* 'never', *augljóslega* 'obvisiously', *ekki* 'not', *greinilega* 'obvisiously', *sennilega* 'probably', *sýnilega* 'evidently', *trúlega* 'probably'.

b. Manner adverbs: These adverbs occur in the A-position before place and time adverbs. Manner adverbs cannot easily be preposed. These adverbs are: *hratt* 'fast', *klaufalega* 'clumsily', *kæeuleysislega* 'carelessly', *nákvæmlega* 'accurately', *vandlega* 'carefully'.

c. Place and time adverbs: These adverbs occur in the A-position just like manner adverbs and typically they are placed behind these class of adverbs. As sentence adverbs they can be preposed easily: *hér* 'here', *hérna* 'here', *inni* 'inside', *í fyrra* 'last year', *í gær* 'yesterday', *nú* 'now', *núna* 'now', *úti* 'outside', *Þar* 'there', *Þarna* 'there', *Þa* 'then'.

d. The fourth subclass is formed by adverbs which can intervene between the PSA and the finite verb in sentences where the PSA occurs in the F-position. Sometimes these adverbs are also called V3-adverbs. Naturally they fit into the a-position but they can also occur in the A-position. Only some of these V3-adverbs can be preposed: *auðtiað* 'naturally, obviously', *bara* 'just', *einfaldlega* 'simply', *ennÞa* 'still', *kannski* 'maybe' *liklega* 'probably', *vonandi* 'hopefully'.

e. Discourse particles which are also called modal particles typically occur in the a-position. Discourse particles cannot be preposed. Also they are difficult to translate into other languages. These particles are: *jú, nú* and *sko.*

From this discussion it becomes clear that adverbs in Icelandic typically occur either in the a-position or in the A-position which does not occur in Tháinsson's (2007) adaptation of Diderichsen's (1947, 1964) topological model.

2.5 Topicalization in Icelandic

As shown in the previous paragraphs, clause structure in Icelandic is not as free as its rich morphology might suggest (cf. Thráinsson 2007: 341). In simple main declarative sentences the verb in the V2-position, or in Diderichsen's (1947, 1964) framework the v-position, is a landmark which is fixed and always needs to be occupied.

In (21) I have shown that in Icelandic the F-position can either be occupied by the PSA as in (21a) or by the undergoer as in (21c). This effect is known as topicalization in Icelandic and is a V2-phenomenon also found in German (cf. Diedrichsen 2008). Based on this observation, Diedrichsen concludes that the so-called Vorfeld, which is identical with the F-position in Diderichsen's (1947, 1964) framework, can be equaled to the PrCS in RRG (cf. Diedrichsen 2008). In what follows I will show that the F-position in Icelandic can be equaled with the PrCS, too. Following Thráinsson (2007: 342) the order of sentences like (20c) can be described by explaining that the undergoer can be preposed to the F-position, but due to the V2-phenomenon in Icelandic it needs to be immediately followed by the finite verb (cf. Thráinsson 2007: 342). In topicalization as described in (20c) also some restrictions can be found. These restrictions are shown in (444):

(44) (Thráinsson 2007: 342)

a. Lögregl-a-n fann Þjóf-Ø í húsin-u.
police-FsgNOM-DET find.3sgPAST thief-MsgACC in building-FsgDAT
'The police found the thief in the building.'

b. ?*Þjóf-Ø fann lögreglan í húsinu.
thief-MsgACC find.3sgPAST police-FsgNOM-DET in building-FsgDAT

c. Þjóf-Ø-inn fann lögregl-a-n í húsin-u.
thief-MsgACC-DET find.3sgPAST police-FsgNOM-DET in building-FsgDAT
'The thief the police found in the building.'

In example (44a) the sentence is in its usual SVO order. Example (44b) sounds odd however. This is due to the fact that the RP in the F-position is indefinite. As Thráinsson (2007: 342) notes, the fronted constituent needs to be definite since topicalized RPs are usually the topic or the theme of the discussion and topicalization of a RP 'out of the blue' is odd. A grammatical example of topicalization is found in (44c) where the RP in the F-position is definite (cf. Thráinsson 2007: 342). It is also possible to front more than just undergoers in Icelandic. Other types of constituents can also be fronted. This is possible for PPs and adverbials (cf. Thráinsson 2007: 343). This is exemplified in (45):

(45) (Thráinsson 2007: 343)

a.	Harald-ur	hefur		ekki	búið	á Akureyri.
	Haraldur-MsgNOM	have.3sgPRES	not	live.SUP		in Akureyri
	'Haraldur has not lived un Akureyri.'					
b.	À Akureyri	hefur	Harald-ur	ekki	búið.	
	in Akureyri	have.3sgPRES	Haraldur-MsgNOM	not	live.SUP	
	'In Akureyri Haraldur has not lived.'					
c.	Ekki	hefur	Harald-ur	búið	á Akureyri.	
	not	have.3sgPRES	Haraldur-MsgNOM	live.SUP	in Akureyri	

In (45b) the PP occurs in the F-position and precedes the finite verb in the V2-position. This example could have a foregrounding or even contrastive role as in *Haraldur has not lived in Akureyei, but he has lived in Reykjavik*. The fronting of the negation in (45c) on the other hand has a stylistic value. In this case a natural interpretation of the sentence could be as follows: *It doesn't seem that Harold has lived in Akureyri!* However this interpretation depends on the right intonation since it could also mean *I cannot believe that Harold has lived in Ajureyri!* (cf. Thráinsson 2007: 343). Nevertheless there is a restriction on the topicalization of V3-adverbs which are adverbs which can occupy the a-position, modal particles and particles which accompany particle verbs. These constituents cannot occupy the F-position (cf. Thráinsson 2007: 343):

(46) (Thráinnson 2007: 343)

a.	Harald-ur	bara	býr	á Akureyri.			
	Haraldur-MsgNOM	just	live.3sgPRES	in Akureyri			
	'Harold just lives in Akureyri.'						
b.	*Bara	býr	Harald-ur	á Akureyri.			
	just	live.3sgPRES	Haroldur-MsgNOM	in Akureyri			
c.	Harald-ur	býr	sko	á Akureyri.			
	Haroldur-MsgNOM	live.3sgPRES	mod.prt.	in Akureyri			
d.	*Sko	býr	Harald-ur	á Akureyri.			
	mod.prt.	live.3sgPRES	Haraldur-MsgNOM	in Akureyri			
e.	Strák-ar-nir	hafa	tekið	bæk-ur-nar	upp.		
	boys-MplACC-DET	have.3plPRES	taken.SUP	book.FplACC-DET	up		
	'The boys have unpacked the books.'						
f.	*Upp	hafa	strák-ar-nir	tekið	bæk-ur-nar.		
	up	have.3plPRES	boy.MplNOM-DET	take.SUP	book.FplACC-DET		

As can be seen in (46b) it is not possible for V3-adverbs to occupy the F-position. The same restriction in occupying the F-position is true for modal particles which cannot be frontend. This is shown in (46d). Also verbal particles cannot occur in the F-position as shown in (46f) (cf. Thráinsson 2007: 344). The question if the restriction of fronting V3-adverbs is due to lexical restrictions or to other reasons is subject to further examination.

Thráinsson (2007: 344) notes that in certain contexts it is possible for the predicate adjectives and secondary predicates to occupy the F-position. However non-finite forms of main verbs which follow modal auxiliary, a perfective auxiliary or a passive auxiliary cannot occupy the F-position (cf. Thráinnson 2007: 344). This is shown in (47):

(47) (Thráinsson 2007: 345)

a.	Harald-ur	var	fljótur	að	flytja	
	Haraldur-NOM	be.3sgPAST	quick	to	move.INF	
	til Reykjavik-ur.					
	to Reykjavik-MsgDAT					
a'.	Fljótur	var	Harald-ur	að	flytja	til
	quick	be.3sgPAST	Haroldur-NOM	to	move.INF	to
	Reykjavik-ur!					
	Reykjavik-MsgDAT					
b.	Hann	mála-ði	bíl-Ø-inn		rauðan.	
	3MsgNOM	paint-3sgPAST	car-MsgACC-DET		red	
b'.	?Rauðan	mála-ði	hann		bíl-Ø-inn.	
	red	paint-3sgPAST	3MsgNOM		car-MsgACC-DET	
c.	Strák-ar-nir	munu	lesa		bæk-ur-nar	
	boy-MplNOM	be.3plPRES	read.INF		book.FplACC.DET	
c'.	?*Lesa	munu	strák-ar-nir		bæk-ur-nar.	
	read.INF	be.3plPRES	boys-MplNOM-DET		book.FplACC.DET	
d.	Strák-ar-nir	hafa	les-ið		bæk-ur-nar.	
	boy-MplNOM-DET	have.3plPRES	read-SUP		book.FplACC.DET	
d'.	?*Lesið	hafa	strák-ar-nir		bæk-ur-nar.	
	read.SUP	have3.plPRES	boy-MplNOM-DET		book.FplACC.DET	
e.	Bæk-ur-nar	voru	lesnar		upp til agna.	
	book-FplACC-DET	be.3plPAST	read.PASTPART		up to pieces	
	'The books were read to shreads.'					
e'.	?*Lesnar	voru	bæk-ur-nar		upp til agna.	
	read.PASTPART	be.3plPAST	book.FplACC-DET		up to pieces	

Putting the predicative adjective in the F-position as in (47a') has a special stylistic value. This is indicated by the exclamation mark. However, if the secondary predicate occupies the F-position the sentence becomes odd since it is difficult to imagine a proper context for the fronting. As can be seen in (47c') it is impossible for the infinitive to occupy the F-position. The same is true for verbs in the supine as in (47d') and past participles as in (47e') (cf. Thráinsson 2007: 345)

In Icelandic, certain variants of topicalization can be found which are not found in other languages. For example RPs can sometimes be fronted out of certain types of PPs. This is called preposition stranding. Also instances of pied piping where the preposition together with the RP occupies another position in the clause occur. In addition, Wh-words occupy the F-position in question formation in Icelandic (cf. Thráinsson 2007: 345). Examples of these variants of topicalization are given in (48):

(48) (Thráinsson 2007: 345)

a.	Èg	hef	aldrei	tala-ð	við	Sigrún-u.
	1sg	have.1sgPRES	never	speak-SUP	to	Sigrun-FsgACC
	'I have never spoken to Sigrun.'					
b.	Sigrún-u	hef	ég	aldrei	tala-ð	við.
	Sigrun-FsgACC	have.1sgPRES	1sg	never	speak-SUP	to.
c.	Við	Sigrún-u	hef	ég	aldrei	tala-ð.
	to	Sigrun-FsgACC	have.1sgPRES	1sg	never	speak-SUP

As can be seen in (48b) it is possible for the PP to be splited with the preposition stranded. In this case the undergoer occupies the F-position and the preposition is stranded in the N-position. It is also possible for the whole PP to occupy the F-position as shown in (48c).

However there are also instances where preposition stranding is disallowed, as will be shown in (49) (cf. Thráinsson 2007: 345):

(50) (Thráinsson 2007: 345)

a. Èg hef aldrei búið á Akureyri.
1sg have.1sgPRES never live.SUP in Akureyri
'I have never lived in Akureyri.'

b. ?*Akureyri hef ég aldrei búið á.
Akureyri have.1sgPRES 1sg never live.SUP in

c. À Akureyri hef ég aldrei búid.
in Akureyri have.1sgPRES 1sg never live.SUP

d. Jón-Ø send-i bréf-Ø-ið til Harald-ar.
Jón-MsgNOM send-3sgPAST letter-NsgACC-DET to Haraldur-GEN

e. ?*Harald-ar/ ?*Hvers send-i Jón-Ø bréf-Ø-ið til.
*Harald-GEN *who send-3sgPAST Jón-NOM letter-NsgACC-DET to

f. Til Harald-ar/ Til hverssend-i Jón-Ø bréf-Ø-ið.
to Haraldur-GEN to whom send-3sgPAST John-MsgNOM letter-NsgACC-DET

As is exemplified in (49b) and (49e), in these instances it is not possible for these prepositions to be stranded in the N-position. Nevertheless I do not want to go into the details of preposition stranding. I will introduce some examples of degree adverbs which can occupy the F-position out of an adjectival phrase in (51).

(51) (Thráinsson 2007: 347)

a. Hann hleypur svakalega hratt.
3MsgNOM run.3sgPRES terribly fast
'He runs terribly fast.'

b. Svakalega hleypur hann hratt.
terribly run.3sgPRES 3MsgNOM fast

c. ?*svakalega hratt hleypur hann!
terribly fast run.3sgPRES 3MsgNOM

d. Marí-a er ofsalega góður kennari-Ø.
María-NOM be.3sgPRES extremely good teacher-ACC

e. Ofsalega er Marí-a góður kennari-Ø.
extremely be.3sgPRES María-NOM good teacher-ACC

f. *Ofsalega góður er Marí-a kennari-Ø.
extremely good be.3sgPRES María-NOM teacher-ACC

g. ??Ofsalega góður kennari-Ø er Marí-a.
extremely good teacher -ACC be.3sgPRES María-NOM

The findings in (51c, f, g) suggest that it is only possible for one single degree adverb to occupy the F-position. As (51g) shows it is not even possible for a RP with two adverbials, which form the periphery in RRG-terms, to occupy the F-position. However, as Thráinsson (2007: 348) notes this kind of fronting seems to be restricted to a small set of adverbs. This is shown in (52). As noted by Thráinsson (2007: 348f), in literary style one can also find examples of 'constituent splitting'. This will be shown in (53b) and (53c).

(52) (Thráinsson 2007: 348)

a. Marí-a er mjög góður kennari-Ø.
María-NOM be.3sgPRES very good teacher-ACC
'Mary is a very good teacher.'

b. *Mjög er Marí-a góður kennari-Ø
very be.3sgPRES María-NOM good teacher-ACC

(53) (Thráinsson 2007: 349)

a. Hann var góður smið-ur.
3MsgNOM be.3sgPAST good carpenter-ACC
'He was a good carpenter.'

b. Smið-ur var hann góður.
carpenter-ACC be.3sgPAST 3MsgNOM good

c. *Góður var hann smið-ur.
good be.3sgPAST 3MsgNOM carpenter-ACC

As can be seen in (53b) it is possible for an RP to be split if the undergoer occupies the F-position. However it is not possible for the adjective to occupy the F-position with the undergoer left in the N-position. This is shown in (53c). Fronting of the Nucleus together with the undergoer is also not possible in Icelandic. In the traditional generative literature this is called VP fronting. As example (54c) and (54d) will show this is not possible in Icelandic (cf. Thráinsson 2007: 349):

(54) (cf. Thráinsson 2007: 349)

a.	Hún	hefur	keypt		bæk-ur.
	3FsgNOM	have.3sgPRES	buy.SUP		book.FplACC
	'She has bought books.'				
b.	*Keypt	bæk-ur	hefur		hún
	buy.3sgPERF	book.FplACC	have.SUP		3FsgNOM
c.	Hún	mun	lesa	allar	bæk-ur-nar.
	3FsgNOM	will.3sgFUT	read.INF	all	books.FplACC-DET
d.	*Lesa	allar	bæk-ur-nar	mun	hún
	read.INF	all	books-FplACC-DET	will.3sgFUT	3FsgNOM

While this kind of fronting, which is called VP-fronting in the traditional generative literature, is not possible in Icelandic, fronting of the Nucleus is possible (cf. Thráinsson 2007: 349). This is shown in (55):

(55) (cf. Tháinsson 2007: 345)

a.	Þeir	gengu	inn	og	heilsaðu
	3plNOM	walk.3plPRES	in	and	greet.3plPAST
	'They entered and greeted.'				
b.	Gengu	Þeir	inn	og	heilsuðu
	walk.3plPRES	3plNOM	in	and	greet.3plPAST

Based on these findings the following constituents can occupy the F-position in main declarative sentences in Icelandic:

(56) Possible elements in the F-position
- a. PSAs
- b. Undergoers
- c. PPs
- d. Predicative adjectives
- e. Degree adverbs
- f. Nucleus

Besides these elements it is also possible for undergoers which are part of a PP to occur in the F-position. This is the case with preposition stranding. Since in Icelandic examples of 'constituent splitting' are found it is also possible for bare undergoers to occur in the F-position, with the corresponding adjective occupying the N-position. In section 2.2 it was also explained that in yes/no-questions and in narrative V1-constructions the finite verb can occupy the F-position.

In this section I have shown that the finite verb always needs to occupy the second position in the clause and that a topicalization pattern as in English is not possible in Icelandic because it is a V2-language. Due to the V2-phenomenon in Icelandic it is not possible to propose a PrCS as in English clause structure. The PrCS in Icelandic rather should be equaled with the F-position in Icelandic as it is done with the Vorfeld in German (cf. Diedrichsen 2008: 206). As for German, this means that Icelandic has an obligatory PrCS (cf. Diedrichsen 2008). To support this idea I will present a semantic argumentation for an obligatory PrCS in the next section.

3.0 Modal verbs in Icelandic and Diedrichsen's (2008) approach

To support her account of an obligatory PrCS in German, Diedrichsen (2008) uses a semantic test showing that the Vorfeld in German has a special status. As said in section 0, Diedrichsen bases her observation of an obligatory PrCS in German on the fact that some German modal verbs exhibit an ambiguity between an epistemic and a deontic reading which remains an obligatory PrCS as highly reasonable. In what follows I will first describe the semantic, syntactic and morphological properties of Icelandic modal verbs. I will then summarize Diedrichsen's (2008) test and adopt it for Icelandic.

In Icelandic the operators modality and status, which represent epistemic and deontic modality, are realized with the use of modal verbs. The morphological, syntactic and semantic properties of modal verbs in Icelandic are summarized in (57):

(57) (cf. Tháinsson and Vikner 1995: 53)

1. Modal verbs in Icelandic show subject-verb agreement.
   a. Èg mun / Þú munt / við munum
      1sgNOM / will.1sgFUT 2sgNOM will.2sgFUT / 3plNOM will will.3plFUT
      koma
      come.INF
2. In Icelandic there is no general ban on modals following auxiliary verbs in Scandinavian, including other modal verbs.
   b. Mig hefur vilja-ð vanta pening-ar.
      1sgACC have.3sgPRES will-SUP lack money-MplNOM
      'I have tended to lack money.'
3. Some of the Icelandic modal verbs take bare infinitival complements while others do not.
   c. Èg vil (*að) fara heim.
      1sgNOM want.1sgPRES to go.INF home
      'I want to go home.'
4. In Icelandic modal verbs express a modal meaning which is typically of two kinds: Epistemic and root. The epistemic sense qualifies the truth value of the sentence containing the modal while the root sense expresses necessity, obligation permission, volition, or ability of an agent which usually, but not necessarily is expressed by the subject of the sentence.

Some of the modal verbs in Icelandic are ambiguous between an epistemic and a root meaning, which has serious syntactic consequences within an RRG-framework.

The most important subclasses of epistemic and root modals in Icelandic are shown in the diagram in (57) adopted from Thráinsson and Vikner (1995: 55):

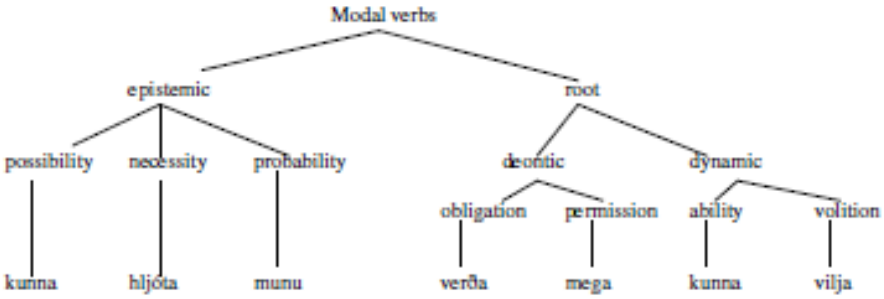


Figure 5. Classification of Icelandic modal verbs (Thráinsson and Vikner 1995: 55)

Some of the modal verbs in figure XX are ambiguous in that they can either have an epistemic or a root meaning. These modals are given in (58).

(58) verða 'must', hljóta 'must', geta 'can', kunna 'can', vilja 'will'

Examples of double modals are found in Icelandic as well (cf. Tháinsson and Vikner 1995). It is possible to embed root modals under root modals and epistemic modals under epistemic modals but what is of most interest with respect to this analysis is that it is only possible to embed root modals under epistemic modals but not vice versa. This is shown in (59)

(59)

a.	Þau	munu	vilj-a			byggja	hús-Ø.
	3plNOM	be.3plFUT	want-3plPRES			build.3plPRES	house-NsgACC
	'They are said to want to built a house.'						
b.	Hann	kann	að	verða	að	selja	hús-Ø-ið
	3MsgNOM	can.3sgPRES	to	must.INF	to	sell.INF	house-NsgACC-DET
	'It is possible that he will have to sell the house.'						
c.	*Hann	verður	að	kunna	að	kunna	að synda
	3Msg	must.3sgPRES	to	can.INF	to	can.INF	to swim.INF
	Intended meaning: 'He has to may be able to swim.'						
d.	*Èg	verð	að	vilja	reka	á land-Ø.	
	1sgNOM	must.1sgPRES	to	will.INF	drift.NF	to land-NsgACC	
	Intended meaning: 'I have to tend to drift ashore.'						

As predicted by Van Valin (2005: 11) it is possible to embed root modals under epistemic modals as in (59a, b), where the root modal is closer to the verb than the epistemic modal. This is due to the fact that the epistemic modal is a clausal operator and the root modal is a core operator. However, as shown in (59c, d) it is not possible for the epistemic modal to be embedded under the root modal. This would contradict the idea that clausal operators need to be further away from the verb than core operators (cf. Van Valin 2005: 12).

These findings are presented as evidence for the following. Deontic modal verbs express modality. This is an operator of the core layer. Epistemic modal verbs on the other hand express status, which is an operator of the clausal layer. A consequence is that modal verbs occur within the scope of epistemic ones (cf. Diedrichsen 2008: 207; Foley and Van Valin 1984: 231; Van Valin and LaPolla 1997: 40ff).

Example 58 shows an Icelandic sentence with a modal verb which shows an ambiguity between a root and an epistemic reading:

(60)	Marí-a	hefur	geta-ð	les-ið	bók-i-na.
	María-NOM	have.3sgPRES	can-SUP	read-SUP	book-FsgACC-DET
	'Mary could have read the books.'				

Based on Diedrichsen (2008: 207) the sentences in (60) can be paraphrased as given in (61) below:

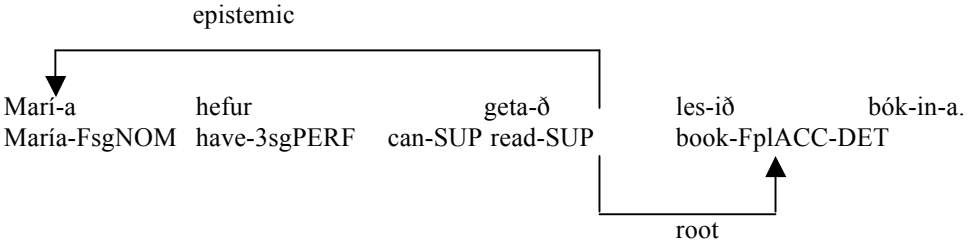
(61) (cf. Diedrichsen 2008: 207)
a. María has the obligation to read the book.
b. There is some obligation or strong reason to assume that María has read the book.

As described in Van Valin and LaPolla (1997), the paraphrase in (61a) illustrates that deontic modal verbs predicate a relation between the actor and the action, or the idea of the action. Such modal verbs are core operators. The epistemic readings of modal verbs are a predication along the realis / irrealis dimension made of the entire reported event involving the act itself and its participants (cf. Diedrichsen 2008: 207). Diedrichsen explains:

> Modal verbs with an epistemic reading have the whole proposition in their scope. Status, which involves the realis/irrealis dimension, is a clausal operator, and thus it modifies the clause as a whole (cf. Van Valin & LaPolla 1997: 48; Diewald 1999 observes the same for German). (Diedrichsen 2008: 207)

In this connection based on Diedrichsen (2008: 208) one might ask the question if the F-position in Icelandic could be represented in the PrCS in RRG-terms. For German, Diedrichsen shows there is a semantic decomposition of this particular position with respect to the deontic vs. epistemic reading of modal verbs. She explains that only the epistemic reading can effect the core-external position, because it is a clausal operator. She says there should be a way to determine the PrCS vs. operator-position of the F-position or the Vorfeld-position in German by testing deontic and epistemic readings of modal verbs in different sentence types (cf Diedrichsen 2008: 208). Diedrichsen has shown this for German. I will show the same test is applicable for Icelandic. She points out that with a deontic reading, the modal verb points to the right and modifies the action that is stated in the non-finite verb. With an epistemic meaning the modal verb rather points to the left, where the Vorfeld-element is located. In this case it is said that something has to be true about the Vorfeld-element, which means that it expresses the obligation (or at least a strong reason) for the speaker to believe that something is true with respect to the Vorfeld-element (cf. Diedrichsen 2008: 208). This is illustrated in (60) for Icelandic:

(62) (Diedrichsen 2008: 208):



The scope of *geta* 'could' can be better understood by using the following paraphrases, which are adopted form Diedrichsen (2008: 208) and involve a semantic decomposition of the root and epistemic readings with respect to *geta*.

(63) (cf. Diedrichsen 2008: 208)
a. For María it is true: She has the obligation to read the book.
b. For María it is true = has to be the case: He read the book.

In both the deontic and epistemic reading the topic of the sentence is *María* as in (62). This means that both readings are understood as statements about *Mary*. Both readings show the relationship between the finite modal verb *geta* 'must' in (62). The topic changes with the two readings. Consequently, in the deontic reading *geta* 'must' is included in the statement about *María* while in the epistemic reading it gives a comment on the statement with respect to *María*, saying that this whole statement follows from external reasons that oblique the speaker to assume this statement can be made about the two participants. This means that in the epistemic reading, the obligation is on the speaker and not on *María*. In this case it is found on another level, which could be described as extra-core level (cf. Diedrichsen 2008: 208f). Following Diedrichsen this is not surprising, since status modifiers have been described as clausal operators (cf. Diedrichsen 2008: 209).

Diedrichsen (2008: 209) has developed a test for German which can be used to determine if the difference between the two readings of modal verbs in German depends on the position of the modal verb with respect to the Vorfeld-element respectively the element in the F-position. This test can easily be adopted for Icelandic as the following examples show:

(64)

À morgun	hlýt	ég	að	hafa
tomorrow	must.3sgPRES	1sgNOM	to	have.INF
farið	bíl-Ø-inn.			
drive.SUP	car.MsgACC-DET			

'Tomorrow, I must have driven the car.'

a. deontic reading
   For tomorrow is true: I have to have driven the car.
b. epistemic reading
   *For tomorrow is true = has to be the case: I have driven the car

(cf. Diedrichsen 2008: 209)

In (64) the epistemic reading is excluded. The semantic decompositions show why this is the case: For speakers it is not possible to make an assumption about the truth of something which has not taken place yet, and which might happen in the future. However, the deontic reading is acceptable since it is possible that a speaker knows about something that he or someone else has to do in the future (cf. Diedrichsen 2008: 209).

(65)

Í gær,	hlýt	ég	að	hafa	far-ið	bíl-Ø-inn
yesterday	must-3sgPRES	1sg	to	have.INF	drive-SUP	car.MsgACC-DET

'Yesterday, I must have driven the car.'

a. deontic reading
   *For yesterday is true: I have to have driven the car.
b. epistemic reading
   For yesterday is true = has to be the case: I have driven the car

In (65) the epistemic reading is possible while the deontic reading is excluded. This is because it is not possible to talk about the obligation somebody had in the past. This means that deontic obligation necessarily refers to the future, while epistemic necessity can only refer to the past (cf. Diedrichsen 2008: 209).

As can be seen in the examples in (64) and (65), the semantic decomposition always involves the element in the F-Position in Icelandic. This is shown in the examples in (66):

(66)

bíl-Ø-inn	hlýt	ég	að	hafa	far-ið.
car.MsgACC	must.1sgPRES	1sg	to	have.INF	drive-SUP

'The car, I must drive.'

a. deontic reading
   For the car is true: I have to drive it.
b. epistemic reading
   For the car is true = has to be the case: I have driven it.

(cf. Diedrichsen 2008: 209f)

These tests show that the difference between the two readings depends on the position of the element in the F-position, as shown in the semantic decompositions. In general, Diedrichsen resumes that the Vorfeld-position in clauses which have one would have to be regarded as being core-external. It should therefore be equated with the RRG-concept of the PrCS (cf. Diedrichsen 2008: 210). For Icelandic this means it is reasonable to assume an obligatory PrCS, since the element in the F-Position is regarded as core-external, too.

In the next section I will analyze a sample of simple Icelandic sentences with an obligatory PrCS and theory internal reasons for this assumption are given.

4.0 RRG-analysis if Icelandic simple main declarative sentences with an obligatory PrCS

In the previous sections I have presented arguments which reveal the assumption of an obligatory PrCS in Icelandic to be reasonable. In section 2 I have analyzed clause structure in simple main declarative sentences in Icelandic based on the topological modal developed in Diderichsen (1947, 1964) and shown that due to the V2-phenomenon in Icelandic topicalization in Icelandic has a rather different pattern than English, which the notion of the

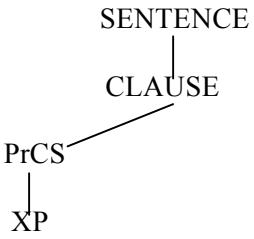
PrCS was originally developed for. The fact that in a V2-language like Icelandic and German, as shown in Diedrichsen (2008), suggests that at least in cases of topicalization the F-position in Icelandic is equal to the PrCS. However, the semantic tests in section 3 show that the F-position in Icelandic (just as the Vorfeld in German (cf. Diedrichsen 2008)) seems to be pragmatically motivated since - as the tests in (62) and (63) show - the F-position has a special status in Icelandic. All these findings suggest one can assume an obligatory PrCS in Icelandic, just as Diedrichsen suggested an obligatory PrCS in German (cf. Diedrichsen 2008).

Based on the findings of section 2 and 3 and on Van Valin (1991) I will develop a semantics-to-syntax and linking algorithm for Icelandic in which an obligatory PrCS is assumed. As explained in Van Valin (2005: 13), in RRG syntactic representations are not specified by phrase structure rules, but rather the different patterns are stored as 'syntactic templates' in the syntactic inventory which is closely linked to the lexicon. The syntactic inventory of a language is not universal but language-specific, while the LSC as a whole is universal. In what follows I will in extracts develop a syntactic inventory of simple main declarative sentences in Icelandic based on Van Valin and Diedrichsen (2006), before I will be able to develop the semantics to syntax linking algorithm for Icelandic. In figure 1, templates of simple Icelandic main declarative sentences are given. Figure 5 gives an overview of an excerpt of some Icelandic syntactic templates. Within the linking algorithm the appropriate syntactic templates are chosen and the LSC of the sentence in question is constructed (cf. Van Valin 2005; Van Valin and Diedrichsen 2006). In (64) I will give the core template selection principle for Icelandic, which consists of universal selection principles and of language specific selection principles based on Van Valin (1991):

(67) Core syntactic template selection principles (active voice) (cf. Van Valin and Diedrichsen 2006: 5)
   a. Core syntactic template selection principle for active voice sentences:
      The number of syntactic slots for arguments within the core is equal to the number of distinct specified argument positions in the semantic representation of the core.
   b. Language specific qualifications of the principle in (a):
      1. All cores in the active voice have a minimum syntactic valence of 1.
      2. The occurrence of a syntactic argument in the pre/postcore slot reduces the number of core slots by 1 [may override (1) above]

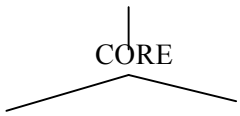
The core syntactic template selection principles in (64) refer to active voice sentences. (64a) assumes that the syntactic slots for arguments within the core need to be equal to the number of argument positions in the LS. This principle is universal, while the qualifications in (64b) are specific for Icelandic. In (65) I will give the case marking rules for Icelandic based on Van Valin (1991):

(68) Case marking rules for Icelandic (Van Valin 1991: 171)
   a. The highest ranking macrorole takes nominative case.
   b. The other macrorole argument takes accusative case.
   c. Non-macrorole arguments take dative as their default case.

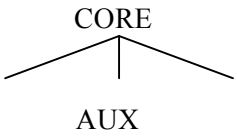


Clause / sentence template with precore slot

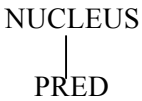
Core template with one slot



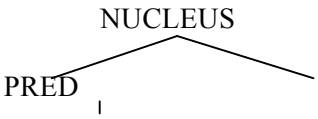
Core template with two slots



Core template with three slots

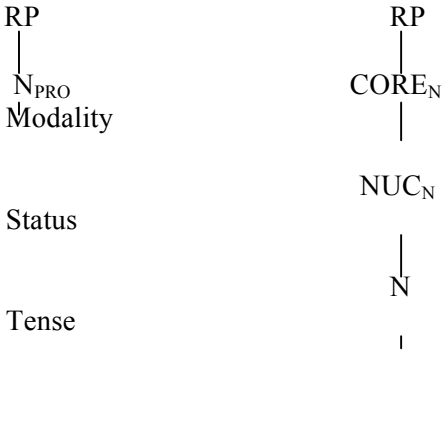


Nucleus template



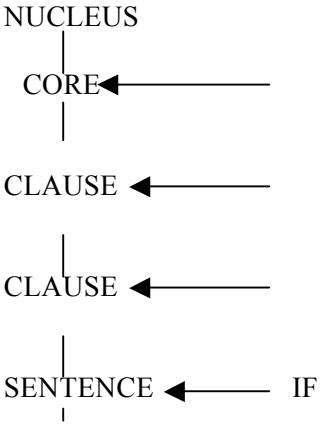
Branching nucleus template

Proper noun RP

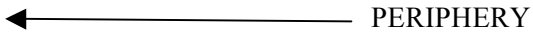


Pronominal RP

Common noun RP



Main clause operator projection



Periphery template

Figure 5. Extract of Icelandic syntactic inventory (cf. Van Valin and Diedrichsen 2006: 4)

In Icelandic the actor is the unmarked choice for the PSA. When both actor and undergoer occur in a clause the actor is the highest-ranking macrorole. The other macrorole with transitive or ditransitive verbs takes accusative case. In cases where direct arguments are not assigned a macrorole status they have dative case. From this follows that dative is the default case for direct arguments (cf. Van Valin 1991: 171-2).

(69) Case assignment rules for Icelandic prepositions (cf. Van Valin and Diedrichsen 2006: 6)

a. Assign accusative case to the second argument with verbs of motion (cf. Einarsson 1945: 106)
b. Assign accusative case to the first argument of **be-LOC**`(x, y)
c. Assign dative case to the first argument of [PROC … INGR] / INGR **be-LOC**´(x, y)
d. Assign dative case to verbs of rest (cf. Einarsson 1945: 110)

Following Einarsson (1945: 108-10), it is possible for most of the Icelandic prepositions to occur with both dative and accusative case. The case assignment with preposition in Icelandic is specified in the lexical entry of the preposition, if it is not handled by the case assignment principles in (69).

(70) Agreement principles for Icelandic (Van Valin 1991: 173)
   a. The finite verb agrees with the highest ranking macrorole in its clause.
   b. Predicate adjectives and passive particles agree with the undergoer of the predicate of which they are a part.

The agreement principles in Icelandic are very similar to the agreement principles given in Van Valin and Diedrichsen (2006: 6). The agreement principles are aligned with the case marking rules in Icelandic which also handle quirky case marking in Icelandic. Following Van Valin (1991), case marking in Icelandic is not as quirky as assumed elsewhere, since most occurrences of quirky cases are governed by the lexical entry of the verb.

(71) Accessibility to PSA hierarchy: the highest ranking argument (cf. Van Valin 1991: 181) with respect to the actor end of the AUH, regardless of whether it is a macrorole or not, is the PSA.

The PSA selection hierarchy was given in (68). However, this was based on the analysis of normal case marking with verbs only. In Icelandic, quirky case marking is found. This requires the revision of the PSA selection hierarchy for Icelandic (cf. Van Valin 1991: 181). In this context Van Valin (1991: 181) explains that the case marking rules and agreement rules in (69) and (70) make reference to macroroles. This necessitates the correct accessibility to the coding trigger hierarchy to be Actor < Undergoer. In verbs like *Þykja* 'think, consider', the coding trigger is not always the PSA. With this verb, it is the dative (experiencer) RP which is the trigger (cf. Van Valin 1991: 181). This is due to the fact that in Icelandic some verbs appear to be transitive, but lexically and syntactically they are intransitive. Therefore Van Valin (1991: 181) argues for the experiencer argument is not an actor but simply a direct core argument. The accessibility to the PSA selection hierarchy makes reference to more than just the macroroles of actor and undergoer. In terms of the AUH in figure 4, the experiencer (dative RP) outranks the theme (nominative undergoer) with respect to the actor end of the hierarchy. Therefore it is the highest ranking direct core argument that will be the behavioral PSA in these clauses (cf. Van Valin 1991: 181).

The theory internal advantages of the assumption of an obligatory PrCS are that in simple tense forms the finite main verb always occupies the first position in the core. With respect to the use of syntactic templates as assumed in Van Valin (2005) this has the advantage that fewer rules for the constructions of syntactic templates need to apply and the LSC with both topicalized simple main declarative sentences and main declarative sentences remains stable. The linking algorithm from semantics to syntax for Icelandic is based on the principles mentioned above and takes the assumption of an obligatory PrCS into account. In what follows I will analyze the linking from semantics to syntax for a sample of some simple Icelandic main declarative sentences.

(71) Linking rules for Icelandic: Semantics to Syntax (cf. Van Valin and Diedrichsen 2006: 7)
   1. Construct the semantic representation of the sentence based on the LS of the predicator by the use of inheritance rules.
   2. Determine the actor and undergoer assignments, based on the AUH.
   3. Determine the morphosyntactic coding of the arguments
      a. Select the PSA based on the accessibility to PSA hierarchy (68)
      b. Assign the appropriate case markers, definite article suffixes and prepositions to the arguments.
      c. Assign the agreement marking:
         1. Verbal
            a. Assign the agreement based in the principles in (67)
               a. In present and past tense the agreement marking is on the nucleus.

b. In complex tense forms, the passive and copular constructions the agreement marking is on the auxiliary (nuclear or operator auxiliary)

2. Nominal: case, number and gender agreement is determined and attached as suffixes to the nouns.

3. Select the syntactic template(s) for the sentence
   a. In simple main declarative sentences and questions, select the clause template with the PrCS.
   b. With the core template follow the core template selection principles in (1)
   c. With the nucleus template:
      1. Select the branching template in cases where an non-finite auxiliary occurs.
      2. otherwise, select a non-branching template.
   d. With RPs select the appropriate template depending whether the RP is pronominal, a common noun or a proper noun.
   e. Select the periphery template for all adjunct modifiers.

4. Assign the elements in the LS to the appropriate positions in the syntactic representation.
   a. Assign the predicate to the nucleus.
   b. Assign the operator projection template to the nucleus and attach the morphemes expressing operators to the nucleus.
   c. Assign the nucleus to a position in the clause.
      3. In main clauses:
         a. if the nucleus is finite, assign the nucleus to the first postion in the core (default) or assign the nucleus to the PrCS in cases of topicalization or yes/ no questions.
         b. Assign the non-finite nucleus to the last position of the core with intransitive verbs or to the next to last position with transitive verbs (default). In cases of topicalization assign the non-finite nucleus to the next to the last position of the clause if the sentence contains a negative sentence adverb. Otherwise follow Holmberg's generalization. Non-finite auxiliaries are placed after the finite-auxiliary and assign the non-finite nucleus to the next to last position of the clause (default) otherwise use negative OS and place the non-finite nucleus to the last position of the core.
         c. if the nucleus is non-finite, assign it to the last position in the core
         d. if the nucleus is in the PrCS,
            1. the nucleus in the PrCS always needs to be finite.[9] It is either an imperative or occurs in ongoing writing.

d. An element must be assigned to the PrCS, [+ WH] > other.

e. Remaining elements are assigned to the core and periphery
   1. General constraints: pronoun > other, RP > PP
   2. Case-based arguments ordering constraint: NOM > DAT > ACC (default)
   3. If ACC = pronoun, then ACC > DAT (default)

(72) Strák-ur-inn hljóp kringum tjörn-Ø-ina.
boy-MsgNOM ran.3sgPAST around pond-FsgACC-DET
'The boy ran around the pond.'

Step 1: Construct the semantic representation in the lexicon.

a. Access the LS for *hlaupa* 'run' and select the prepositional LS to fill the **be-LOC´** slot in LS, *kringum* 'around':
do´(x [**run´**(x, [**be-LOC´**(y, x)]) + **directed-around´**(_ , _) =>
do´(x [**run´**(x, [**directed-around´**(x, y)])])

b. Determine the value of the operators to be expressed:
$<_{IF}$DEC$<_{TNS}$PAST<**do´**(x [**run´**(x, [**directed-around´**(y, x)])])>>>

[9] Following Magnúsdóttir it is not possible to have a non-finite nucleus in the PrCS with finite auxiliaries following.

c. Select the referring expressions to fill the variable positions in LS:
<$_{IF}$DEC<$_{TNS}$PAST< **do´**(strák-[**run´**(strák-[**directed-around´**(tjörn-, strákurinn)])])>>>

Step 2: Determine the actor and undergoer assignments:

<$_{IF}$DEC<$_{TNS}$PASR<**do´**(ACT: strák- [**run´**(strák-, [**directed-around´**(tjörn-, strák-)])])>>>

Step 3: Determine the morphosyntactic coding of the arguments:

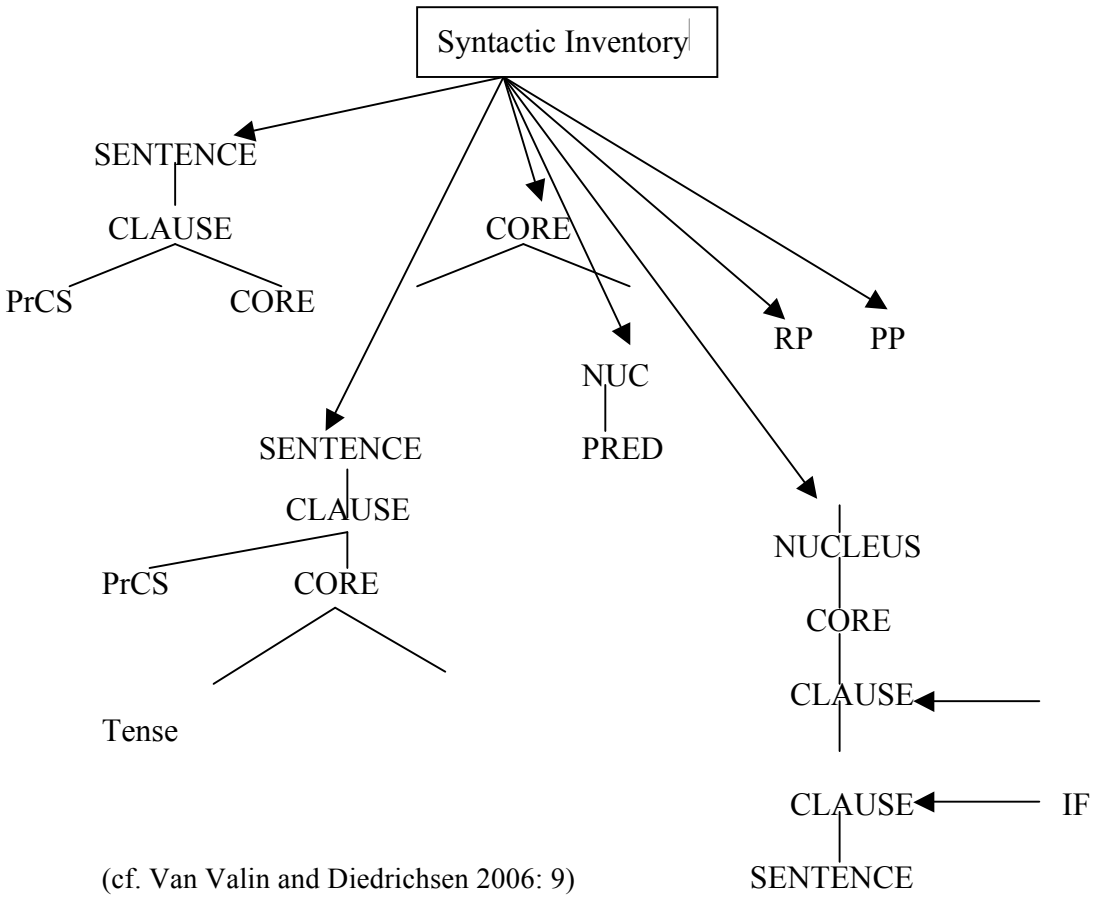
a. PSA selection: Actor as sole macrorole is selected as PSA.
b. Actor is assigned nominative case as highest ranking macrorole; preposition *kringum* is assigned to *tjörn* 'the pont', which receives accusative case due to being the first argument of **directed-around´**, a dynamic location.
c. As tense is past the agreement marking is on the nucleus. The nucleus will agree with the actor since it is the highest ranking macrorole.

Step 4: Select syntactic templates:

a. Select the PrCS template, which is obligatory in main declarative clauses in Icelandic.
b. d.n.a.
c. Select a two-place core, one place for the nucleus and one for the PP.
d. Select a nucleus template.
e. Select a common noun RP templates and a predicative PP template.

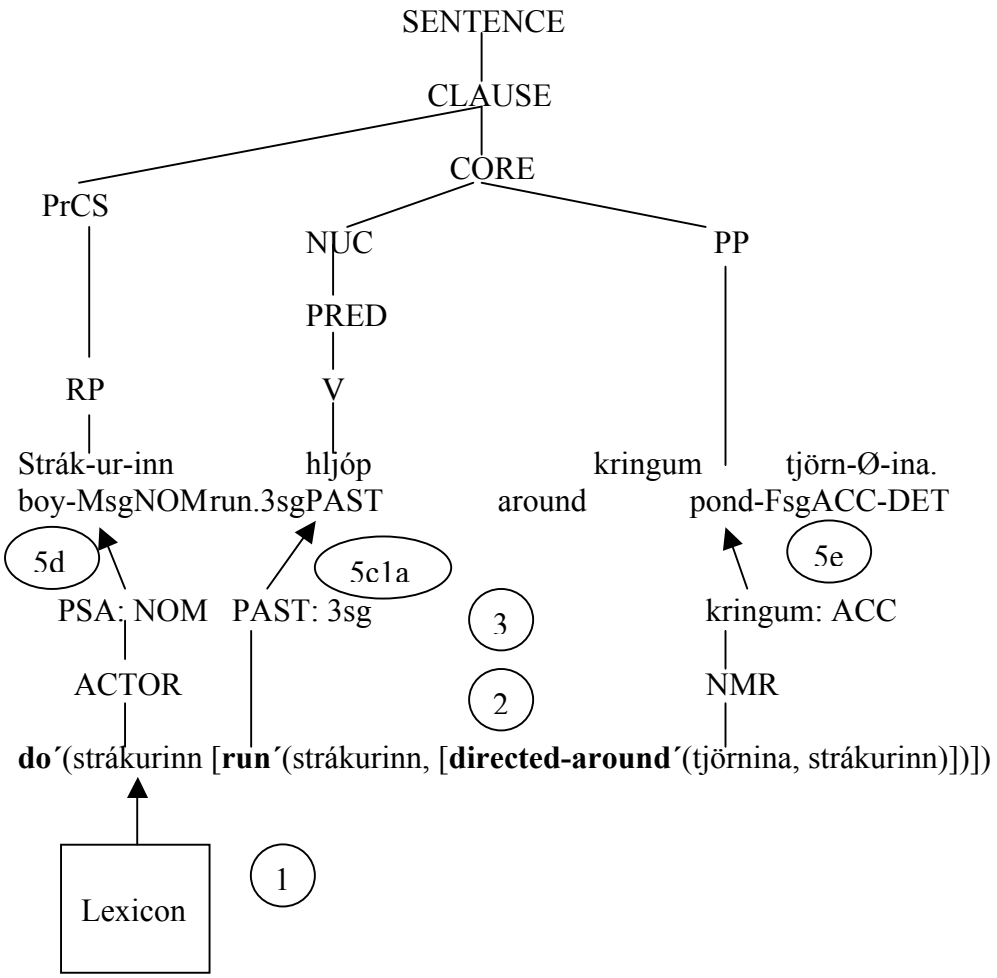
Step 5: Assign the LS elements to the positions in the syntactic representation:

a. Assign the predicate to the nucleus.
b. Join the operator projection template to the nucleus and attach the morphemes expressing operators to it.
c. (1a) since the nucleus is finite, link it to the first position in the core.
d. Link the nominative case actor *strákurinn* to the PrCS.
e. Link the PP to the remaining core position.
Completeness constraint satisfied. (cf. Van Valin and Diedrichsen 2006: 10)



(cf. Van Valin and Diedrichsen 2006: 9)

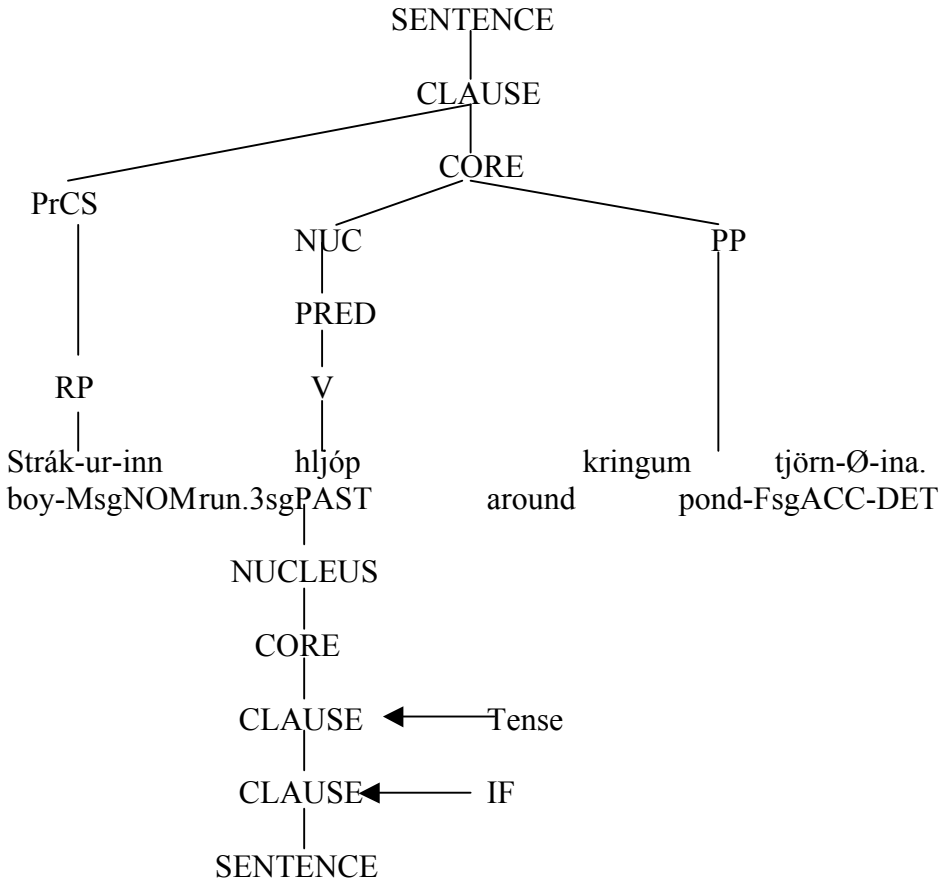
Figure 6 Syntactic inventory and template construction



(cf. Van Valin and Diedrichsen 2006: 10)

Figure 7 Simplified diagram of the semantics to syntax linking

Figure 7 gives a simplified diagram of the linking. The numbers refer to the steps in the linking algorithm. In figure 8 the resulting tree structure with constituents and the operator projection is given (cf. Van Valin and Diedrichsen 2006: 10).



(cf. Van Valin and Diedrichsen 2006: 10)

Figure 8. Resulting tree structure with constituent and operator projection

In the next example I will develop a linking algorithm for a verb-first question before I will show how the linking from syntax to semantics for Icelandic works.

(73) Las strák-ur-inn bók-i-na?
read.3sgPAST boy-MsgNOM-DET book-FsgACC-DET
(cf. Thráinsson 2007: XX)

Step 1: Construct the semantic representation in the lexicon.

a. Access the LS for *lesa* 'read':
do´(x [**read´**(x, y)])
b. Determine the value of the operators to be expressed:
$<_{IF}$INT$<_{TNS}$PAST<**do´**(x [**read´**(x, y)])>>>
c. Select the referring expressions to fill the variable positions in LS:
$<_{IF}$INT$<_{TNS}$PAST<**do´**(strák- [**read´**(strák-, bók-)])>>>

Step 2: Determine the actor and undergoer assignments:

$<_{INF}$INT$<_{TNS}$PAST<**do´**(ACT: strák- [**read´**(strák-, UND: bók-)])

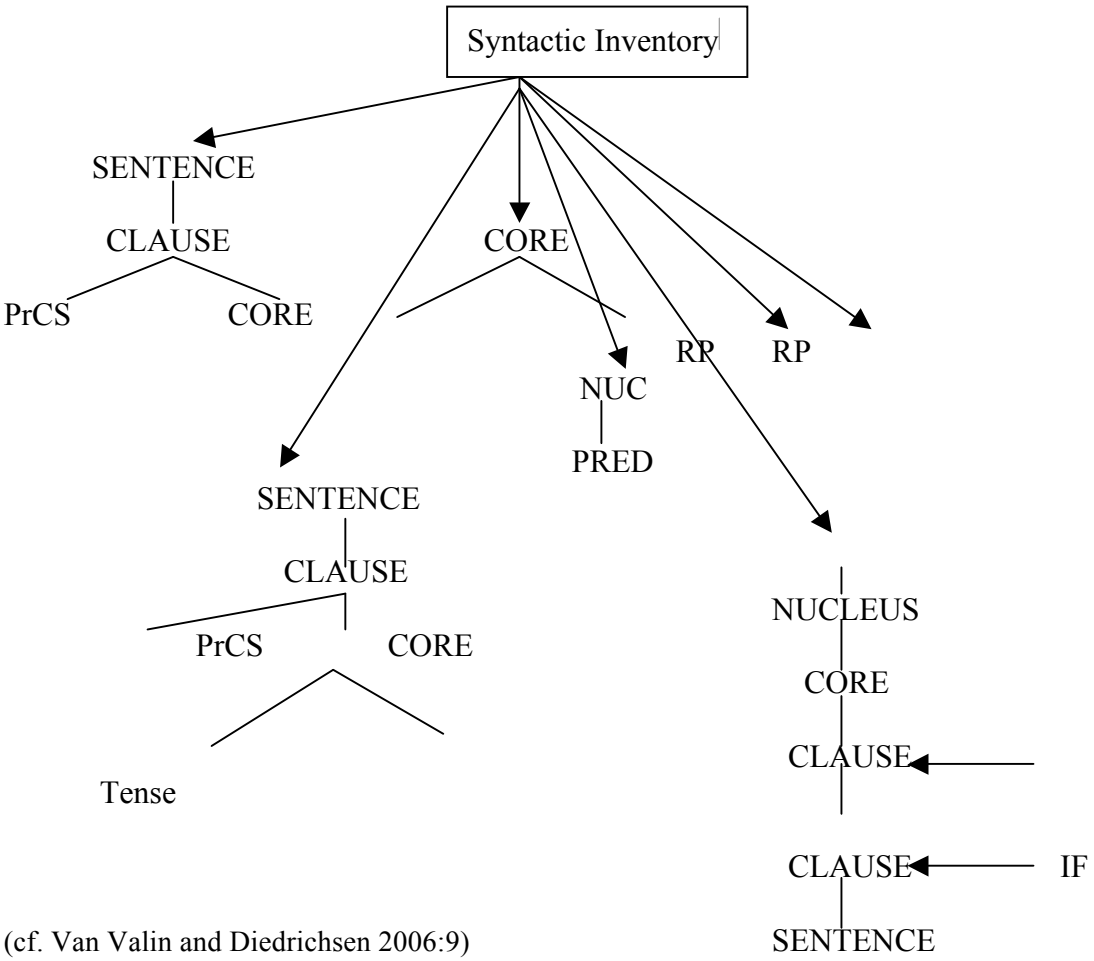
Step 3: Determine the morphosyntactic coding of the arguments:

a. PSA selection: Actor as highest ranking macrorole is selected as PSA.
b. Actor is assigned nominative case as highest ranking macrorole; Undergoer is assigned accusative case as the other macrorole.
c. As tense is past the agreement marking is on the nucleus. The nucleus will agree with the actor as it is the highest ranking macrorole.

Step 4: Select syntactic templates:

a. Select the PrCS template which is obligatory in Icelandic.
b. Select the nucleus template and attach it to the PrCS template.
c. Select a two place core, one place for the actor RP and one for the undergoer RP.
d. Select two common noun RP templates.

(cf. Van Valin and Diedrichsen 2006)



(cf. Van Valin and Diedrichsen 2006:9)

Figure 9 Syntactic inventory and template construction

Step 5: Assign the LS elements to the positions in the syntactic representation:

a. Assign the predicate to the nucleus.
b. Join the operator projection template to the nucleus and attach the morphemes expressing operators to it.
c. Since the sentence is interrogative assign the finite verb in the Nucleus to the PrCS.
d. Assign the nominative case actor *strákurinn* to the first position in the core.
e. Assign the accusative case undergoer *bókina* to the remaining core position.
Completeness constraint statisfied (cf. Van Valin and Diedrichsen 2006)

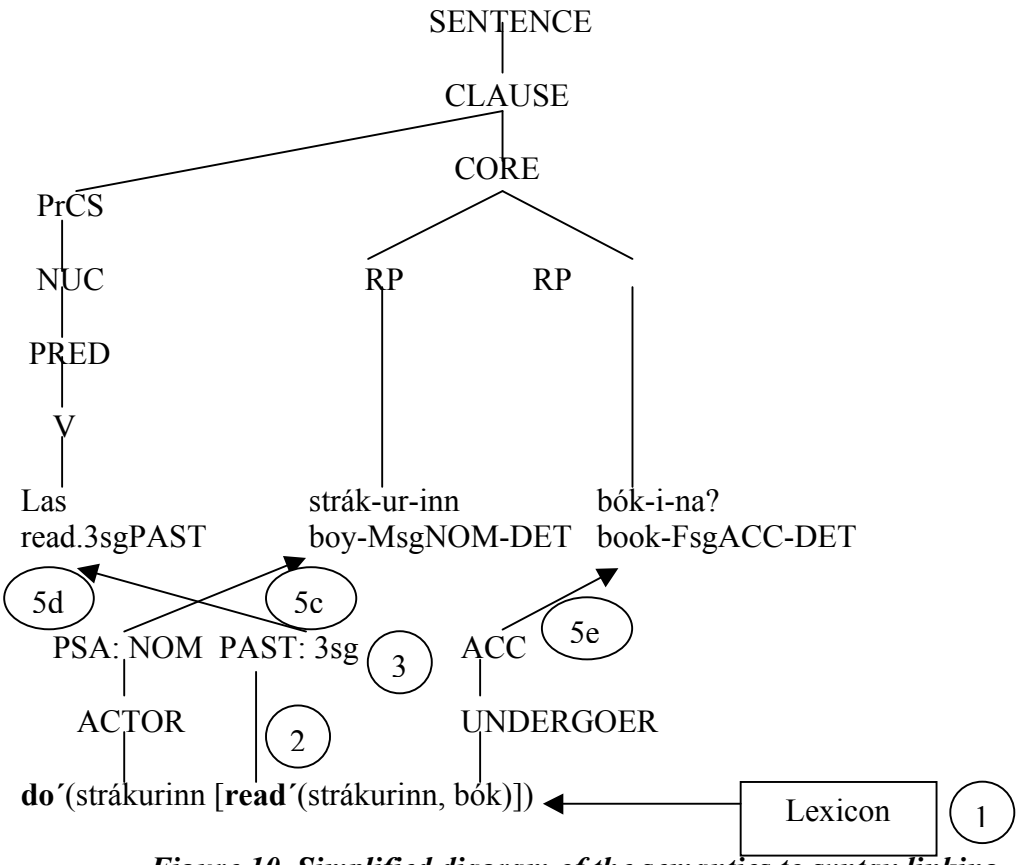


Figure 10. Simplified diagram of the semantics to syntax linking

Figure 10 gives a simplified diagram of the linking. The numbers refer to the steps in the linking algorithm. In figure 11 the resulting tree structure with constituents and the operator projection is given (cf. Van Valin and Diedrichsen 2006: 10).

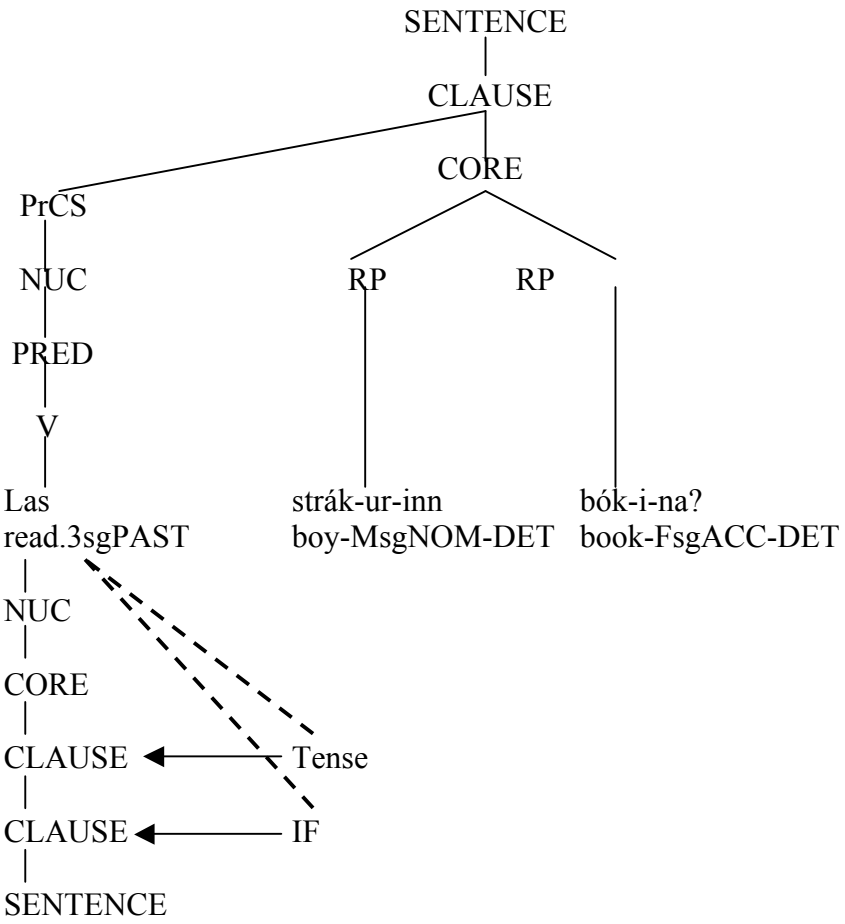


Figure 11. Resulting tree structure with constituent and operator projection

In the last example I will describe the semantics to syntax linking for an Icelandic sentence with a case of topicalization

(74)	Þjóf-Ø-inn	fann	lögreg-l-an
	thief-MsgACC-DET	find.3sgPAST	police-FsgNOM-DET

Step 1: Construct the semantic representation in the lexicon.

a. Access the LS for *finna* 'find':
do´(x [**find´**(x, y) & INGR **be-found´**(y) Determine the value of the operators to be expressed:
<$_{IF}$DEC<$_{TNS}$PAST<**do´**(x [**find´**(x, y) & INGR **be-found´**(y)]>>>
b. Select the referring expressions to fill the variable positions in LS:
<$_{IF}$DEC<$_{TNS}$PAST<**do´**(lögregl- [**find´** (lögregl-, Þjóf-) & INGR **be-found´**(Þjóf-)>>>

Step 2: Determine the actor and undergoer assignments:

<$_{INF}$DEC<$_{TNS}$Past<**do´**(ACT: lögreglan [**find´**(lögregl-, Þjóf-) & INGR **be-found´**(UND: Þjóf-)>>>

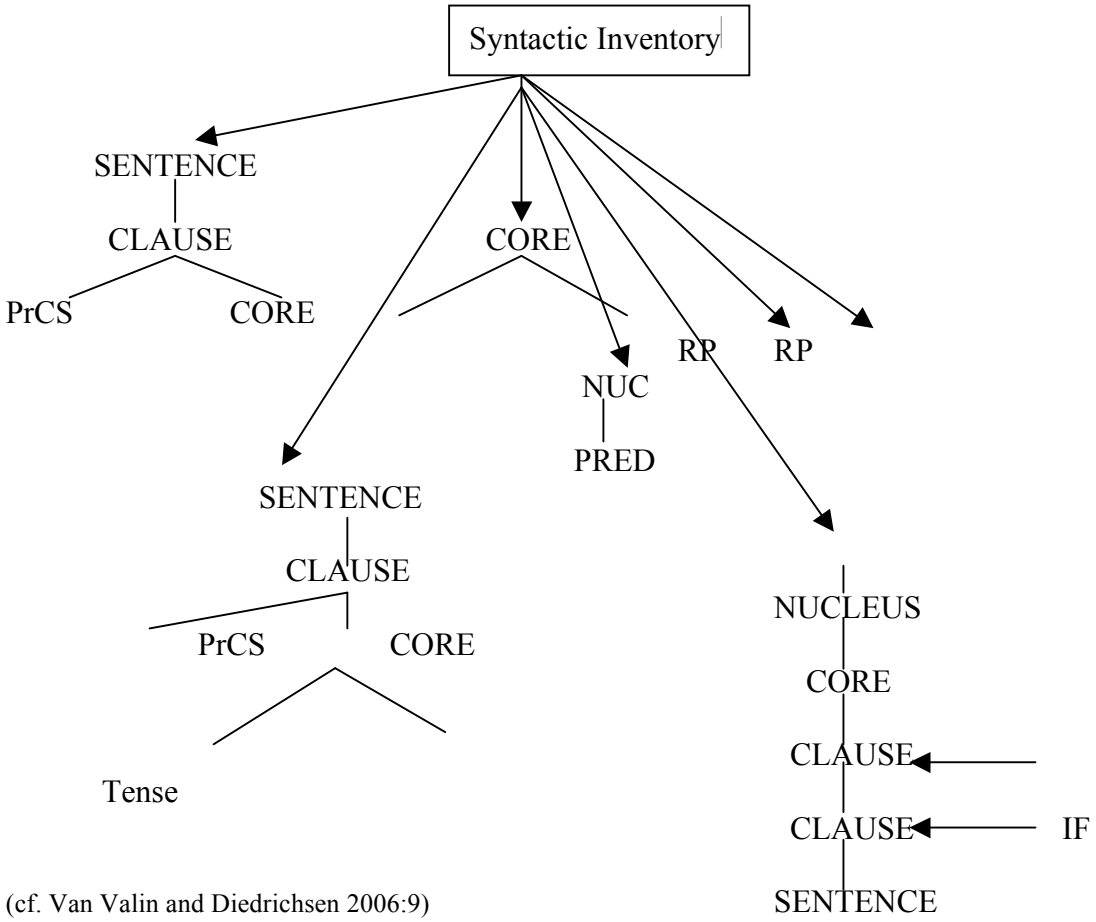
Step 3: Determine the mophosyntactic coding of the arguments:

a. PSA selection: Actor as highest ranking macrorole is selected as PSA.
b. Actor is assigned nominative case as highest ranking macrorole; Undergoer is assigned accusative case as the other macrorole.
c. As tense is past the agreement marking is on the nucleus. The nucleus will agree with the actor as it is the highest ranking macrorole.

Step 4: Select syntactic templates:

a. Select the PrCS template which is obligatory in Icelandic.

b. d.n.a.
c. Select a two-place core, one place for the nucleus and one for the RP.
d. Select a nucleus template.
e. Select two common noun RPs. (cf. Van Valin and Diedrichsen 2006: 10)



(cf. Van Valin and Diedrichsen 2006:9)

Figure 12. Syntactic inventory and template construction

Step 5: Assign the LS elements to the positions in the syntactic representation:

a. Assign the predicate to the nucleus.
b. Join the operator projection template to the nucleus and attach the morphemes expressing operators to it.
c. (1a) since the nucleus is finite link it to the first position in the core.
d. Link the nominative case undergoer *Þjófinn* to to the PrCS
e. Link the actor RP to the remaining core position.
Completeness constraint satisfied. (cf. Van Valin and Diedrichsen 2006: 10)

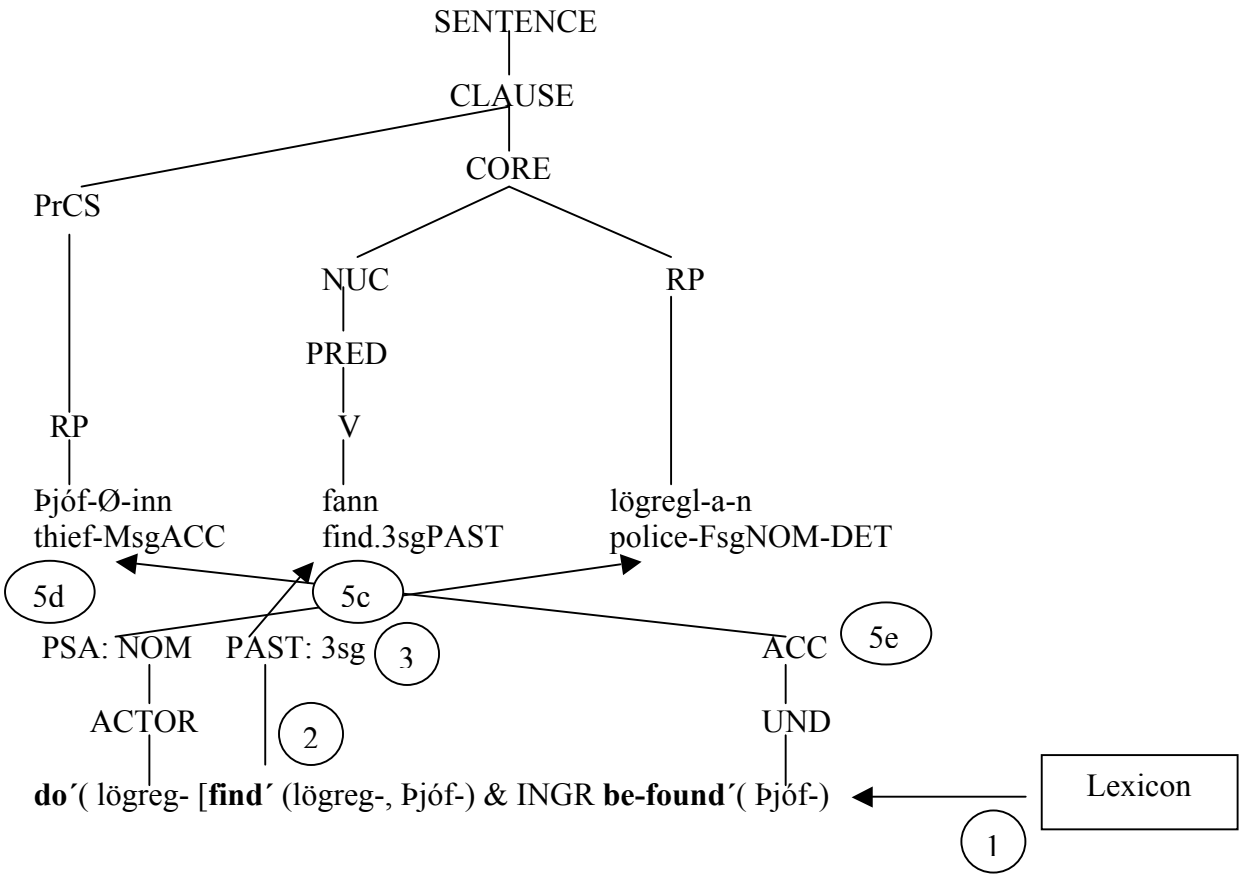


Figure 13. Simplified diagram of the semantics to syntax linking

Figure 13 gives a simplified diagram of the linking. The numbers refer to the steps in the linking algorithm. In figure 14 the resulting tree structure with constituents and the operator projection is given (cf. Van Valin and Diedrichsen 2006: 10).

What was shown in this section thus far is that the assumption of an obligatory PrCS in Icelandic has the advantage that the linking algorithm makes correct assumptions for the linking from semantics to syntax for simple Icelandic active voice main declarative sentences. This was shown with an Icelandic sentence which exhibits basic word order as in (72), with an example of the V1-phenomenon in questions as in (73), and in cases of topicalization in (74). This means that besides the structural motivation for an obligatory PrCS as given in section 3, there are also theory internal reasons for the assumption of an obligatory PrCS, as was shown in this section. This analysis of Icelandic clause structure will be concluded in section 5, where further questions regarding clause structure in V2-languages will be posed.

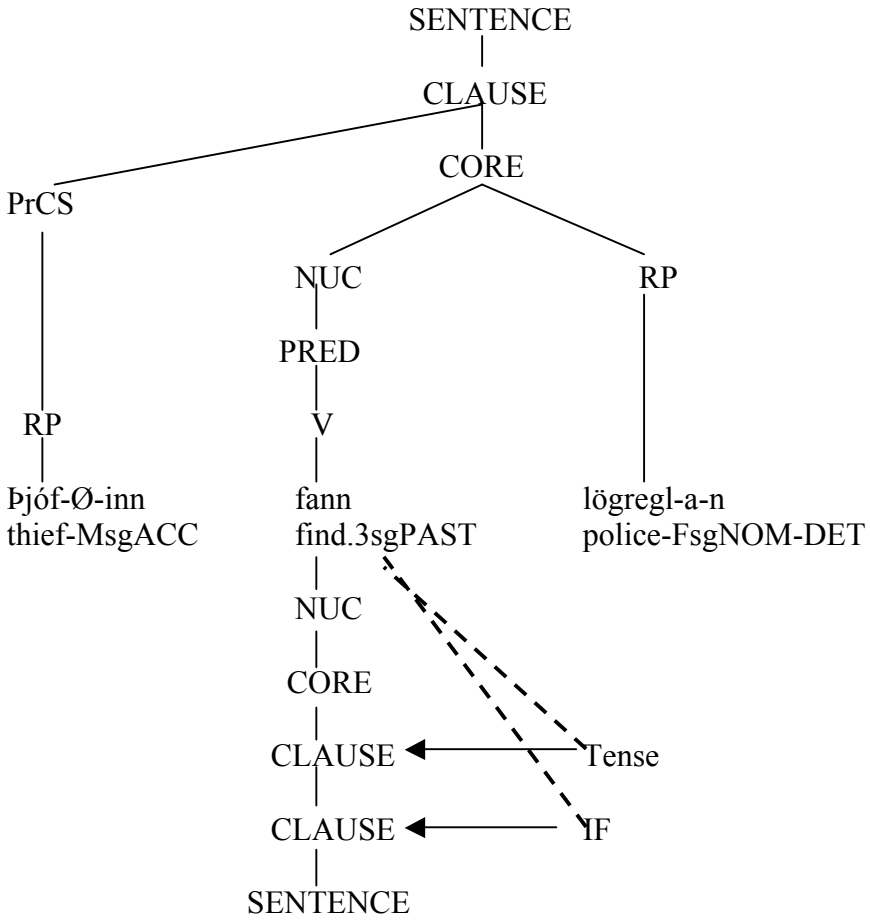


Figure 14. Resulting tree structure with constituent and operator projection

5.0 Conclusion

In the previous sections I have analyzed Icelandic clause structure within the typological model Thráinsson (2007: 19) has introduced for Icelandic based on Diderichsen (1945, 1964). As shown in section 2, Icelandic is a V2-language where the verb always remains in the V2-position, even in cases of topicalization. In section 3, a semantic test was introduced, showing that the F-position within the topological model introduced in section 0 should be analyzed rather as core-external position. It thereby comes to be regarded as PrCS rather than as core-internal element. In section 4, the semantics-to-syntax linking algorithm for Icelandic was developed. As shown in section 4 passing on the PrCS in the syntactic inventory of Icelandic results in wrong predictions, while the assumption of an obligatory PrCS offers correct predictions for the semantics-to-syntax linking in Icelandic.

Theory external and theory internal reasons for the assumption of an obligatory PrCS in Icelandic were hereby given. It appears to be the case that the ambiguity of modal verbs and the V2-phenomenon, which is found in several Germanic V2-languages, like Icelandic, German (Diedrichsen 2008) and Danish (Tháinsson and Vikner 1991), suggests that it is reasonable to equal the front-position in these languages with the PrCS in RRG-terms. For Germanic V2-languages this could mean that all these languages have an obligatory PrCS. So the important question is whether the V2-phenomenon in general makes the assumption of an obligatory PrCS necessary, or if there are further mechanisms at work. One further question with respect to V2-languages is if the V2-phenomenon causes modal verbs in these languages

to be ambiguous between an epistemic and a deonic reading or if this results from idiosyncratic features of the modal verb in question. These are questions for future research.

In general, this analysis of clause structure in Icelandic, in addition to Diedrichsen's (2008) work on German clause structure, shows that the PrCS does not generally have a pragmatic status only in RRG, as it is assumed in Van Valin (2005: 8), but can also be part of the basic clause structure in some languages. This results in a future task: The semantic, syntactic and pragmatic definition of the PrCS in RRG needs to be revised and sharpened.

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Towards a Linguistically Motivated Irish Sign Language Conversational Avatar.

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Abstract

Avatars are life-like characters that exist in a virtual world on our computer monitors. They are synthetic actors that have, in more recent times, received a significant amount of investigation and development. This is primarily due to leverage gained from advances in computing power and 3D animation technologies. Since the release of the movie "Avatar" last year, there is also a broader awareness and interest in avatars in the public domain. Ishizuka and Prendinger (2004) describe how researchers, while endeavouring to develop a creature that is believable and capable of intelligible communication, use a wide variety of terms to describe their work: avatars, anthropomorphic agents, creatures, synthetic actors, non-player characters, embodied conversational agents, bots, intelligent agents. While most of these terms are inspired from the character specific applications, some intend to draw attention to a particular aspect of the life-like character. To date it seems that there is no universal agreement with regard to terminology. The term avatar can be used to refer to the visual representation of a human being within a virtual environment whereas the term embodied conversational agent refers to a character that visually incorporates knowledge with regard to the conversational process. For the purpose of this research, the term embodied conversational agent is deemed an appropriate descriptor for the synthetic agent undergoing development. The value that RRG contributes to this is that it is a theory of grammar that is concerned with the interaction of syntax, semantics and pragmatics across grammatical systems. RRG can be characterised as a descriptive framework for the analysis of languages and also an explanatory framework for the analysis of language acquisition (Van Valin, 2008). As a lexicalist theory of grammar, RRG can be described as being well motivated cross-linguistically. The grammar model links the syntactic structure of a sentence to the semantic structure by means of a linking algorithm, which is bi-directional in nature. With respect to cognitive issues, RRG adopts the criterion of psychological adequacy formulated in Dik (1991), which states that a theory should be compatible with the results of psycholinguistic research on the acquisition, processing, production, interpretation and memorisation of linguistic expressions. It also accepts the criterion put forward in Bresnan and Kaplan (1982), that theories of linguistic structure should be directly relatable to testable theories of language production and comprehension. RRG incorporates many of the viewpoints of current functional grammar theories. RRG takes language to be a system of communicative social action, and accordingly, analysing the communicative functions of grammatical structures plays a vital role in grammatical description and theory from this perspective. The view of the lexicon in RRG is such that lexical entries for verbs should contain unique information only, while as much information as possible should be derived from general lexical rules. It is envisaged that the RRG parser/generator described in this paper will later be used as a component in the development of a computational framework for the embodied conversational agent for ISL.

This poses significant technical and theoretical difficulties within both RRG and for software (Nolan and Salem 2009, Salem, Hensman and Nolan 2009). As ISL is a visual gestural language without any aural or written form, like all other sign languages, the challenge is to extend the RRG view of the lexicon and the layered structure of the word, indeed the model itself, to accommodate sign languages. In particular, the morphology of sign languages is concerned with manual and non-manual features, handshapes across the dominant and non-dominant hand in simultaneous signed constructions, head, eyebrows and mouth shape. These are the morphemes and lexemes of sign language. How can these fit into the RRG lexicon and what are the difficulties this presents for RRG at the semantic-morphosyntax interface? This paper will discuss this research as a work in progress to date. It is envisaged that the embodied conversational agent undergoing development in this research will later be employed for real-time sign language visualisation for Irish Sign Language (ISL).

1 Introduction

The aim of this paper is to discuss research work in progress in the development of an avatar for Irish Sign Language understood as an embodied conversational agent. It is planned to use RRG as the linguistic 'engine' in this development for use in sign languages, in particular, in this work in progress, Irish Sign Language. This paper aims to discuss the development of an

embodied conversational agent to encode gesture, while also discussing the use of Role and Reference Grammar, a functional model of grammar, henceforth termed RRG, in the development of an RRG parser for sign language.

Avatars are life-like characters that exist in a virtual world on our computer monitors. They are synthetic actors that have in more recent times, received a significant amount of investigation and development. This is primarily due to leverage gained from advances in computing power and 3D animation technologies. Since the release of the movie "Avatar" last year, there is also a broader awareness and interest in avatars in the public domain. Ishizuka and Prendinger, 2004, describe how researchers, while endeavouring to develop a creature that is believable and capable of intelligible communication, use a wide variety of terms to describe their work: avatars, anthropomorphic agents, creatures, synthetic actors, non-player characters, embodied conversational agents, bots, intelligent agents. While most of these terms are inspired from the character specific applications, some intend to draw attention to a particular aspect of the life-like character. To date it seems that there is no universal agreement with regard to terminology. The term *avatar* can be used to refer to the visual representation of a human being within a virtual environment whereas the term *embodied conversational agent* refers to a character that visually incorporates knowledge with regard to the conversational process. For the purpose of this research, the term embodied conversational agent is deemed an appropriate descriptor for the synthetic agent undergoing development. One topic that has been the subject of much research in the field of animated agents is whether the agent is more life-like and therefore more coherent when developed based on a more realistic human form as opposed to a cartoon-style approach. Researchers that aim to create virtual humans seem to follow the more realistic approach (Thalmann et al., 1997). It is envisaged that the depiction of the agent in a more realistic human form would be more appropriate in this instance.

RRG is a theory of grammar that is concerned with the interaction of syntax, semantics and pragmatics across grammatical systems. RRG can be characterised as a descriptive framework for the analysis of languages and also an explanatory framework for the analysis of language acquisition (Van Valin, 2008). It is a relatively new linguistic theory of grammar, which was developed in the 1980's by William Foley and Robert Van Valin Jnr. (Foley and Van Valin, 1984). As a lexicalist theory of grammar, RRG can be described as being well motivated cross-linguistically. It is a monostratal theory positing only one level of syntactic representation, the actual form of the sentence. Syntacic clause structure in RRG is represented by the layered structure of the clause (LSC). The grammar model links the syntactic structure of a sentence to the semantic structure by means of a linking algorithm, which is bi-directional in nature. In RRG the semantic representation of a sentence is described as a logical structure [LS]. With respect to cognitive issues, RRG adopts the criterion of psychological adequacy formulated in Dik (1991), which states that a theory should be "compatible with the results of phsyco-linguistic research and the acquisition, processing, production, interpretation and memorisation of linguistic expressions". It also accepts the related criterion put forward in Bresnan and Kaplan (1982), that theories of linguistic structure should be directly relatable to testable theories of language production and comprehension. RRG incorporates many of the viewpoints of current functional grammar theories, however, it takes language to be a system of communicative social action, and accordingly, analysing the communicative functions of grammatical structures plays a vital role in grammatical description and theory from this perspective. The lexicon in RRG takes the position that lexical entries for verbs should contain unique information only, while as much information as possible should derived from general lexical rules. It is envisaged that the RRG parser described in this paper will later be used as a tool or component in the development of a computational framework for the embodied conversational agent for ISL. It is envisaged that the embodied conversational agent undergoing development in this research will later be employed for real-time sign language visualisation, in particular, Irish Sign Language (ISL).

2 Avatar Technologies

MakeHuman and Blender are the core technologies used in this research. MakeHuman is an open source, innovative and professional software tool which can be utilised for the development of 3-Dimensional humanoid characters. Makehuman provides for the creation of virtual humanoid characters through the manipulation of a base polygonal mesh. It is possible to sculpt and shape the mesh provided by MakeHuman, by manipulating various user interface parameters. The mesh can then be exported in various formats for further use and development, (www.makehuman.org).

Blender is an open source, cross platform 3D graphics and animation application, which provides capabilities for the development of images and animations through 3D modelling and rendering. Blender was chosen as a tool for this research as it provides extensive capabilities that will aid in the development of an embodied conversational agent. Blender provides its own internal games engine, which renders it particularly attractive for real time processing. Some of the more important features that Blender provides for this research include: 3D modelling, rigging, skinning, animation, non-linear animation, shape keys, simulation and rendering UV mapping, texturing,. It provides a powerful character animation toolkit, advanced simulation tools including cloth and softbody dynamics and most importantly it supports the use of Python for embedded scripting. This provides Python scripting access for custom and procedural animation effects. It is expected that this area in particular will be central to the development of my research in the future. Another important feature of Blender is its cross platform capabilities, enabling it to run on multiple computer platforms including Microsoft Windows, Mac OS X and Linux.

2.1 Character Animation in Blender

In this section we provide a summary of our development in Blender of a humanoid avatar. Within the Blender environment, the initial stage of avatar development in character animation involves working with a skeleton referred to as an *armature*. An armature behaves in a similar fashion to the human skeleton. The bones of the armature can be connected by using an array of different approaches, resulting in a controllable, intuitively movable character rig. The process of building an armature is called rigging. Figure 1 below provides a front view of the avatar rig which was developed using Blender 2.49b. The armature gives the avatar structure while also providing a mechanism for creating and holding poses. Figure 1 also provides various orientations of the right and left hand armature. The right hand armature includes added constraints.

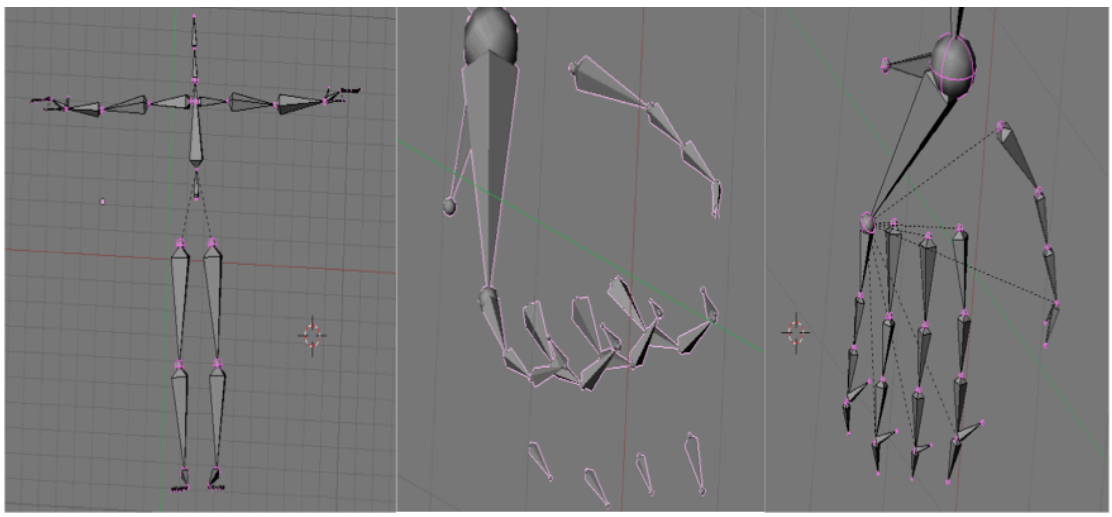

Figure 1: The Blender avatar rig and the armature of the left and the right hand respectively

2.2 Skinning

Before its possible to animate the armature it must be attached to the mesh object. The process of attaching an armature to a mesh is called skinning. The mesh used in this research was imported from MakeHuman and then the custom built armature was added to the mesh.

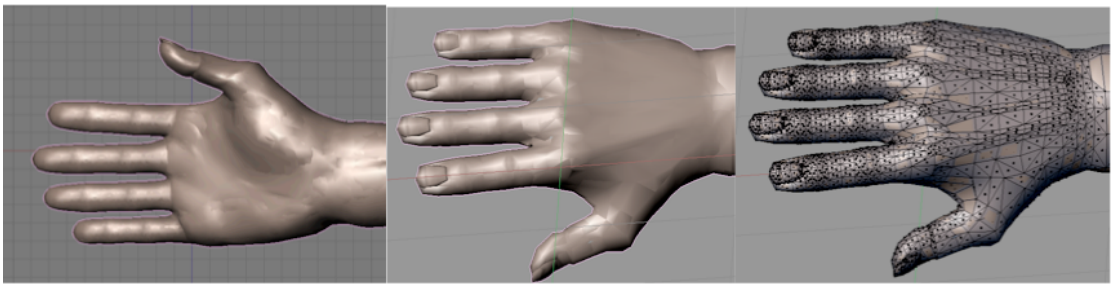

Figure 2: Various orientations and views for the avatar right hand mesh in Blender

Figure 2 provides the various orientations of the right hand mesh of the avatar, including the mesh object in Edit mode, where the polygonal mesh and the painted skin layer are visible.

2.3 Animating with Blender using a Python Script

Blender can be used in conjunction with Python. Blender provides Python scripting access for custom and procedural animation effects. Creating Python scripts using Blenders text editor makes it possible to extend Blenders functionality. Scripts in the text editor can be linked to scenes, materials and objects in the 3D view. These linked scripts can then be set to run whenever the frame changes or screen redraws. This functionality provides Python scripts with the ability to control and alter objects in real-time over the course of an animation. It is envisaged that for this research, Python scripting will be used to create specific deformations of the avatar mesh in Blender. The particular deformations will depend on the English text that has been inputted into the system. It is envisaged that once the inputted text has been converted into a meta-representation in RRG logical structures, that Python scripting will be used to generate ISL as output to the embodied conversational agent.

2.4 Animating with the Game Engine

2.4.1 Blender Games Engine

The Blender environment includes a built-in Blender Game Engine (BGE) that provides tools for the development of interactive 3D applications. The main focus of this engine is game development, however it can also be used to develop interactive 3D software. The BGE provides logic bricks fro users without any programming language knowledge. This provides an easy to use visual interface for designing interactive applications. There are three types of logic bricks. These are: sensors, controllers and actuators. Blender also provides its own Python API, which can be utilised to create scripts to control the real-time interactive environment. This is realised by creating a python controller and linking it to a python script.

2.4.2 Blender Sensors

Sensors are used to trigger events. When a sensor is triggered, a pulse is sent to all controllers that the particular sensor is connected to. Sensors therefore can be described as sending pulses to controllers. The pulses can be TRUE or FALSE. Different parameters on the sensor's logic block control when a sensor fires a particular pulse. The controllers are programmed to react on TRUE and FALSE pulses as is necessary. There are 14 different types of sensors available with Blender. These are: Always, Delay, Keyboard, Mouse, Touch Collision, Near Radar, Property, Random, Ray, Message, Joystick, Actuator. One sensor that is of particular interest to this research is the Keyboard sensor. This is used in Blender for detecting keyboard input.

It can save keyboard input to a String property. The Game Logic Python API is used to create scripts for interaction with these sensors.

2.4.3 Creating a Python Controller (Python Scripting)

Controllers are used to collect data sent by a sensor. When a sensor is activated it produces a positive pulse and when it is deactivated it produces a negative pulse. The controllers' job is to check and combine these pulses so that the correct response is triggered. There are 8 different types of controllers available in Blender. These are AND, OR, XOR, NAND, NOR, XNOR, Expression and Python. Table 1 provides a quick overview of the various controller types provided by Blender ([Blender_Controllers]).

Table 1: Blender Controller Types ([Blender_Controllers])

Positive sensors	**Controllers**					
	AND	OR	XOR	NAND	NOR	XNOR
None	False	False	False	True	True	True
One	False	True	True	True	False	False
Multiple, not all	False	True	False	True	False	True
All	True	True	False	False	False	True

2.4.4 Using Blender Actuators

Actuators are used in Blender to perform actions, such as creating, moving or destroying objects, editing a mesh etc. Actuators are triggered by receiving a positive pulse from a controller. There are many actuators available in Blender and the majority of these are particularly interesting for this research. Table 2 ([Blender_Actuators]) provides a list of the actuators available in Blender and also a brief description of their function.

Table 2: Blender Actuators ([Blender_Actuators])

Motion	Sets object into motion and/or rotation, there are different options from "teleporting" to physically push rotate objects.
Shape Action	Handles animations stored in shape keys and animated with shape actions.
Action	Handles armature actions, this is only visible if an armature is selected.
Constraint	Constraints are used to limit object's locations, distance or rotation. These are useful for controlling the physics of the object in game.
Ipo	Controls Ipo animations, these can move, rotate, scale, change colour of objects and more.
Camera	Has options to follow objects smoothly, primarily for camera objects but any object can use this.
Sound	Used to play sounds in the game.
Property	Manipulates the object's properties, like assigning, adding or copying.
Edit Object	Edits the object's mesh, adds objects or destroys them, it can also change the mesh of an object (and soon also recreate the collision mesh).
Scene	Manage the scenes in your blend file; these can be used as levels or for UI and background.
Random	Creates random values which can be stored in properties.
Message	Sends messages, which can be received by other objects to activate them.
CD	Plays CD music (might not make it to 2.5).
Game	Handles the entire game and can do things as restart, quit, load and save.
Visibility	Changes visibility of the object.
2D Filter	Filters for special effects like sepia colours or blur.
Parent	Can set a parent to the object, or unparent it.
State	Changes states of the object.

3. Gesture in human communications and language

Human conversation is known to encompass a myriad of complex behaviours. Further to using our vocal organs to produce a speech signal, there are a wide range of complex bodily behaviours underlying human communication (Abercrombie, 1956). It is important to realise, that even though speech is prominent in conveying content in face-to-face conversation, spontaneous gesture is also integral to conveying propositional content. In fact 50% of gestures add non-redundant information to the common ground of the conversation (Cassell, Stone et al. 2000). In face-to-face dialogue, utterances consist of co-ordinated ensembles of coherent verbal and non-verbal actions (McNeill, 1992) (Bavelas and Chovil, 2000) (Engle, 2000).

With regard to sign language, signs use visual imagery to convey ideas instead of single words. Sign language is used worldwide by the hearing-impaired, as a form of communication with each other and with those that hear. It is a visual, spatial language, which utilises a combination of body and facial expression, lip formation and hand signs. Sign languages are fully developed natural languages and are used by deaf communities all over the world (Gordon, 2005). Sign language is heavily reliant on gesture and facial expression, which play a very important role in the expression of meaning. It can be described as a natural language. It was not consciously invented by anyone, but was developed spontaneously by deaf people and passed down without instruction from one deaf generation to the next (Sandler and Lillo-Martin, 2001).

In terms of 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 (O'Baoill and Matthews, 2000). Communication occurs using a visual-gestural modality, encompassing manual and non-manual gestures. Manual gestures

make use of hand forms, hand locations, hand movements and orientations of the palm. Non-manual gestures include the use of eye gaze, facial expression, head and upper body movements. Both manual and non-manual gestures must be performed to produce a valid understanding and interpretation of the sign language ([deafsa]).

3.1 Irish Sign Language (ISL)

ISL is the indigineous language of the Irish deaf community and is the first language of deaf people in Ireland. It is a visual, spatial language, with its own distinct grammar. ISL is not only a language of the hands, but also of the face and body. In both modality and linguistic terms, ISL is very different to spoken English or Irish. "While ISL is used by approximately 5,000 Irish deaf people, it is estimated that some 50,000 people also know and use the language, to a greater or lesser extent" (Leeson 2001). ISL can be described as a minority language and therefore there is currently no real framework in place to describe its architecture. We propose to use RRG as a theory of grammar that will allow for the development of a lexicon architecture that is sufficiently universal with regard to content to accommodate ISL. We discuss RRG as a model of grammar in a later section.

3.2 Potential of an avatar to deploy sign Language communication in ISL

ISL is a fully developed natural language used by the Irish deaf community, however, ISL can be described as a minority language and therefore it is not currently recognised as a language in the Republic of Ireland. As a consequence, access to important information in relation to education, employment and a myriad of other resources are not available to members of the deaf community in Ireland. Currently in Ireland, highly skilled interpreters must be employed to facilitate the communication between the deaf or hearing impaired and the hearing. The use of an interpreter may not always be appropriate or even possible. The development of a three dimensional (3D) computer generated conversational avatar to deploy sign language communication would solve this problem. Conversational agents are believable humanoid avatars, capable of intelligible communication. In this particular instance communication would be through the articulation of Irish Sign Language.

4 Role and Reference Grammar (RRG)

Van Valin, (2008) describes how RRG theory was developed in an attempt to answer two simple questions: (i) What would linguistic theory look like if it was based on the analysis of other languages such as Lakhota, Dyirbal and Tagalog, rather than the analysis of English, and (ii) how can the interaction of syntax, semantics and pragmatics in different grammatical systems best be captured and explained?". Figure 3 shows the organisation of RRG.

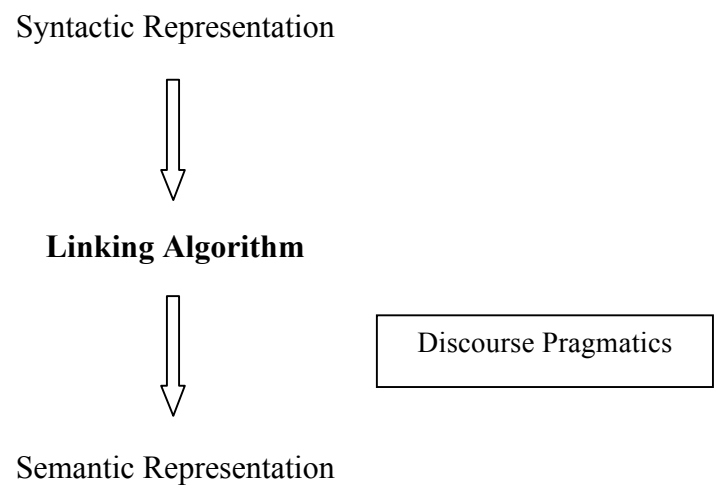

Figure 3: Organisation of Role and Reference Grammar (Van Valin 2005)

RRG can be described as a monostratal theory positing only one level of syntactic representation, the actual form of the sentence. Therefore there is only one syntactic representation for a sentence. This representation corresponds to the actual form of the sentence. RRG does not allow any phonologically null elements in the syntax; if there's nothing there, there's nothing there (Van Valin, 2003).

With respect to cognitive issues RRG adopts the criterion of phsycological adequacy formulated in Dik, (1991), which states that a theory should be "compatible with the results of phsycolinguistic research on the acquisition, processing, production, interpretation and memorization of linguistic expressions." The RRG approach to language acquisition rejects the theory that grammar is radically arbitrary and therefore unlearnable. RRG maintains that grammar is relatively motivated (in Saussure's sense) semantically and pragmatically. Therefore it maintains that there is sufficient information available for a child in the speech to which it is exposed to enable it to construct a grammar.

Syntactic clause structure in RRG is represented by the layered structure of the clause. Within RRG a clause is said to be universally composed of a nucleus (which contains the predicating element) a core (which is composed of the nucleus and the predicating elements of the nucleus) and a periphery (which is composed of the temporal and locative modifiers of the core) RRG applies the use of operators to modify the layers of the clause. Operators include gramatical categories such as tense, aspect, modality, negation and illucutionary force. Within RRG complex sentences may be composed of a nuclear juncture (nucleus + nucleus), a core juncture (core + core), and a clausal juncture (clause + clause). The units in a juncture may also be connected to each other in one of three relationships: co-ordination, subordination and co-subordination.

RRG links the syntactic structure of a sentence to the semantic structure by means of a linking algorithm. In RRG the semantic representation of a sentence is described as a logical structure [LS]. The semantic structure is based on a system of lexical representation and semantic roles. The system of lexical representation is based on Vendler's Aktionsart classification of verbs into state, activity, acheivement and accomplishment, and also uses an added class called active accomplishment. RRG introduces us to the concept of semantic macrorole, where there is an actor and an undergoer. These macroroles and other arguments are linked to the syntax by means of the linking algorithm. In addition to the syntactic and semantic representations there is also a representation of the focus structure of the sentence. Van Valin, (2008) describes how the focus structure indicates the scope of the assertion of an utterance in contrast to the pragmatic supposition.

4.1 Clause Structure

Van Valin (2005) states that regarding clause structure, there are two fundamental aspects of theory that must be dealt with; relational and non-relational. Relational structure is concerned with relations between a predicate and its argument(s), while non-relational structure is concerned with the hierarchical organisation of phrases, clauses and sentences. With regard to RRG, there are two general considerations that a theory of clause structure must meet. The general considerations for a theory of clause structure are that a) a theory of clause structure must capture all of the universal features of clauses, without imposing features on languages in which there is no evidence for them, and b) a theory should represent comparable structures in different languages in comparable ways.

4.1.1 The Layered structure of the clause

Within RRG theory, non-relational clause structure is referred to as the layered structure of the clause. The layered structure of the clause is based on two fundamental contrasts. Between the predicate and non-predicating elements, on one hand, and among the non-predicating elements, between arguments and non-arguments on the other, Van Valin, 2005. Since these contrasts are found within all languages, RRG describes the primary constituent

units of the clause as the 'nucleus', the 'core' and a 'periphery', where the 'nucleus' contains the predicate (usually a verb), the 'core' contains the nucleus and the arguments of the predicate and the 'periphery' subsumes non-arguments of the predicate. This is informally represented in the two figures following.

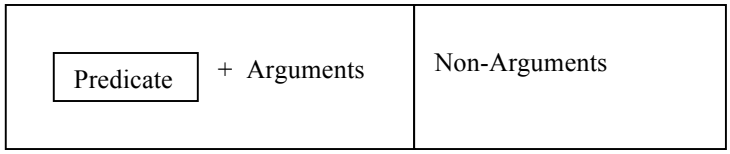

Figure 4: Universal oppositions underlying clause structure (Van Valin 2005)

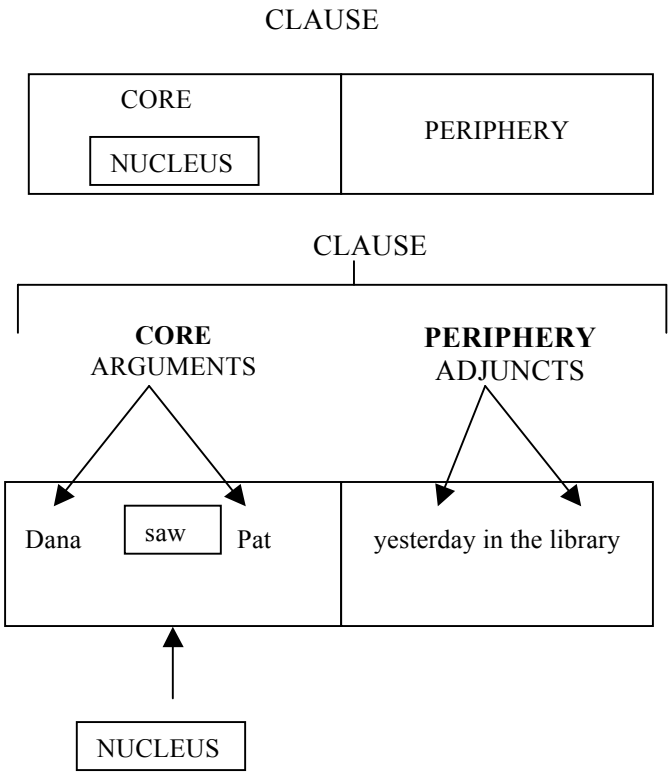

Figure 5: Components of the layered structure of the clause (Van Valin 2005)

Table 3 below shows the semantic units underlying the layered structure of the clause.

Table 3: The semantic units underlying the layered structure of the clause (Van Valin 2005)

Semantic Elements	**Syntactic Unit**
Predicate	Nucleus
Argument in semantic representation of predicate	Core argument
Non-arguments	Periphery
Predicate + Arguments	Core
Predicate + Arguments + Non-Arguments	Clause = (Core + Periphery)

Since these hierarchical units are defined semantically and not syntactically, they are not dependent upon their immediate dominance or linear precedence relations. The elements in these units can therefore occur in any order, provided that a given language permits it. There are additional elements, which may occur in a simple sentence i.e. a single clause sentence.

The first is the 'precore slot' [PrCS], the position in which question words appear in languages in which they do not occur in *situ* e.g. English, Italian, and Zapotec. The precore slot is also the position in which the fronted element in a sentence occurs, e.g. *Bean soup* I can't stand. This can be described in RRG as core external as opposed to clause internal.

There is also a 'postcore slot' [PoCS], to be taken into consideration. This must be taken into account in verb-final languages, e.g. Japanese and Dhivehi. In addition to a clause, a sentence may also include a clause in a detached position, most commonly in the 'left detached position' [LDP]. This is the location of sentence initial elements, most commonly adverbials, which are set off from the clause by a pause e.g. Yesterday, I bought myself a new car, or as for Jane, I haven't seen her in weeks. There is also a 'right detached position' [RDP] as in sentences like 'I know them, those children'. When an element in a detached position functions as a semantic argument of the verb, there is normally a resumptive pronoun in the core referring to it. The layered structure of the clause applies equally to fixed word-order and free word-order languages, to head-marking and dependent-marking languages and also to languages with or without grammatical relations.

4.1.2 Operators in the layered structure of the clause

Each of the major layers (nucleus, core and clause) is modified by one or more operators, which are closed-class grammatical categories including tense, aspect, negation, illocutionary force, modality and evidentiality. Operators are another important component of the RRG theory of clause structure. An important property of operators is that they modify specific layers of the clause. This is summarized in Table 4.

Table 4: Operators in the layered structure of the clause (Van Valin 2008)

Nuclear operators: Aspect Negation Directionals (only those modifying orientation of action or event without reference to participants)
Core operators: Directionals (only those expressing the orientation or motion of one participant with reference to another participant or to the speaker) Event quantification Modality (root modals, e.g. ability, permission, obligation) Internal (narrow scope) negation
Clausal operators: Status (epistemic modals, external negation) Tense Evidentials Illocutionary Force

Languages normally do not have all of these operators as grammatical categories; the absolutely universal ones are illocutionary force and negation. Grammatical categories like tense, aspect and modality are treated as operators, modifying different layers of the clause. Each of the clause levels may be modified by one or more different operators. The nuclear operators have scope over the nucleus. They modify the action, event or state itself without reference to the participant. Core operators modify the operation between a core argument, normally the actor and the action. Clausal operators modify the clause as a whole. They fall into two groups. One containing tense and status and the other evidentials and illocutionary force. Since operators are technically not seen as part of the nucleus, core or periphery in RRG, but are modifiers of these units and combinations of them, they are represented separately from the predicates and the arguments that they modify. Predicates and arguments are subject to language specific constraints on their ordering, while the principal governing the ordering of operators is the universal scope constraint.

The main language specific consideration which affects their occurrence is the basic word order type of the language, which governs if the operators are prefixes or suffixes, if they are bound or free morphemes or if they occur before or after the nucleus. But the ordering among them is determined by the scope principle. Johnson, 1987, proposed a formalisation of the layered structure of the clause to capture the differences between restrictions on predicates and arguments on one hand and operators on the other. He called this formalisation a 'projection grammar'. In RRG syntactic representations are not specified by phrase structure rules or the like.

The different parts are stored in 'syntactic templates' in a 'syntactic inventory'. While the layered structure of the clause is seen as universal, there is a cross-linguistic variation with regard to the syntactic templates in the syntactic inventory in each language. Languages that lack a precore or postcore slot will not have templates for them. In languages with a fixed word order, this would be specified in the template, while languages with a flexible word order will have unordered templates in varying degrees. Included within the NP operators are determiners, quantifiers and adjectival and nominal modifiers. In the formal representation of the layered structure of the clause Johnson (1987), operators are presented in a distinct projection of the clause from the predicates and arguments (the constitute projection). The structure in figure 6 taken from Van Valin (2008) describes this.

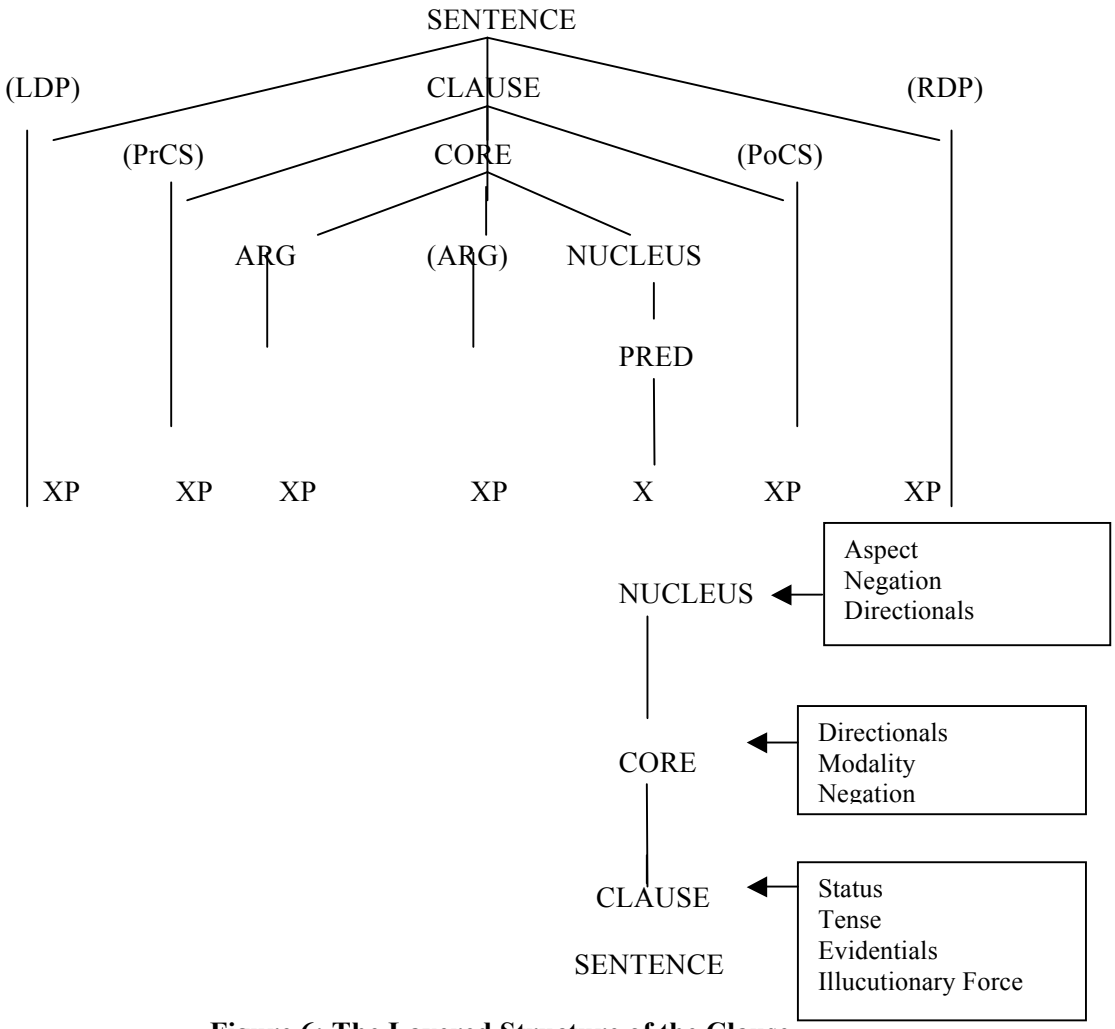

Figure 6: The Layered Structure of the Clause

Operators are represented in a separate projection of the clause, which is the mirror image of the constituent projection. Within the theory of RRG, the layered structure of the clause is a

semantically based theory of non-relational syntactic structure. The fundamental units in the hierarchical organisation of sentences and clauses are semantically motivated by the contrast between predicate and argument on one hand and between NPs and PPs which are related to the predicate and which are not.

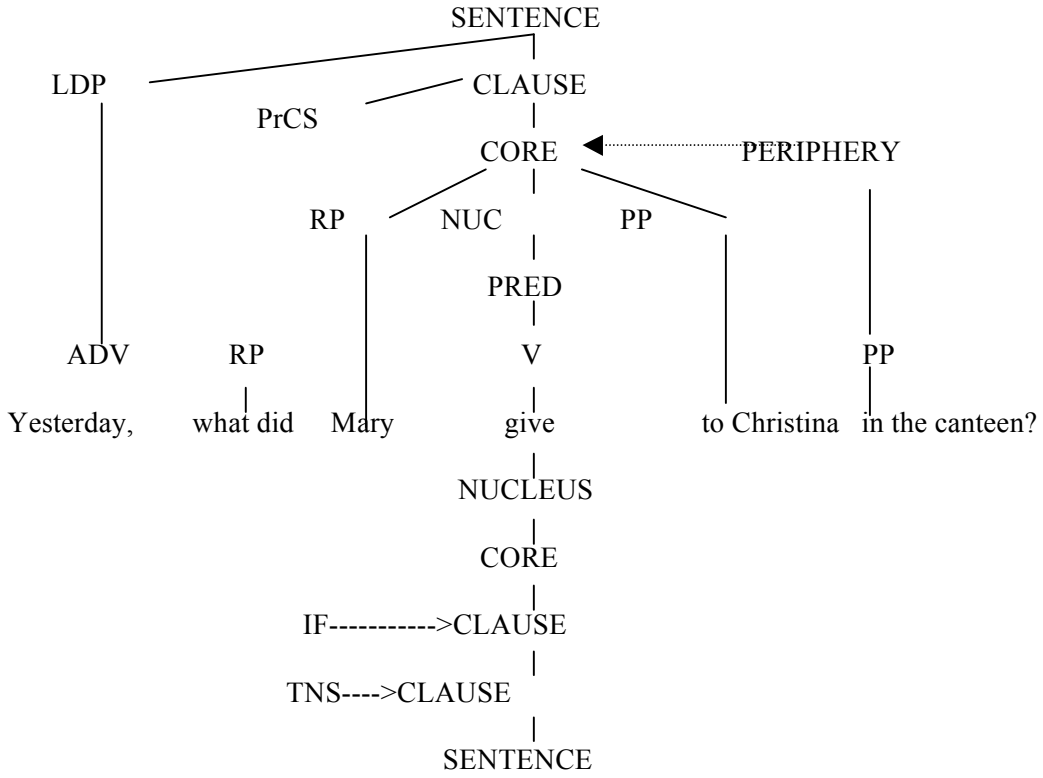

Figure 7: An English sentence with both constituent and operator projections

4.2 The layered structure of the noun phrase

There are many fundamental similarities in the structure of NPs and clauses. The primary link between NPs and clauses in RRG is that both clause and NPs have a layered structure and also both have operators modifying the layers. In the layered structure of the NP there is a nominal nucleus and a nominal core consisting of a nucleus and the arguments of a complex derived nominal, but there is only one level, the NP level corresponding to the clause and sentence levels of the layered structure of the clause.

4.3 Clause structure in independent marking languages

Nichols, 1986, proposes a fundamental typological contrast with respect to the way the syntactic relationship between a head and its dependents is signalled morphologically. In languages like English, Russian and Japanese, the relationship between a verb and the argument(s) it governs is indicated on the dependent arguments in the form of case or adpositional marking. An example is given below:

(1) *The young doctor gave a/the new book to an/the old man.*

The relationship of each of the NPs in the sentence to the verb is expressed by its case: the subject, 'the young doctor, is in the nominative case; the direct object, 'a new book', is in the accusative case, and the indirect object, 'the old man, is in the dative case. In Tzotzil however, this relationship is marked on the head, the verb; where there is no marking on the dependent NPs to indicate their relationship with respect to the verb, but the verb itself or the governing head carries morphemes, which indicate the person and number of its arguments.

Nichols labels languages in which the first pattern predominates as 'dependent-marking' languages, and those in which the second pattern is primary are seen as 'head-marking' languages. This contrast is very important syntactically, as in the head-marking pattern, the head bears the morphemes, which indicate its governed dependents. These dependents can be omitted without grammatically affecting the phrasal unit. Therefore the head can act as the whole unit. The same cannot be said of the dependent-marking pattern. In English a finite verb alone cannot constitute a clause, and if the possessor is dropped from a possessive construction, e.g. the man's daughter → (the) daughter, the result is grammatical, but no longer a grammatical construction. This is very important within syntactic theory as many theories are based primarily if not exclusively on the analysis of dependent marking languages. Van Valin strives to capture this contrast in his theory of clause structure. In Van Valin (1977, 1995, 1987), it was argued that with respect to clauses in head marking languages, the pronominal affixes on the verb are the core arguments of the clause, not the optional independent lexical NPs and pronouns.

4.4 Adjunct and Periphery

In the layered structure of the clause the distinction between the core and the periphery is based on the distinction between arguments and non-arguments. There are two types of argument or adjunct. Phrasal adjuncts such as PPs, and non-phrasal adjuncts such as adverbs. PP adjuncts modify the core when they express locational or temporal features of the state of affairs coded by the core. The periphery containing them can therefore be described as a core modifier. Some modifiers modify the core also and they too occur in the periphery. In fact it is noted in Van Valin (2005) that adverbs may actually modify all three layers of the clause, however they are not operators. McConnell and Ginet (1982) pointed out that manner adverbs interact in an important way with the tense operator. Those that occur before the tense operator can be seen as clausal modifiers, and those occurring after tense cannot.

(2) a. *Ann cleverly hid the present*
b. *Ann hid the present cleverly*
c. *Cleverly, Ann hid the present*

The first sentence is ambiguous in that it can refer to the manner in which Ann hid the present was clever, or that the fact that Ann hid the present was clever. The next two sentences are unambiguous. When there are multiple adverbs in a sentence, they are constrained by the layered structure of the clause, in that adverbs related to more outer operators occur outside of adverbs related to adverbs of more inner operators. In the simplest case 'outside' means 'further from the verb'.

(3) *Evidently, Triona has been slowly immersing herself in the new language.*

Unlike operators, which have fixed positions, adverbs may occur either before or after the verb, but in both cases the scope constraints require that the nuclear adverb be closer to the verb than the core adverb and likewise for the core adverb with respect to the clausal adverb. This makes them unlike PP adjuncts, which normally follow the core in English. If the PP adjunct precedes the core in English it must be in the precore slot or left-detached position.

4.5 Adpositional and noun phrase structure

Adpositions come in two basic varieties: predicative and non-predicative. Predicative adpositions function like predicates in that they contribute substantive semantic information to the clause in which they occur. Non-predicative Adpositions do not add any substantive semantic information to the clause and do not license the argument that they mark; in actual fact their argument is licensed by the predicate i.e. it is a core argument. These prepositions are a function of the semantics of the predicate. E.g. *to Pat* is a non-predicative PP functioning as a core argument, whereas *in the library* is a predicative PP functioning as an adjunct.

4.6 Semantic Structure

The semantic representation is based on a system of lexical representation and semantic roles. The system of lexical representation is based on Vendler's (1967) Aktionsart classification of verbs into states, activities, achievements and accomplishments. There are two additional classes; active accomplishments, which describe telic uses of activity verbs (e.g. devour) and also semelfactives (punctual events; Smith, 1997). Examples of each class and their formal representation, including their causative counterparts are given in (4) and (5) below:

(4) a. States: *be sick, be tall, be dead, love, know, believe, have*
b. Activities: *march, swim, walk* (– goal PP); *think, eat* (+ mass noun/bare plural RP)
c. Semelfactives: *flash, tap, burst* (the intransitive versions), *glimpse*
d. Achievements: *pop, explode, shatter* (all intransitive)
e. Accomplishments: *melt, freeze, dry* (the intransitive versions), *learn*
f. Active accomplishments: *walk* (+ goal PP), *eat* (+ quantified RP), *devour*

(5) a. State: The teacher is upset about the school situation.
a'. Causative state: The school situation upsets the teacher.
b. Achievement: The bubble popped.
b'. Causative achievement: The baby popped the bubble.
c. Semelfactive: The light flashed
c'. Causative semelfactive: The man flashed the light.
d. Activity: The soccer ball rolled around the field.
d'. Causative activity: The girl rolled the soccer ball around the field.
e. Active accomplishment: The soldiers marched to the barracks.
e'. Causative active accomplishment: The sergeant marched the soldiers to the barracks.
f. Accomplishment: The snow melted.
f ' Causative accomplishment: The hot sun melted the snow.

A single verb can have more than one *Aktionsart* interpretation. For example the verb *'march'* would be listed in the lexicon as an activity verb, and lexical rules would derive the other uses from the basic activity use. The lexical representation of a verb or other predicate is termed its LOGICAL STRUCTURE [LS]. State predicates are represented simply as **predicate´**, while all activity predicates contain **do´**. Accomplishments, which are durative, are distinguished from achievements, which are punctual. Accomplishment LSs contain BECOME, while achievement LSs contain INGR, which is short for 'ingressive'. Semelfactives contain SEML. In addition, causation is treated as an independent parameter that crosscuts the six *Aktionsart* classes. It is represented by CAUSE in LSs. The lexical representations for each type of verb shown above are given in Table 5.

Table 5: Lexical Representation for Aktionsart classes (Van Valin 2003)

Verb Class	**Logical Structure**
State	predicate' (x) or (x, y)
Activity	do' (x, [predicate' (x) or (x, y)]}
Achievement	INGR predicate' (x) or (x, y), or INGR do' (x, [predicate' (x) or (x, y)]}
Accomplishment	BECOME predicate' (x) or (x, y), or BECOME do' (x, [predicate' (x) or (x, y)]}
Active accomplishment	do' (x, [predicate$_1$,' (x, (y))]) & BECOME predicate$_2$; (z, x) or (y)
Causative	α CAUSE β where α, β are representations of any type

Examples of simple English sentences with the LS of the predicate are presented following.

(6) a. STATES
Peter is a clown.
be´ (Peter, [**fool´**])
Sean saw the photo.
see´ (sean, photo)
The mirror is shattered.
shattered´ (mirror)
Joe is at the club.
be-at´ (club, Joe)

b. ACTIVITIES
The baby cried.
do´ (baby, [**cry´** (baby)])
James ate pizza.
do´ (James, [**eat´** (James, pizza)]

c. SEMELFACTIVES
The light flashed.
SEML **do´** (light, [**flash´** (light)])
John glimpsed Mary.
SEML **see´** (John, Mary)

d. ACHIEVEMENTS
The window shattered.
INGR **shattered´** (window)
The balloon popped.
INGR **popped´** (balloon)
John glimpsed the picture.
INGR **see´** (John, picture)

e. ACCOMPLISHMENTS
The snow melted.
BECOME **melted´** (snow)
The sky reddened.
BECOME **red´** (sky)
Niamh learned Spanish.
BECOME **know´** (Niamh, Spanish)

f. ACTIVE ACCOMPLISHMENTS
James ate the pizza. **do´** (James, [**eat´** (James, pizza)]) & BECOME **eaten´** (pizza)
John ran to the shelter. **do´** (John, [**run´** (John)]) & BECOME **be-at´** (shelter, John)

g. CAUSATIVES
The monster scared the boy. [**do´** (monster, Ø)] CAUSE [**feel´** (boy, [**afraid´**])]
Brian broke the window. [**do´** (Brian, Ø)] CAUSE [BECOME **broken´** (window)]
The cat popped the balloon. [**do´** (cat, Ø)] CAUSE [INGR **popped´** (balloon)]
The girl walked the dog to the park.
[do´ (girl, Ø)] CAUSE [**do´** (dog, [**walk´** (dog)]) & BECOME **be-at´** (park, dog)]

Full semantic representations of sentences also contain lexical representations of the RPs, adjuncts, and grammatical operators like tense and aspect. For the linking between syntactic and semantic representations, the semantic interpretation of an argument is a function of its position in the LS of the predicate. Thematic relations as such play no role in the theory of RRG. The traditional thematic role labels are used only as mnemonics for the LS argument positions, e.g. 'theme' is the mnemonic for the second position (y) in a two-place locational LS like be-at´ (x, y). RRG defines two generalized semantic roles or semantic macroroles, which play a crucial role in the linking system. The two macroroles defined by RRG are ACTOR and UNDERGOER, and they are the two primary arguments of a transitive predication. The single argument of an intransitive predicate can be either an actor or an undergoer, depending upon the semantic properties of the predicate. The basic distinction is illustrated in the following German examples below are taken from Van Valin (2005).

(7)

a. Der Junge [SUBJ, ACTOR] hat den Kuchen [OBJ, UNDERGOER] aufgegessen.
'The boy ate the cake.'

b. Der Hund [SUBJ, ACTOR] ist um das Haus herumgelaufen.
'The dog [SUBJ, ACTOR] ran around the house.'

c. Der Hund [SUBJ, UNDERGOER] ist gestorben.
'The dog [SUBJ, UNDERGOER] died.'

d. Der Kuchen [SUBJ, UNDERGOER]wurde vom Jungen [ACTOR] aufgegessen.
'The cake [SUBJ, UNDERGOER] was eaten by the boy [ACTOR].'

In (7a), *der Junge* 'the boy' is the actor and *den Kuchen* 'the cake' is the undergoer of the transitive verb *aufessen* 'eat up'; in the sentences with intransitive verbs, *Der Hund* is an actor with the activity verb *herumlaufen* 'run around' and an undergoer with the accomplishment verb *sterben* 'die'. Actor is not equivalent to syntactic subject, nor is undergoer equivalent to syntactic direct object, as the examples in (7c) and (7d) show: in both of these sentences the syntactic subject is an undergoer, and in the passive sentence in (7d) the actor is an oblique adjunct. In an English clause with an active voice transitive verb, the actor is the initial RP (the traditional subject) and the undergoer, when it occurs, is always the direct RP immediately following the verb. In an English passive construction, the undergoer is the subject and the actor, if it occurs, is in an adjunct PP in the periphery to the CORE. Actor and undergoer are generalizations across specific semantic argument types, as defined by LS positions. This is illustrated in (8).

(8)

	kill	[**do´** (x, Ø)] CAUSE [BECOME **dead´** (y)]
	see	[**see´** (x, y)
	put	[**do´** (x, Ø)] CAUSE [INGR **be-LOC´** (y, z)]
	present	[**do´** (x, Ø)] CAUSE [INGR **have´** (y, z)]

Actor Undergoer

The *x* argument of all of these verbs functions as the actor, regardless of whether it is the first argument of the generalized activity verb **do´** (conventionally labeled 'effector'), as with *kill, put* and *present,* or the first argument of a two-place state predicate, as with *see*. With two-place transitive verbs like *kill* and *see,* the *y* argument is the undergoer. With three-place verbs like *put* and *present* (as in *Bill presented Mary with the flowers*), on the other hand, the situation is more complex. The relationship between LS argument positions and macroroles is captured in the Actor-Undergoer Hierarchy, henceforth termed AUH, in Figure 8. The basic idea of the AUH is that in a LS the leftmost argument in terms of the hierarchy will be the actor and the rightmost will be the undergoer. This was true for *kill, see* and *put* in (8). It was not true for *present,* however, and this illustrates how the leftmost argument in a LS (in terms of the AUH) is always the actor, but the rightmost argument is only the default choice for undergoer.

ACTOR **UNDERGOER**

Arg of DO	1st arg of **do´** (x,...	1st arg of **pred´** (x,y)	2nd arg of **pred´** (x,y)	Arg of state **pred´** (x)

[····▶' = increasing markedness of realization of argument as macrorole]

Figure 8: The Actor-Undergoer Hierarchy (from Van Valin, 2003).

RRG treats the notion of 'agent' rather differently from other theories. The basic notion is 'effector', which is the first argument of **do´** and is unspecified for agentivity. With many verbs, a human effector may be interpreted as an agent in certain contexts. If the verb lexicalizes agentivity, as with *murder*, then the logical structure contains 'DO', which indicates that the argument must be interpreted as an agent. Transitivity in RRG is defined semantically in terms of the number of macroroles a predicate takes. This is termed 'M-transitivity' in RRG. The number of syntactic arguments a predicate takes is described as its 'S-transitivity'. The three M-transitivity possibilities are: transitive (2 macroroles), intransitive (1 macrorole), and atransitive (0 macroroles). The theoretical label for the third argument in a ditransitive predication, e.g. *the picture* in the English sentence *Sam showed Sally the picture*, is 'non-macrorole direct core argument'. The principles determining the M-transitivity of verbs are given in (9).

(9) Default Macrorole Assignment Principles

A. Number: the number of macroroles a verb takes is less than or equal to the number of arguments in its LS.

1. If a verb has two or more arguments in its LS, it will take two macroroles. RRG treats the notion of 'agent' rather differently from other theories. The basic notion is 'effector', which is the first argument of **do´** and is unspecified for agentivity. With many verbs, a human effector may be interpreted as an agent in certain contexts. If the verb lexicalizes agentivity, as with *murder*, then the logical structure contains 'DO', which indicates that the argument must be interpreted as an agent. Also, primary-object languages patterns require a modified undergoer selection principle, namely that the undergoer is the second-highest ranking argument in the LS.
2. If a verb has one argument in its LS, it will take one macrorole.

B. Nature: for predicates which have one macrorole:

1. If the verb LS contains an activity predicate, the macrorole is actor.
2. If the predicate has no activity predicate in its LS, it is undergoer.

If a verb is irregular and has exceptional transitivity, it will be indicated in its lexical entry by '[MRα]', where 'α' is a variable for the number of macroroles.

Examples of lexical entries for some English verbs are given in (10).

(10) a. *kill*
[**do´** (x, Ø)] CAUSE [BECOME **dead´** (y)]

b. *receive*
BECOME **have´** (x, y)

c. *own*
have´ (x, y)

d. *belong (to)*
have´ (x, y) [MR1]

e. *see*
see´ (x, y)

f. *watch*
do´ (x, [**see´** (x, y)])

g. *show*
[**do´** (w, Ø)] CAUSE [BECOME **see´** (x, y)]

h. *run*
do´ (x, [**run´** (x)])

i. *drink*
do´ (x, [**drink´** (x, y)])

Within the theory of RRG no syntactic subcategorization information of any kind is required in the lexical entries for verbs. For regular verbs, all that is required is the LS and nothing

more, as in all except (6d). For most irregular verbs, only the macrorole number needs to be specified. All of the major morphosyntactic properties of verbs and other predicates follow from their LS together with the linking system.

Arg of DO > 1st arg of **do´** > 1st arg of **pred´** (x,y) > 2nd arg of **pred´** (x,y) > **pred´** (x)

Figure 9: Privileged syntactic argument selection hierarchy (Van Valin 2003)

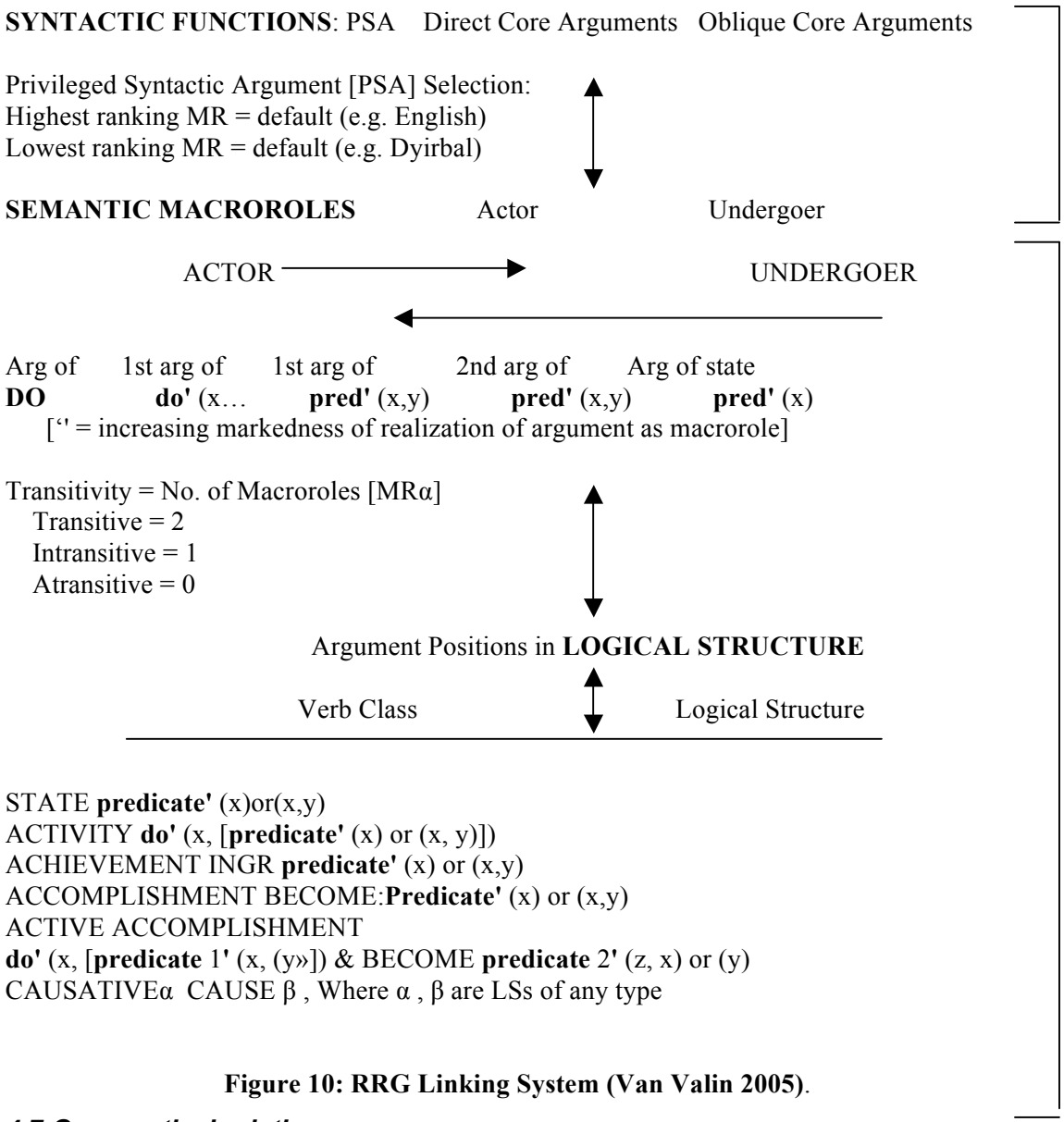

Figure 10: RRG Linking System (Van Valin 2005).

4.7 Grammatical relations

Grammatical relations like subject and direct object are considered to be non-universal in RRG. In place of these notions, RRG employs the notion of ‘privileged syntactic argument’ [PSA], which is a construction-specific relation and is defined as a restricted neutralization of semantic roles and pragmatic functions for syntactic purposes. The other arguments in a clause are characterized as direct or oblique core arguments; there is nothing in RRG corresponding to direct or indirect object (Van Valin 2005, chapter 4). Languages have selection hierarchies to determine the PSA. The privileged syntactic argument selection hierarchy is shown in figure 9.

In syntactically accusative languages like English and Croatian, the highest ranking macrorole is the default choice for PSA, whereas in syntactically ergative languages like Dyirbal and Sama (Austronesian, Philippines; Walton 1986), the lowest ranking macrorole is the default choice. That is, in a syntactically accusative language the unmarked choice for the PSA of a transitive verb is the actor, with the undergoer being a marked choice possible only in a passive construction. On the other hand, in a syntactically ergative language, the unmarked choice for the PSA of a transitive verb is the undergoer, with the actor being a marked choice possible only in an anti passive construction. With an intransitive verb, the hierarchy is irrelevant, as the single macrorole functions as PSA regardless of whether it is actor or undergoer. The linking system relating semantic and syntactic representations is summarized in Figure 10. Syntactic functions like PSA and direct core argument (which are structurally instantiated in the LSC) represent the syntactic pole of the system, while LSs represent the semantic pole. The linking system in RRG is described as bi-directional, in that it maps from syntax to semantics and from semantics to syntax. The linking between semantics and syntax has two phases. The first phase consists of the determination of semantic macroroles based on the logical structure of the verb (or other predicate) in the clause. The second phase is concerned with the mapping of the macroroles and other arguments into the syntactic functions.

Worked example:

Analysis of simple intransitive sentence: ‘The book is sitting on the table’

Step 1: Construct semantic representation in Lexicon.

a. Access LS for *sitting* and select prepositional LS to fill **be-LOC´** slot in LS, *on*:

do´ (x [**sit´** (x, [**be-LOC´** (y, x)]) + **be-on´** (__, __)]) =>
do´ (x [**sit´** (x, [**be-on´** (y, x)])])

b. Determine the value of the operators to be expressed:

<IF *DEC* <TNS *PRES* < **do´** (x, [**sit´** (x, [**be-on´** (y, x)])])>>>

c. Select the referring expressions to fill the variable positions in LS:

<IF *DEC* <TNS *PRES* < **do´** (Book, [**sit´** (Book, ([**be-on´** (Table, Book))])>>>

Step 2: Determine actor and undergoer assignments:

<IF *DEC* <TNS *PRES* < **do´** (ACT: Book, [**sit´** (Book, [**be-on´** (Table, Book)])])>>>

Step 3: Determine the morphosyntactic coding of the arguments

a. PSA selection: Actor as sole macrorole is selected as PSA.

b. Actor is assigned nominative case as highest ranking macrorole;
preposition *on* is assigned to *the table*, which receives dative case due
to being the first argument of **be-on´**, a static location.

c. As the tense is present, the agreement marking is on the nucleus. The nucleus
will agree with the actor since it is the highest ranking macrorole.

Step 4: Select syntactic templates:

a. Select the PrCS template, which is obligatory in main declarative clauses.

b. d. n. a.

c. Select a two-place core, one place for the nucleus and one for the PP.

d. Select the non-branching nucleus template.

e. Select two common noun NP templates and a predicative PP template.

Step 5: Assign LS elements to positions in the syntactic representation:

a. Assign the predicate to the nucleus.

b. Join the operator projection template to the nucleus and attach the morphemes expressing operators to it.

c (1.a). Since the nucleus is finite, link it to the first position in the core.

d. Link the nominative case-actor *The Book* to the PrCS.

e. Link the PP to the remaining core position.

Lexicon:

Verb: *sit* **do´** (x, [**sit´** (x, ([**be-LOC´** (y, x)]))])
Operators:
<IF <TNS <STA <NEG <MOD <DIR<ASP <LS>>>>>>>>>

Nuclear auxiliaries: (attach to the nucleus when they are non-finite; they do not attach to the nucleus when they are finite): ['be'] locative predication

Preposition: on' **be-on´** (x, y)
Nouns:
Book n
Table n
Articles: Definite: *the*

do´ (Book, [**sit´** (Book, [**be-on´** (Table, LEXICON Book)])])

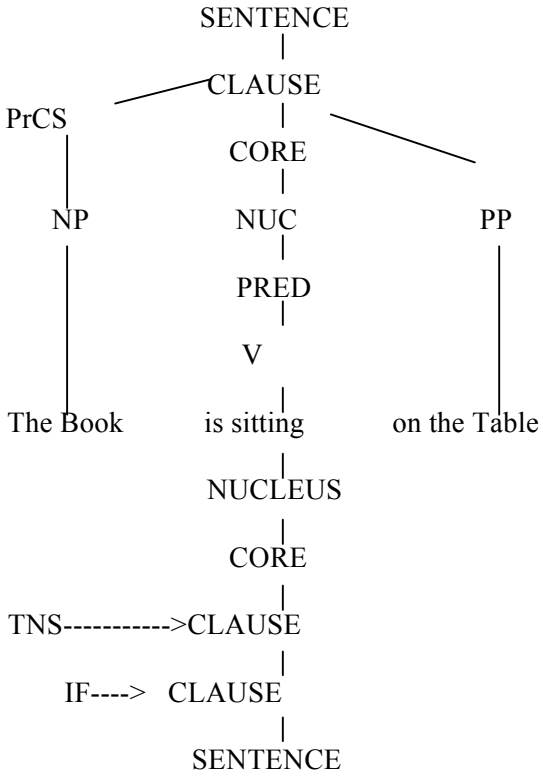

Figure 11: Resulting tree structure with constituent and operator projections

5 The Basic Components of Irish Sign Language

5.1 The handshapes of ISL

Ó Baoill and Matthews, 2000, describe how signs are formed within ISL by applying a set of phonological rules to a combination of handshapes and also how "identification of these handshapes and permissible combinations (noting that alteration of a single aspect provides the potential for expansion to the lexicon) provides us with an understanding of the building

blocks of the formation of signs". Figure 12 below, taken from Ó Baoill and Matthews, 2000, indicates the 66 different handshapes that are utilised within ISL in the formation of signed vocabulary.

Figure 12: The handshapes of ISL, part 1 of 2, from Ó Baoill and Matthews (2000)

Figure 13: The handshapes of ISL, part 2 of 2, from Ó Baoill and Matthews (2000)

Studies carried out by Ó Baoill and Matthews, 2000, reveal a high correlation between ease of articulation in handshapes and frequency of occurrence. Less complicated or unmarked handshapes tend to occur more often than more intricate or marked handshapes. Figure 14

and 15 below categorise some of the more frequent handshapes of ISL, unmarked and marked.

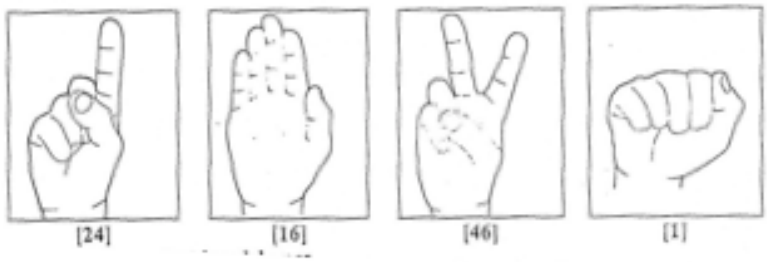

Figure 14: Unmarked handshapes of ISL, from Ó Baoill and Matthews, 2000.

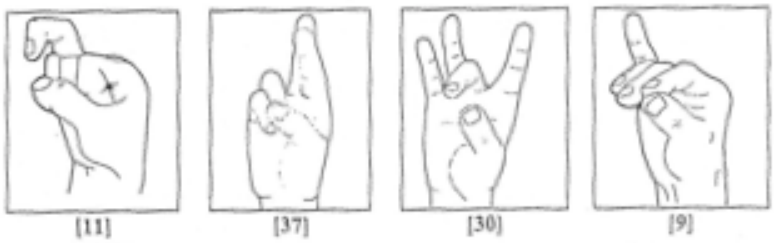

Figure 15: Marked handshapes of ISL, from Ó Baoill and Matthews, 2000.

5.2 The signing space

Ó Baoill and Matthews, 2000, describe the signing space as the space within which all signs must be articulated. The signing space usually extends from the waist outwards and includes the shoulders and the face. To ensure grammatical clarity, the signing space can be sub-divided for meaning. Morphemes are articulated at particular points or *loci* in relation to the signer for pronominal and anaphoric reference. A diagram of the signing space taken from Ó Baoill and Matthews, 2000, is shown in Figure 16.

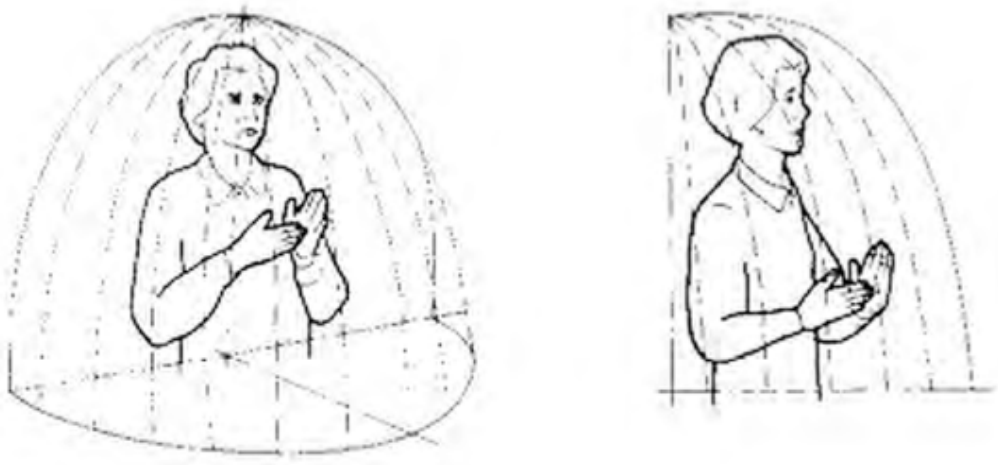

Figure 16: Sign Language Signing Space, from Ó Baoill and Matthews, 2000.

Neutral space is the space immediately in front of the signer and close to the signer's body. It encompasses the area from the head to the waist and extends the width of the signer's body. Neutral space is the space that is used when producing the citation form of an item and generally does not act as a referent for particular or special meaning.

5.3 The signs of ISL

The signs of ISL can be divided into eight different categories according to the manner and mode of production. Their description is based on the following parameters, which relates mostly to whether a signer uses one or two hands in the articulation of a particular sign.

(11).

a) One-handed signs, including body or near body contact during articulation.
b) One-handed signs, where the sign is articulated in free space without any body contact.
c) Two-handed signs having identical shape, where the hands touch during the articulation of the sign in space.
d) Two-handed signs having identical shape, where the hands move in symmetry but without any contact taking place during the articulation of the sign in space.
e) Two-handed signs having identical shape, where the hands perform a similar action and come in contact with the body.
f) Two-handed signs having identical shape, where the hands are in contact during articulation, however, using one dominant articulator and one passive articulator.
g) Two-handed signs showing a different shape, each hand having an active articulator and having equal importance.
h) Two-handed signs showing a different shape, where the dominant hand (depending on whether the signer is left-handed or right-handed) is the active articulator and the other hand is the subordinate or passive articulator.

5.4 The non-manual features of ISL

Non-manual features (NMF) or markers in signed languages refer to those meaningful units of the visual-gestural language, which are used to convey additional information to the meaning being expressed by manual handshapes. The existence of NMF within signed languages has been well documented by researchers, including Nolan (1993), Coerts (1990), Bellugi and Klima (1990), Baker and Padden (1978b). NMF consist of various facial expressions such as eyebrow movement, movement of the eyes, mouth patterns, blowing of the cheeks and also include head tilting and shoulder movement. While NMF are normally accompanied by a signed lexical item, they can be used to communicate meaning independent to manual accompaniment.

Within the linguistic system of ISL, NMF are used to express various emotions. They are also used to modulate or intensify the content of the information. In this sense NMF function as intensifiers. The use of NMF to express various syntactic properties is an identifying feature of sign languages and ISL is no exception to this. Ó Baoill and Matthews, 2000, point out that NMF function as both morphological and syntactic markers in ISL. While the majority of functions expressed through the use of NMF occur at the single lexical item level, there are certain syntactic functions that are expressed by means of NMF, but are not attached to any lexical item. The following list identified by Ó Baoill and Matthews, 2000, include all the relevant functions provided by NMF.

(12)

a) To show the degrees of emotion
b) To denote intensification or modulation
c) To distinguish declarative or interrogative sentences
d) To denote negation
e) To define topic or comment structures
f) To indicate conditional clauses
g) To show sarcasm

5.5 Hand configuration in ISL

William Stokoe, (1960) identified the various parameters which are relevant for the analysis of sign language. He suggested that the articulation of a sign encompassed three different parameters. A designator, which was used to refer to the specific combination of hand configuration, abbreviated to *dez*. A tabulation, used to refer to the location of the hands and abbreviated to *tab*, and a *signation* used to refer to the movement of the hands and abbreviated to *sig*. Dez, tab and sig were examples of what he called *cheremes*, the signed equivalent of phonemes.

Figure 17 is taken from Peporte (2009), and shows a step by step real-time video capture of the ISL sign for "adult". The signer starts with the hands in the "start position" where the hands are resting on the legs.

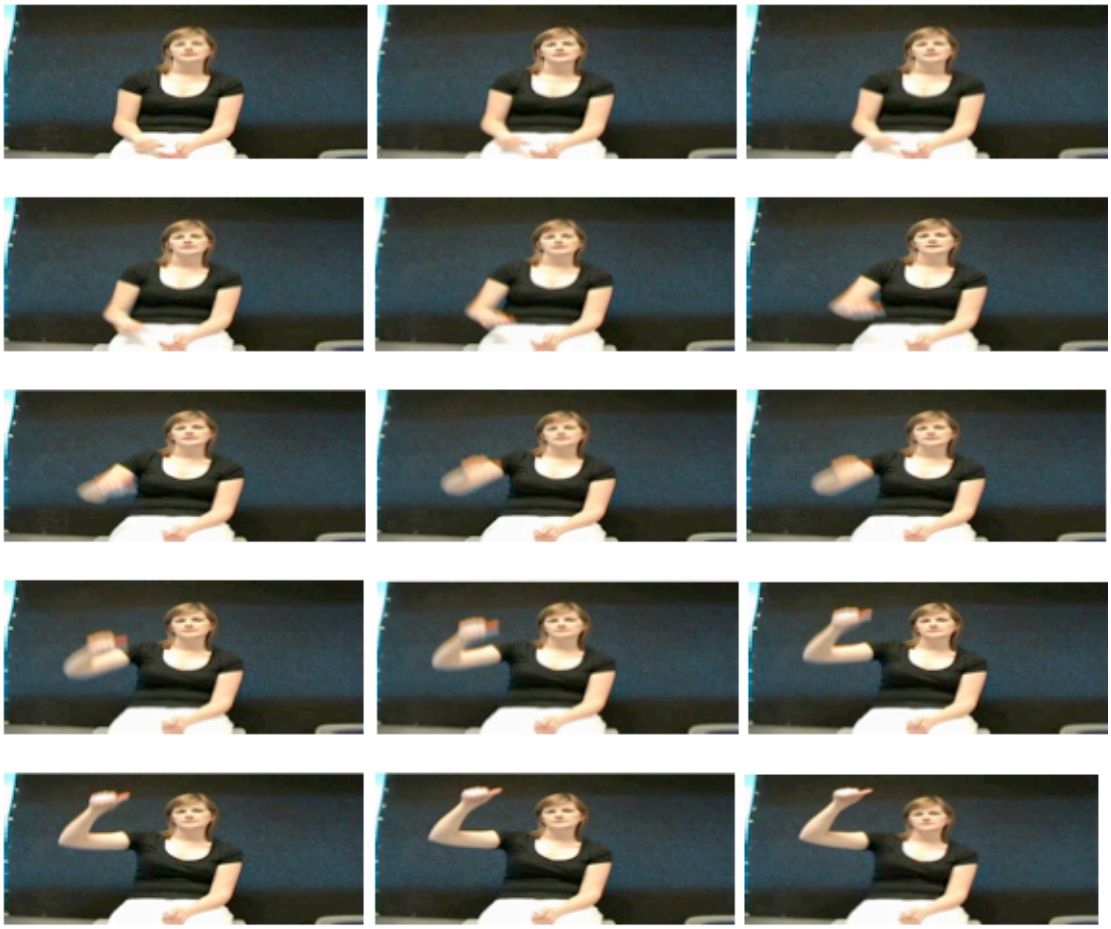

Figure 17: ISL sign for "Adult" taken using real-time video, from Peporte, 2009.

Later research refers to the parameters of sign language as *handshape*, *location* and *movement,* (Sutton-Spence & Woll 1999, Valli & Lucas, 1995). Battison, (1974) claimed that a fourth parameter is necessary in order to be able to fully transcribe signs. This fourth parameter was called orientation, and denotes the orientation of the hands and fingers during the articulation of the sign. The abbreviation of orientation is *ori.*

6 The Parse and Generate Process for ISL Avatar

6.1 Overview of the process

The architecture of the parse and generate process for the ISL avatar is shown in figure 18 below. This architecture describes the flow of processing. It documents the processes from the user inputs text until the an ISL articulation is produced via the Blender interface. The

model accepts input in the form of an English sentence or English text. Once the inputted text has been parsed into its various parts of speech it is stored in the parts of speech (POS) lexicon. The next phase involves the syntactic parser. This parser retrieves the tokens or lexical items with their various information from the POS lexicon. It then uses the RRG linking system to convert from a syntactic description to a semantic description of the sentence or text. The output of this phase of parsing is a rich logical structure.

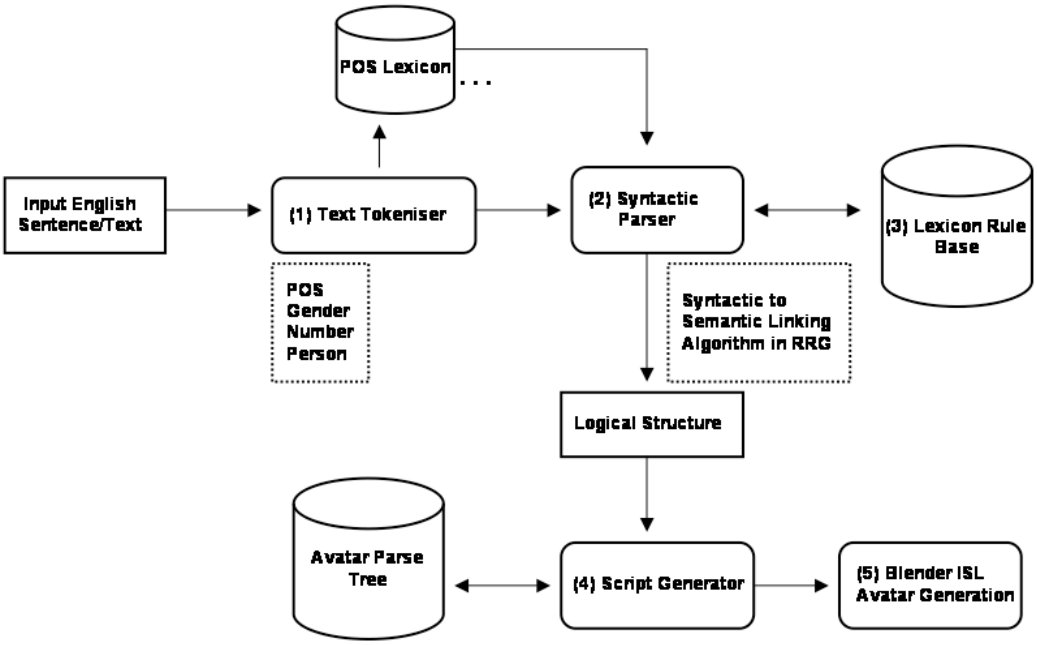

Figure 18: Architecture of the Parse and Generate Process for the ISL Avatar

Phase 4 is concerned with expanding the logical structure to produce what can be described as a meta representation of the parsed sentence. This will include agreement features, operators and constituents as well as information pertaining to the modality of the target language, i.e. the manual and non-manual features of ISL. The final phase or phase 5 of the processing is the generation of an articulation in our target language which is ISL. ISL is a visual gestural language and therefore the ISL is outputted to the user by the implementation of a conversational avatar via the Blender UI. Blender provides Python programming interfaces and Python scripting access for the development of custom and procedural animation effects. The Python script developed at phase 4 will be used as input for the Blender interface and the result will be the generation of an articulation of the input sentence or text in ISL by the conversational avatar.

6.2 Phase 1 processing – finding the lexical items

In the initial processing phase, an English sentence will be inputted and stored in the form of a String. With regard to RRG, the sentence will be classified as one of the following: State, Activity, Achievement or Accomplishment.

The sentence will then be tokenised and saved in a suitable data structure, where each token is a word. For each token the lexicon must be searched to see if the word is present and decipher its parts of speech (POS) (gender, number, person).

The information must then be stored with the lexical item in the specified data structure. Once this step has been carried out for all tokens, there will be a better sense of the word order of the String.

6.3 Phase 2 processing – creating the rich logical structure of the utterance

The initial step for phase 2 is to identify where the NP is in the String? Then it must be interpreted as transitive, ditransitive or intransitive? This will clarify the type of sentence that is being processed.

The next step for this phase involves the extraction of the logical structure for the verb from the lexicon.

(13) < …. < …. < …. [do [x… pred x, y, z] >>>

The tokens from phase 1 can then be retrieved and mapped based on the RRG theory of grammar :

(14) The 1st NP into x, the 2^{nd}. into y and the 3^{rd} (typically in preposition.) into z.

From the information recorded above (in the verb and the form of the verb for example run, ran, will run) information regarding the tense can be extracted and consequently the verbal and nominal structure can be determined. At the conclusion of this phase a rich logical structure will have been generated.

6.4 Phase 3 – The ISL Lexicon as an XML structure

It is envisaged that the lexicon will be developed using Extensible Markup Language (XML). XML is a platform neutral markup language, which is easily understood, while also lending itself well to computational parsing. XML will be used as a data structure for the storage and organisation of the various lexical entries i.e. verbs, nouns etc. to include the lexical items of ISL. It will be necessary at this phase of development to extend the lexicon to provide for the storage of the morphophonological handshapes of ISL as a visual gestural language. Signs are composed of both manual and non-manual features. Non-manual features are used to convey additional information to the meaning being expressed by manual handshapes. The lexicon architecture must be extended so that it is sufficiently universal to encompass both the syntactic and the semantic content of an articulation in ISL. This constitutes present work. We describe the characteristics of ISL in the next section of this paper.

6.5 Phase 4 processing – expanding the logical structure to sign the utterance

This part of the processing will involve the development of the underlying linguistic model with bi-directional RRG. This will enable the conversion of the English text into a meta-representation in RRG logical structures and generate ISL on output to the embodied conversational agent in real time using Python scripting. ISL language specific information, for example manual and non-manual features will have to be considered at this phase of processing. The structure will then have to be expanded so that it is sufficiently universal to encompass all of the necessary parameters consistent with ISL.

6.6 Phase 5 processing – generate the utterance via Blender

This phase will allow for the interaction between the Blender interface and the output from phase 4 processing. It is anticipated that the gap between Blender and the generated logical structures from phase 4 will be bridged by the utilization of Python scripts. The Blender API provides Python scripting access for custom and procedural animation effects. The output of this phase will be the generation of the ISL articulation via the Blender UI.

6.7 Challenges and Issues

ISL, our target language, is a visual gestural language and by its very nature will prove challenging at the generation phase of this research. The development of a computational framework that will be capable of bridging the gap between the lexicon and the generation of ISL is a very complex and challenging issue. The development of a meta representation of the

data, which must be sufficiently rich to encompass all of the necessary information consistent with ISL is also very challenging. Factors such as synchronisation of various articulators including articulators for manual and non-manual features of the language are currently being researched. Figure 19 is a first draft at resolving the question of how any given sign may be generated using our 3D animation tool, Blender.

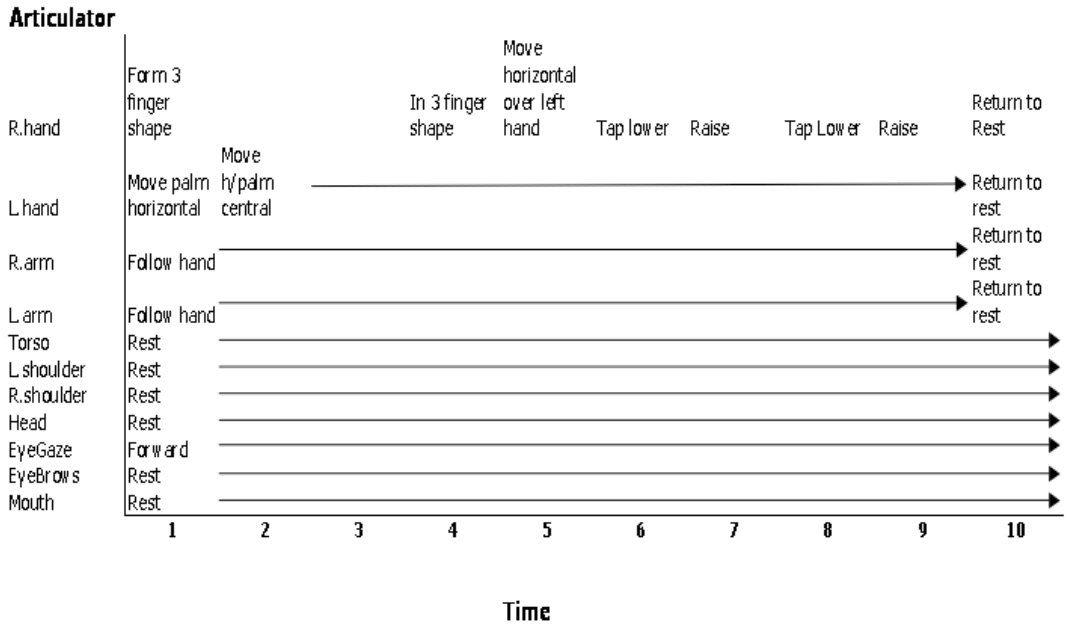

Figure 19: Method for the sign for "Mother" in ISL

It is envisaged that the articulators as shown in figure 19 will be choreographed and orchestrated simultaneously, equivalent to instruments in an orchestra at the generation phase. This provides a signature for the orchestration of a method to generate the sign for Mother in ISL. It is followed by the pseudocode for this signature in Figure 20.

```
sign: mother = method
{       do{
                RHand(sign 51, orientation)
                Tap(RH, LH, 2, x, y)
                LHand(sign 51, orientation)
                RArm(rest)
                LArm(rest)
                Head(rest)
                LShoulder(rest)
                RShoulder(rest)
                Torso(rest)
                Eyebrow(rest)
                Eyegaze(forward)
                Mouth(rest)
        }
}
```

Figure 20: Pseudocode for the sign for "Mother" in ISL

The pseudocode for the sign for "Mother in ISL" as shown above, lists the various articulators of the avatar which will be triggered on execution, together with their various arguments or information that must be passed to each articulator to generate the utterance.

7 Discussion

The research presented here is a work in progress. To date the armature and the mesh of the avatar have been developed using MakeHuman and Blender. The signs of ISL and the various handshapes of ISL have been identified and the RRG linguistic framework including the lexicon has been mapped to XML. The proposed parse and generate process for this research has been outlined and the envisaged simultaneous orchestration and choreography of articulators for an utterance method have also been outlined together with Pseudocode for the same. The next phase of my research will involve the development of the underlying linguistic model with bi-directional RRG. This will enable the conversion of English text into a meta-representation in RRG logical structures and allow for the generation of ISL on output to the embodied conversational agent in real time using Python scripting.

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Autonomy of a Rebrand: How Aviva came to Ireland

Richard Brophy

Abstract

This article charts the rebranding of the Hibernian Group companies in Ireland to Aviva in a manner that kept business as usual, without harming the rich tradition and brand heritage crafted over 100 years. The paper examines the progression of Hibernian to Aviva through academic literature and the course that Aviva pursued in Ireland to rename an established insurance brand cherished by both the industry and public alike.

1. Introduction

The corporate brand as defined by Aaker (2004) potentially contains the components of a rich heritage, assets and capabilities, people, values and priorities, a local or global frame of reference, citizenship programs, and a performance record. As we have seen in recent years, a number of corporate brands have undergone a remodelling or a complete change. Rebranding of an organisation is usually driven by external factors, mostly from consolidation, mergers and acquisitions and/or change in corporate strategy (Muzellec & Lambkin, 2006).

In breaking down the components of the brand, de Chernatony & Dall'Olmo Riley (1998) developed a model encompassing the internal and external attributes of the brand; where internal attributes included – vision, mission, values, corporate cultural heritage, naming policy, functional capacity and personality, and external attributes included – confidence, rational performance, and emotional attributes. Both are developed over time and experience and their connection is governed by consumer perceptions and relationships.

Due to its size and its historical connections to the UK, the insurance industry in Ireland has been subject to massive change in which mergers have consolidated the market and also the number of companies operating in Ireland who have a rich heritage, background, loyal customers and established distribution channels (Pike, 1990). Like any other industry, the insurance industry has relied on improved technology to facilitate access to customers at lower costs or at times more convenient for the customer and this has significantly changed the landscape of how insurance is sold and managed (O'Driscoll, 2010).

This paper aims to explore the current rebranding literature published and compare and contrast with the most significant rebranding initiative taken on a well known and developed brand of over 100 years, the Hibernian companies of Aviva plc.

2. Rebranding in the Service Industry

Brands can connect to people through a variety of way which can make or break product or service. If Google was named after the initial university project title 'Back Rub' (Battelle, 2005), perhaps we would not have the successful brand name that is now used as a verb for online searches? Branding too can have negative effects on a product or service such as the rebranding of the British Royal Mail to Consignia and back again to Royal Mail (Stuart & Muzellec, 2004).

Daly and Moloney (2004) outline rebranding as a challenging process that affects the values and promises, attitudes and feelings about brands and that brands of established companies have taken years of investment to become major assets. In keeping connection with the past and moving towards the future with the new brand, Haig (2003) outlines the sins of branding which are: Brand Amnesia (where the venerable brand creates a radical new identity) and Brand Irrelevance (where the markets that are constantly evolving, the brand must remain relevant to the market) are major concerns for any rebrand, especially in financial services.

Building a brand may take lots of resources in advertising and promotion and any rebrand would obviously have a potential high spend. However companies can create a successful brand even without resorting to expensive media. This can be achieved through a well-devised marketing strategy that incorporates brand building by way of a clear identity made visible even before it is launched and allows customer buy-in / participation into the brand (Joachimsthaler and Aaker, 1997). Joachimsthaler and Aaker (1997) illustrated this using example of brands being built without mass media such as Cadburys promoting their brand through their historical background of chocolate making but highlighting their progressive industrial relations in an era of hard labour through factory tours and a theme park.

As the brand is an asset, we have seen it used to extend into unfamiliar areas such as grocery retailer entering the financial services sector (Burt, 2000). Within service industries, many are adopting Fast Moving Consumer Goods (FMCG) techniques to differentiate themselves in a homogeneous market where products are virtually identical in nature and service (McDonald et al, 2001).

In rebranding, employees as stakeholders in the organisation have a part to play in the process. Muzellec and Lambkin (2006) described employees as internal stakeholders who must be involved in the process, have a buy-in into the process and be convinced of the need for change of the brand for it to work. They also established that customers' brand images are primarily formed on the basis of encounters with employees which in turn make employees an integral part of the rebranding process.

3. Rich Heritage in Insurance

The Hibernian name for the insurance company pre dates the foundation of the Irish State in 1922 where it was founded in 1908 by a group of business men in Dublin (Mulhern, 2008). Although the original Hibernian Insurance Co was founded in the early 20th century, Norwich Union (a British mutual insurer) had Irish operations dating back to 1816 and like Hibernian dealt with a wide range of insurance products for both personal and commercial risks.

Consolidation of insurance companies is an ongoing process that comes in cycles. Both Hibernian and Norwich Union have been subject to their respective consolidation events in the past, however in the 1990s their merger led a trend of global consolidation of the insurance industry. This consolidation gave way to demutualisation of some insurance institutions. Additionally the mergers of large insurers had a massive effect in Ireland and changed the way in which insurers operated and the nature of stakeholder involvement.

In Ireland alone, the majority of insurers operating in the 1990's had a British or foreign parent company and this consolidation joined many insurers which would have been competitors in the past. Notable ones to mention would include the merger of Sun Alliance to the Royal Insurance company creating Royal & Sun Alliance, now called RSA; and the purchase of Irish National Insurance Co by Eagle Star creating a larger Eagle Star general insurance company.

4. Associated Activities

4.1 Health Insurance

Unlike the rest of Europe, the Health Insurance industry in Ireland is not as developed in terms of competing forces. Dominated by the Voluntary Health Insurance (VHI) which is government owned, competition first entered the Irish Market with the arrival of BUPA from the UK. From there the market became regulated by an independent government agency that set ground rules regarding products and what it covered for Ireland. After BUPA, VIVAS Health was formed in 2004 making it the third player in the marketplace and it grew

considerably over a short space of time. During the risk equalisation debacle, BUPA ended up withdrawing from the Irish market and sold its book of business to Quinn Insurance creating Quinn Healthcare. Along with this, VIVAS Health founders ended up selling their controlling shareholding to Hibernian Insurance in 2008 and this was subsequently renamed Hibernian Health. Distribution channels of health insurance in the past tended to have been sold directly to the customer. However Vivas Health and subsequently Aviva maintained an intermediary network of AIB Bank (who have a shareholding in this company) and professionals to sell group and individual health plans and are presently the only insurer in Ireland that maintain this distribution channel for health insurance.

4.2 Driving School and Breakdown Assistance

Royal Automobile Club (RAC) is a well established breakdown assistance organisation in the UK that established itself in Ireland in the mid 1990s providing breakdown cover and also a driving school. In the UK (but to a lesser degree in Ireland), they maintained a financial services division where it was an insurance intermediary and sold motor insurance to the general public. Established as a major breakdown service company in Ireland like in the United Kingdom, the RAC was taken over by Aviva in 2005 in a massive takeover of all its operations. The RAC brand was retained in the UK for breakdown and financial services, while in the Republic of Ireland the RAC operation of breakdown service and driving schools was rebranded with the Hibernian name.

5. Insurance Industry in Ireland – Changing Distribution Models

5.1 Conventional Distribution Models

Traditionally insurance and financial services were sold through intermediaries, namely Insurance Brokers. Typically an insurance broker would have various agencies that they would use to insure specific risks. In the case of Hibernian and its precursor insurers they did grant agencies to individuals where they would sell on behalf of company only and would not sell other insurance products. These would be known as tied agents and would operate exclusively for Hibernian.

Besides insurance brokers and tied agents, Hibernian and its precursor insurers did maintain an extensive branch network that dealt with the public and agents alike. During the 1960's, insurance distribution changed dramatically with the creation of PMPA which, unlike other insurers, bypassed the insurance broker totally and used branch offices around the country (Carswell, 2006).

Over time, direct underwriting changed further with the advent of better telecommunications creating insurance sales call centres and subsequently the Internet creating internet based insurers (Debling, 1998). With this change in technology most insurers in Ireland also developed their own direct channels by extending their existing brand into direct operations like call centres or utilising branch networks. For example Hibernian created Hibernian Direct to sell insurance and financial products to the general public bypassing traditional intermediaries. Hibernian Direct is regulated as an intermediary in its own right and can retail other financial products not developed by them such as Hibernian branded mortgages from KBC Bank.

Although insurance was previously regulated by the Department of Industry and Commerce, its regulation remit was for solvency and prudential supervision only. Statutory regulation of insurance further expanded with the Insurance Act of 1989 and with the Central Bank of Ireland taking over the regulatory supervision of insurance intermediaries under the Investment Intermediaries Act of 1995. In turn this office was merged (along with some other regulatory bodies) into the Irish Financial Services Regulatory Authority. This was subsequently renamed the Financial Regulator and ultimately renamed the Central Bank of

Ireland with responsibility for regulating all financial service products from national and EU passporting of insurers into and out of Ireland, to the conduct of intermediaries and the sale of financial products to the general public. The Central Bank of Ireland also became a consumer advisory service providing the public with advice on insurance products and engaging in pricing surveys that are published on the web (itsyourmoney.ie). One feature of regulation was the mandatory use of regulatory statements that are featured in all public advertising of insurers and intermediaries alike which indicated to the customer who was regulated and providing the product. This applied to Irish regulated firms and also EU foreign regulated firms operating in Ireland.

With the advent of regulation of the sale of insurance products, many brokers or tied agents merged or exited the marketplace. Alongside this many other types of insurance intermediaries came on the scene using new technology to distribute products.

5.2 New Distribution Models

5.2.1 Bancassurance

Bancassurance is another growing area where banks are retailing insurance products to their customers. In defining this, bancassurance brings together the advanced selling skills of insurance operators and the stronger customer orientation and loyalty of the banks resulting in highly profitable, cost effective cross selling of insurance products (Hughes, 1994). Banking institutions over the years have sold various forms of insurance and life assurance protection products to their customers. Usually combined with or added into mortgage loans, mortgage protection (decreasing term life cover) and property insurance (for the property that the bank has a lien on) have been included in mortgages. In Ireland nearly all banks have established bancassurance products by way of group schemes with existing insurers based in Ireland, for example: AXA Insurance providing Household Insurance to AIB Bank. In some cases, banks have gone further and provided other types of insurance products not related to a traditional banking product, such as Car Insurance. For example, Aviva provide AIB branded car insurance through a web facility and also operate a call centre. Regarding Life Assurance products, we have seen banks enter this market with their own life assurance operations namely Lifetime from Bank of Ireland and Ark Life from AIB who subsequently merged with Hibernian Life & Pensions.

5.2.2 Brandassurance

As brands are expanding into other industries that are either related, complimentary or unrelated, we have seen the advent of Brandassurance where the existing publically trusted brand is used to enter a completely new market where a traditional financial service provider could not (Grice et al, 2008). In many cases brandassurance involves a brand to promote with the product being handled by an existing insurance provider. In Ireland, Tesco Personal Finance was established to extend the grocery retailing brand into financial services where they offer credit cards, life assurance and car insurance. Presently RSA Insurance is providing the car insurance product while Aviva have in the past provided other products namely life assurance. The unique selling factor for these products compared to traditional sales lines of Insurance, is that the offer of clubcard points encouraged Tesco customers to use their product over the traditional channels of purchasing insurance. There have also been other brandassurance ventures in Ireland previously such as joint venture operations between an insurer and an institution such as Premier Direct (joint venture between Bank of Ireland and insurers) and also One Direct (joint venture between An Post (Post Office), Aviva and other product providers). These brands would have been developed from scratch but advertising the principal parent companies with the new brand as opposed to Tesco using an existing brand to enter the market.

6. Aviva Irish Operations

6.1 Brand Architecture

Aaker and Joachimsthaler (2000) defined brand architecture as the organising of the brand portfolio that specifies brand roles and the nature of relationships between brands. This brand architecture was streamlined and defined successfully with the consolidation of Norwich Union and other insurers (General Accident & Friends First non-life business) into the Hibernian name with business units equally rebranded in this fashion. This architecture (see Fig. 1) did define the distinctive business units in a clear and simple fashion under the Hibernian brand however as a brand it was restricted to the Irish market, while it was a major component of the Aviva global business. It is clear from observing the UK Aviva business that they pursued a similar strategy to streamline their well established brands into a strong national identity.

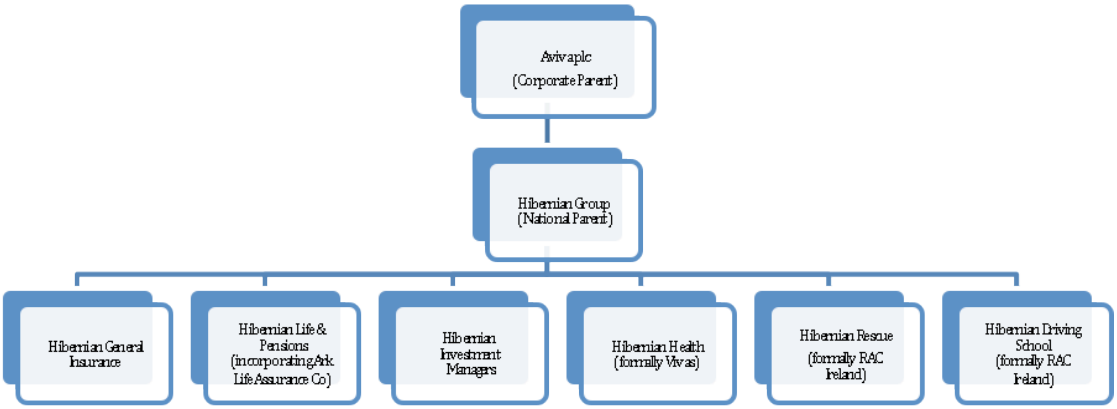

Figure 1: Brand Architecture of Hibernian pre Aviva rebrand in Ireland

6.2 Global Rebrand in Ireland

6.2.1 World Wide Process

Managing corporate brands, especially in times of re-branding, is a complex process that is not just an external process. It requires organisation-wide buy-in to the concept, and an appreciation of the challenges and pitfalls is needed (Gotsi et al., 2008)

The Aviva name came into being when parent company CGNU plc renamed itself in 2002. With that it harmonised the corporate parent of the established British insurers Commercial Union, General Accident and Norwich Union which had merged over a number of years from 1998 to 2000. Although Aviva was the name of the publically traded share company on the London Stock Exchange, Aviva retained its strong national brands such as Norwich Union in the UK, Hibernian in Ireland, Commercial Union in Poland.

The Aviva brand name was introduced to the general public early in some international markets such as Czech Republic, France, Italy and elsewhere around the world in the 2002-3 period. The Aviva global rebrand, the renaming of local brands, officially started in 2008 when it was announced it would rename the locally branded business units that retained the old brands, spelling the end of the Hibernian name in Ireland.

6.2.2 Process in Ireland

Rebranding in the insurance industry is not uncommon in Ireland for a variety of reasons such as the global consolidation of the insurance industry affecting the local market, to mergers and acquisitions happening locally. Within a 10 year period in Ireland we saw the change of Guardian Royal Exchange and PMPA into AXA Insurance, Royal Insurance and Sun Alliance into Royal & Sun Alliance and the Cornhill, Church & General and Insurance

Corporation Ireland into Allianz. Norwich Union too did disappear from the Irish market in 2000 when Commercial General Union (GGU) plc merged with Norwich Union globally affecting its Irish operations and where the Norwich Union name was dropped in favour of Hibernian. Although Hibernian won on this occasion the familiar logo of Norwich Union using the spire of Norwich Cathedral was retained and used by Hibernian.

At the start of 2008, Aviva plc operations in Ireland consisted of Hibernian General Insurance, Hibernian Life & Pensions, Hibernian Investment Managers, Hibernian Direct, Hibernian Health, Hibernian Driving School and Hibernian Rescue (the last two formerly RAC Ireland). All operations retained the Aviva logo and were noted as Aviva group companies. Unlike the UK, the Aviva name was introduced in Ireland over a two year phased period which involved a range of promotional activities including large amounts of advertising.

6.2.3 Phasing in and replacing with the Aviva name

In January 2009 the first phase involved the slotting in of the Hibernian Aviva name into all operations that contained the Hibernian name. This was done through a thorough campaign of writing to its customers informing them of the changes and how Aviva the parent company was a strong trading insurance and investment firm. All regulatory statements also changed for the previously known Hibernian companies containing the Hibernian name were altered to include Aviva. The promotional approach taken to announce this change utilised a massive advertising campaign that encompassed Hibernians' historical establishment in Ireland over 100 years ago and its position within Aviva. The TV commercial that was broadcast across all Irish terrestrial broadcasters used images of Hibernian first opening in Ireland with historical images of Ireland that were thought provoking, such as filmed scenes of emigration alongside archive material, including Charlie Haughey, Martin McGuinness and Ian Paisley in Northern Ireland and the Riverdance troupe performing and Aviva Irelands' theme tune from the American performer Laura Izibor entitled 'Shine'. This was subsequently backed up by press and billboard advertising throughout 2009. Although Hibernian did not engage in much public sponsorship in the recent past, it was announced in 2009 that Aviva would engage in a 10-year deal to sponsor the new Lansdowne Road Stadium and rename it the Aviva Stadium. Heralded with great fanfare, this would raise the Aviva name to new promotional heights for rugby tournaments such as Six Nations (using national Irish, UK, French and Italian sides), Autumn International series and European Rugby Cup games and also for Republic of Ireland soccer international home fixtures.

At the start of 2010, Aviva dropped the Hibernian name completely in its next phase of promotional advertising with a campaign highlighting what Aviva covers in Ireland from Car Insurance, Life Assurance, Pensions and Health Insurance. All regulatory statements were altered and its customers informed of the changes of company names. During this time Ireland and the world saw the first Rugby and Soccer games take place in the Aviva stadium.

7. Review & Conclusion

Branding in financial services plays an important role where it differentiates products or ranges, especially important where given the similarity of many financial products (McGoldrick, 1994). The Hibernian name (see Fig. 2) has now disappeared from the Irish commercial landscape, however its successor brand Aviva continues to operate where Hibernian left off through its intermediary and direct lines network. Alongside this the non insurance activities of Driving Schools and Breakdown Assistance continue to operate under the Aviva stable. The rebrand for this exercise was a truly Irish affair where TV advertising emphasised the heritage of the company in Ireland and its position in the Aviva company worldwide. Its sponsorship of the Lansdowne Road Rugby and Soccer grounds and renaming them as Aviva Stadium (which is not uncommon in Europe as seen by Allianz sponsoring a

German arena for the World Cup in 2006), will truly have a multiple effect for both local and international audiences.

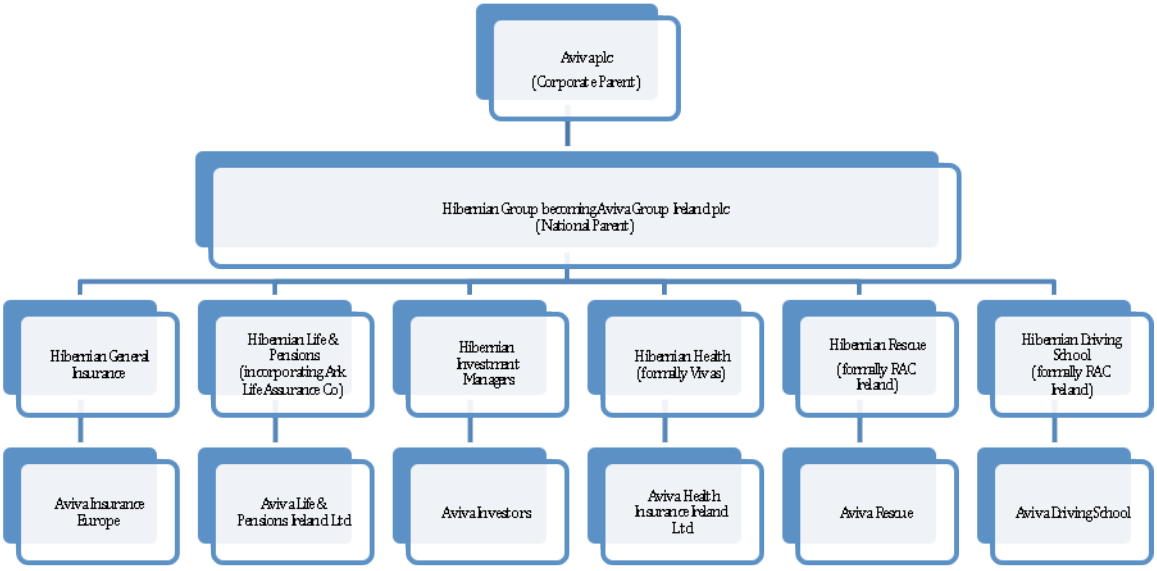

Figure 2: Brand Architecture of Hibernian into Aviva in Ireland

The exercise used historical milestones to promote the company and transferred all of the brand value of Hibernian to the new Aviva brand through visible association of Hibernian and Aviva. The change also organised the brand architecture of Aviva worldwide to take advantage of economies of scale, global promotional opportunities like Aviva Stadium and going forward ensures that the brand is more visible from corporate parent to local level. As insurance and financial products are going through a process of Disintermediation (Atkinson, 2001); where people deal with the product providers directly, the Aviva brand is well positioned to serve both camps of direct and intermediary based business. In this way, the brand is promoted in a more customer friendly way rather through promoting the brand amongst the insurance industry which would have been the norm in the past during rebranding exercises. Regulation requirements of product provider for traditional distribution and brandassurance ventures are also served well with this rebranding exercise.

Delvin & McKechnie (2007) through their research suggest that consumers do not generally consider themselves to have meaningful relationships with financial services brands and appear quite relaxed at the prospect of losing certain brands, provided that change does not occur too often and there is clarity and consistency in an organisation's branding strategy. Applying the above to the rebrand of Hibernian to Aviva suggests that the move to bring the Aviva name to Ireland unified and incorporated all the activities into a fresh umbrella brand reinforced by above and below the line promotional activities making the company relevant to all stakeholders of employees (Hibernian, Norwich Union, Vivas Health and RAC Ireland), industry (insurance industry, intermediaries) and consumer (commercial and personal lines).

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