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Editorial

I am delighted to introduce the **20th edition of the ITB Journal**, the academic journal of the Institute of Technology Blanchardstown.

The first paper, by **Arnold Hensman** of the Department of Informatics at the Institute of Technology Blanchardstown, Dublin, is entitled '*Required features of a Virtual Classroom Tool for use in Higher Education', and* discusses an important topic, the integration of virtual-classroom systems into the arsenal of e-learning tools. This integration of virtual-classroom systems represents a major evolution in the landscape of modern distance education. He finds that, for many courses, standard virtual learning environments (VLEs) provide only a foundation upon which to base a distance-learning programme. Hensman notes, importantly, that synchronous live online-teaching software such as Microsoft Office Communicator and Adobe Connect allow educators to simulate a real-time classroom environment over the internet like never before. As these tools are being used more frequently within higher education, Hensman raises serious questions about how effective they ultimately can be in meeting student learning requirements. What are the best practices to employ when conducting classes online in this way? Hensman examines the basic requirements that a virtual classroom tool should meet for higher education purposes with much reference to a variety of commercial brands available. .

In the second paper in this ITB Journal, Dr. **Zari Saeedi** T. of Trinity College Dublin looks at the '*Personality Variable of Self-Esteem and EFL Reading Comprehension'*. She notes that the contribution of psychology to the process of learning, in general, and language learning, in particular, is so pervasive that there is hardly an aspect of language learning and teaching which could not be related to psychology. Among the psychological variables involved in language pedagogy, she finds that personality factors can have great significance. Her study seeks to determine if there is any association between the crucial personality factor of self-esteem (self-concept) (along with the sex variable) and the reading comprehension achievement of English major university students. The findings reveal that the independent variables of self-esteem and sex have a significant effect on students' performance in EFL reading comprehension although their interaction (self-esteem/sex) was not significant.

The paper by **Ciara Browne**, of Trinity College Dublin looks at the structure of the '*Noun Phrase in Bamunka*' as to its linguistic complexity ranging over the sematiic, syntactic and morphological interfaces. This paper is the product of significant field research in the Camaroon in Africa and the results were gathered first hand with native informants in the summer of 2010. The language data was collected during a field trip to the Bamunka village in the Ndop plain of Cameroon. The Bamunka language is an understudied language about which very little is actually known. It does not appear to have any reference grammars. The language is a member of the Grassfields Bantu family and the Bamunka language of Western Cameroon is spoken by approximately 31, 000 speakers. With scholars having begun the process of transcribing the language into written form just six years ago, the principles and intricacies of its grammatical system are becoming evident. This paper therefore provides a significant and important contribution to our knowledge of the internal structure of the noun phrase in Bamunka, the grammar of the language, and the distribution of linguistic complexity found therein, within a functional linguistics perspective.

The fourth paper in this issue of the ITB Journal is by **Kelli Slimp**, of Trinity College Dublin, and her paper is called '*Construction Grammar as applied to core English modality'* This paper applies Construction Grammar to the phenomenon of linguistic modality and she considers both epistemic and root modal verbs of English. Specifically, her paper is concerned with the English verbs CAN/MAY and MUST/SHOULD. Motivation for these choices is provided as well as a brief look at the other types of modal verbs existent in the language. In applying Construction Grammar to modality, the paper poses the following hypotheses: 1) there are varying types of modality in English; 2) these modal variations are realized uniquely and; 3) an accurate and effective account of these unique modalities and corresponding marking systems can be provided within the Construction Grammar (CxG) framework. In order to ascertain these hypotheses, the current study asks 1) what are

the modal variations of English; 2) how are these variations realized and 3) what would a Construction Grammar analysis of modality in English look like? Construction Grammar is applied within the analysis and visually represented in a Role and Reference Grammar-style construction schema. She finds that expressions of modality in English offer as many ambiguous interpretations and unique realizations as there are conversational situations in which they could be uttered. The modality of English is shown to be heavily context and in some cases subject dependant.

The fifth paper, by **Judith Gottschalk** of Ruhr-Universität Bochum, in Germany, is also concerned with linguistic matters, in this case the formation of NOUN-NOUN compounds in German. The title of the paper is '*N +N compounds in German: An analysis within Role and Reference Grammar*'. The paper analyses German N+N compounds consisting of nominal roots [hence N + N compounds] within the theory of Role and Reference Grammar [RRG]. The basis for this analysis of German N+N compounds is the Layered Structure of the Word [LSW] as developed in Nolan (2010). The LSW is analogous to the Layered Structure of the Clause [LSC] and the Layered Structure of the Noun Phrase [LSNP] as they are used in RRG. Besides the description of German N+N compounds, this paper investigates the role of the lexicon, the necessity of a semantic structure of lexemes - based on Pustejovsky's notion of qualia structures (Pustejovsky 1995) - and the use of inheritance hierarchies in a description of inflectional morphology and the use of interfixes. The paper also investigates the use of Constructional Schemas (CSs). With the help of CSs, part of the semantic representations of lexemes is partially based on Pustejovsky's qualia structures, and Gottschalk shows how lexical entries for nouns are constructed. These lexical entries are stored in the lexeme store, which is part of the lexicon.

The final paper of the 20th issue of the ITB Journal is jointly authored by **Dawn Duffin** of National Learning Network Ireland and **Geraldine Gray** of the Institute of Technology Blanchardstown and is concerned with '*Using learning styles to optimise lecturer and learner experience and results in an Institute of Education'*. The authors find that the past decade of social policy making and legislative change in Ireland has led to a 'broader range of individuals' accessing higher education (ITB, 2006, HEA 2005, Duffin forthcoming). This means that class groups contain a greater range of diversity of learning behaviours than hitherto. The process of accommodating this range of learning behaviours within curriculum development and assessment poses a challenge for lecturers and students alike within Higher Education. This paper proposes an understanding of the relationship of learning styles to cognitive processing and how this can help motivate research-based support for the use of learning styles profiling. It is proposed that the application of learning styles profiling can assist in the creation of conditions for optimal achievement in terms of student retention, attendance and achievement.

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

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Required features of a Virtual Classroom Tool for use in Higher Education

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Abstract

The integration of virtual-classroom systems into the arsenal of e-learning tools represents a major evolution in the landscape of modern distance education. For many courses, standard virtual learning environments (VLEs) provide only a foundation upon which to base a distance learning programme. However, synchronous live online-teaching software such as Microsoft Office Communicator and Adobe Connect allow educators to simulate a real-time classroom environment over the internet like never before. Since these tools are being used more and more within higher education, questions must be asked about how effective they ultimately can be in meeting student learning requirements. More importantly, what are the best practices to employ when conducting classes online in this way?

This paper examines what basic requirements a virtual classroom tool should meet for higher education purposes with much reference to a variety of commercial brands available. Obstacles and restrictions that arise based on these requirements will be discussed in order to identify and overcoming them.

1 Introduction

While virtual learning environments (VLEs) such *Moodle* [Moodle 2010] and *Blackboard* [Blackboard 2010] are now almost ubiquitous within most higher education institutes, virtual classroom software such as *Elluminate* and *Adobe Connect* are only gaining in popularity. Many incoming students with access to a VLE have come to expect that course materials be available online and as such, faculty have generally been keen to oblige. Early adapters of VLEs experimented with additional features such online testing and student forums rather than simply using them as a content management system (CMS). Even if content management is the primary use of a VLE in practice, the combination of meeting room software in conjunction with this represents perhaps the greatest shift so far in how distance education can be delivered. Rather than merely granting the student access to a course page that compliments their physical class, a lecture can now be fully conducted remotely without the need for a physical classroom.

In practice some sort of hybrid model is likely to emerge even if the vast majority of the course is conducted online. Examinations for example, are likely to require student attendance on campus. Also, the physical need for a server for installations, data and recordings still remains. Yet a virtual classroom object does not come as a standard feature of any VLE. It is a separate system that may or may not work easily alongside a VLE.

2 Advantages of virtual classrooms

The question should also be raised as to whether live, synchronous lectures should simply recreate the experience college students get by attending classes as normal on campus. Flexibility in terms of travel is often marketed as the primary advantage to prospective students, but the potential exists for other opportunities to be explored as the standard lecture/tutorial model comes under significant re-assessment in recent years. Problem based

learning (PBL) for instance is now properly established as a viable delivery method [Hmelo-Silver et al 2006].

If a virtual classroom is to be used as a substitute for a standard classroom, the software should actually be capable of taking learning to levels beyond traditional approaches. One obvious enhancement is that sessions may easily be recorded. This opens possibilities for students to download and play back the sessions attended (or not attended) onto a range of devices. It has also been long established that online classrooms are particularly suited to a collaborative learning framework should appropriate technology become readily available [Hiltz 1990]. Many applications allow a facilitator to create 'breakout' rooms during the main session whereby several smaller groups can work together during a supervised session. Not all tools however offer this feature.

3 Required features of a virtual classroom

Software used to conduct meetings online is nothing new. Skype has been a VoIP success for a number of years. The creation of tools specifically made for educational purposes however is proving to be a niche market. Certain private enterprises such as *tutor.com* [Tutor.com 2010] and *tutorvista.com* [Tutorvista 2010] offer direct online tuition to a variety of students from primary level upwards. Such companies employ a network of teachers and generally develop their own software for various reasons. Not least of which is that students are charged per exact time online (usually per minute as in the case of tutor.com) rather than per course. Such companies cater to individuals and small groups. More suitable to a college environment however, is a package that can be installed and managed internally.

Adobe Connect [Adobe 2010] and MS Office communicator [OCS 2010] offer most features required for teaching, yet both are still marketed primarily as conferencing and meeting tools. This often means that some refinement is required for application to educational purposes. Neither for example, integrates easily into Moodle or any other VLE for that matter. While some features course specific, others are more generic. [Schullo et al 2007]. This section outlines some general requirements of virtual classroom tools in terms of meeting the needs of the educationalist to ensure a differentiated approach to teaching and learning. Specifically:

- VLE Integration
- Streaming and Recordings
- Breakout Rooms
- Desktop Sharing
- Microphone Sharing
- File Upload and Exchange
- Whiteboard
- Instant Messaging
- Costs

3.1 VLE Integration: One of the most popular VLEs in use is Moodle. Its popularity derives from it being open source and freely available. A survey by UK ICT agency *BESA*, concluded that Moodle was by far the most popular VLE in use within the sample secondary schools and it came third in the primary section. [Besa 2007]. Like most VLEs, Moodle does not however include a virtual classroom as part of its suite of objects.

Vendors that produce virtual classroom software often provide a web services API for potential integration into a company's enterprise system which may not even operate as a VLE. The overhead involved however in implementation and maintenance can be high. For example, *DimDim* [Dimdim 2010] provide hosted virtual classroom accounts to users free of charge as well as a paid version for more than 20 participants including recordings. They have recently released an open source version that can be installed and managed on any network [SourceForge 2008]. The open source version is not without its critics, especially since there have not been further updates since its release in 2008. This coupled with the installation and maintenance on a Linux based server means opting for open source might yield some hidden pitfalls.

Ideally, any third party online classroom software should properly integrate into Moodle (and/or a selection of established VLEs) by means of some plug-in software provided by the vendor. Students and lecturers should have the feel that the package seamlessly integrates into the VLE, even though it may operate as a separate entity as illustrated in the example in Figure 1.

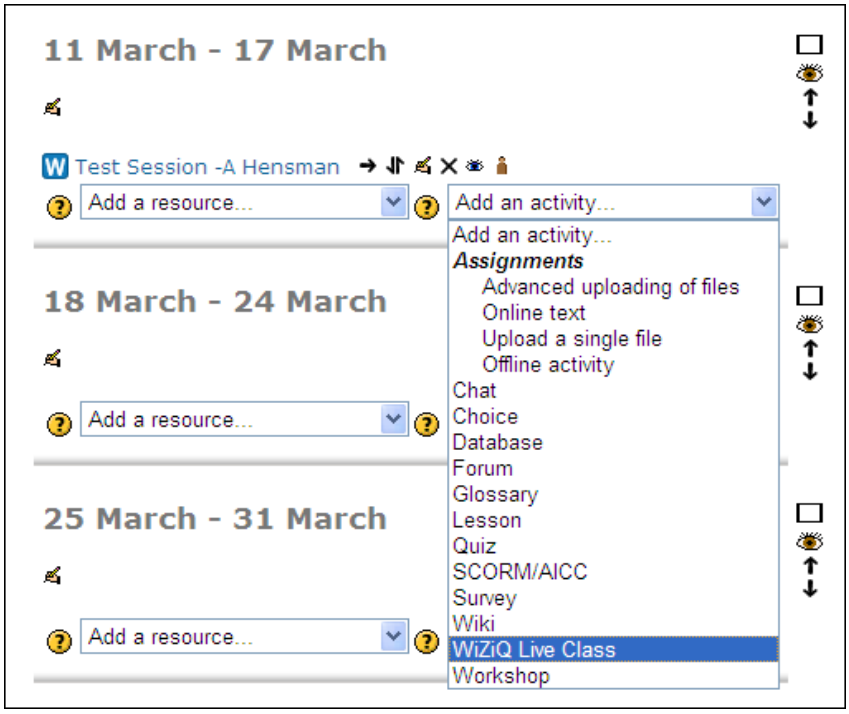

Figure 1: Adding a live WizIQ class object via Moodle

Dimdim, and *WizIQ* [WizIQ 2010] which both offer free hosted classrooms for small numbers do provide a full integration package for Moodle. *Dimdim* also has integrations for Claroline and Docebo.

Wimba [Wimba 2010] is another free hosted package that has integrations for Moodle, Angel and Blackboard. *Elluminate* [Elluminate 2010] goes further in that it currently offers integrations for Moodle, Sakai, Blackboard, Desire2Learn, PearsonLearningStudio as well as offering the standard API. The Open University now uses Elluminate Live as a replacement for an internally developed legacy synchronous collaboration system called Lyceum. [OU 2010]

Full VLE integration means that the date/time scheduler simply appears to lectures as another object when creating a new class, similar to the task of setting up an online quiz. From the student's perspective access to the class should be granted via a single sign in, i.e. a student's Moodle log in should suffice for entry into the classroom even though it is a separate entity. Figures 2 below show WizIQ adding and scheduling a live class as part of a Moodle integration.

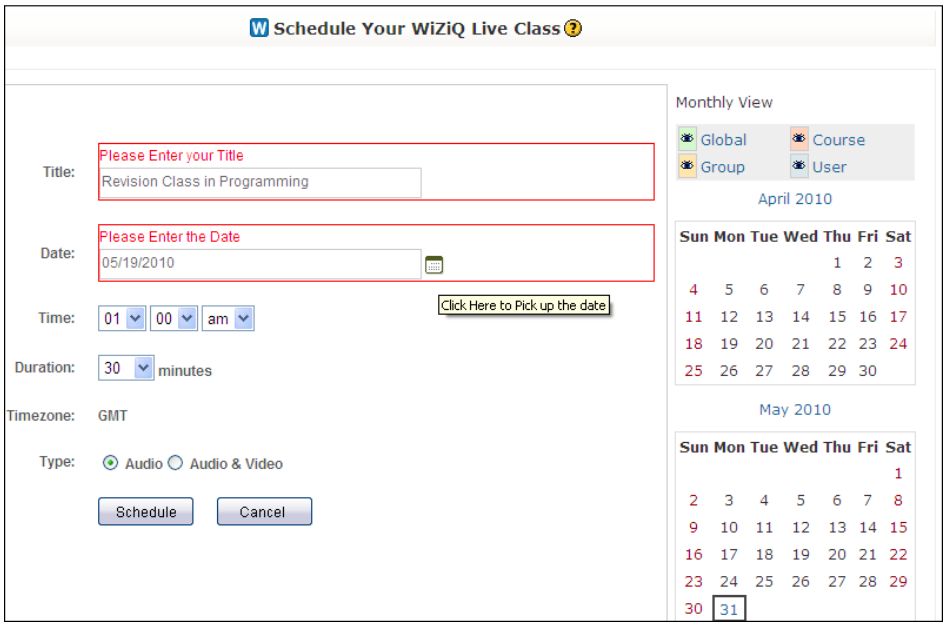

Figure 2: Scheduling a live WizIQ class via Moodle

Adobe Acrobat Connect Pro (formerly *Macromedia Breeze*) offers a wide array of features but does not yet offer any VLE integration solutions. While classes can still be represented as links to a URL, it means the additional task of setting up this URL is necessary every time a class is run by a teacher.

This could perhaps be amended by Adobe for future versions since the upgrade from the original *Macromedia Breeze* now incorporates breakout sessions making it more competitive. *Microsoft Office Communicator* does not offer moodle or any other VLE integration.

3.2 Streaming and Recordings: In some cases, an additional video/audio capture tool such as *Camtasia* may be required to record the session. This adds yet another overhead to the mix not least from the lecturer's perspective that must run the capture software separately for every new class. This approach can add confusion for even the most technically savvy facilitators. Preferably the software itself should have an option to record the session and automatically provide a file for downloading at a later stage. There should also be high quality synchronization between audio and video in the recording.

Perhaps the greatest issue in relation to recordings is storage and storage management. With so many sessions potentially recording, accessibility and optimal use of storage becomes crucial. Vendors providing hosted accounts include storage as part of their offering. *Ellimunate*, *DimDim* and *WizIq* have features that automatically convert the link created on moodle to a link to the recording once the class is complete. All three also allow users to

download this recording but further conversion to different file formats might be necessary to play back on certain devices. With the growing popularity of hand held devices and the use of mobile phones for video playback, both the ability to stream live sessions and download recordings in a suitable format becomes paramount. For example, the *iPhone* requires a plug-in to use *Adobe Connect*.

3.3 Breakout rooms: The maximum number of students allowable during a session is often a decisive factor in selecting a particular tool. However, like the traditional classroom, if real interaction between teacher and student is to take place, numbers should be kept manageable.

Since collaborative learning is becoming more applicable to a variety of courses, it should also be possible within a virtual class. During a session the facilitator should be able to move small groups of students into a breakout room and then move them back to the main session after some time. The teacher should also be able to easily step in and out of these rooms. While the effect can still be created without this feature, logistics can be cumbersome and corporate addressing of all groups at the same time is not possible.

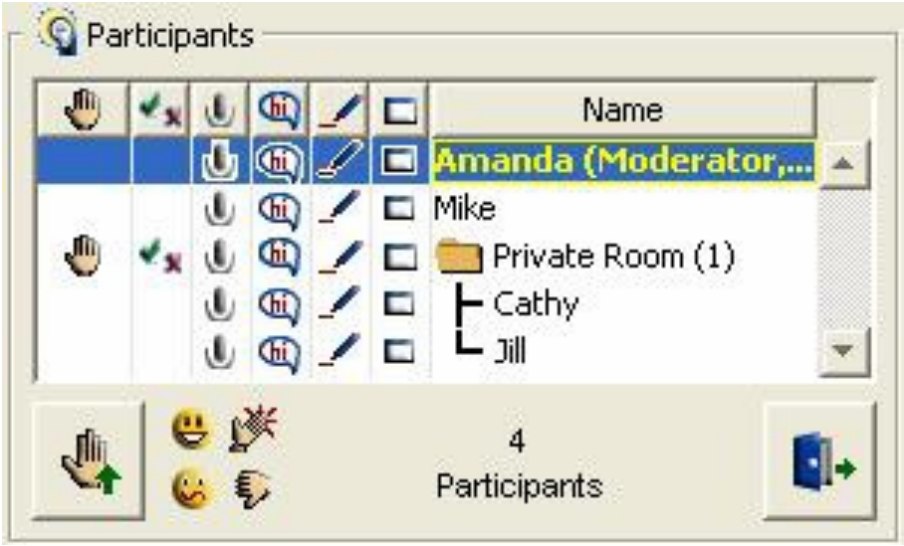

Figure 3: Elluminate's participant's window is updated with breakout rooms. [Elum BR 2006]

The breakout room feature has been severely lacking in most tools until recently. *Adobe Connect Pro* for example has only addressed the issue in its latest version. *Elluminate* and *Microsoft Office Communicator* both allow breakout rooms. Free tools such as *WizIQ* and *DimDim* which have only recently upgraded from their beta editions have a much catching up to do in this regard.

3.4 Desktop Sharing: A common use of desktop sharing is for teachers to move away from the whiteboard or presentation so that students can see what they are doing with some other application on their computer. A screen capture plug-in might be required on the presenter machine to enable desktop sharing.

This is useful for demonstrations but from the students perspective, showing work to teachers and gaining feedback is of primary importance in most learning environments. Two-way

desktop sharing is vital in recreating what is taken for granted in a physical lab class. Obviously the primary control should belong to the teacher.

Recording the sharing part of a session can be problematic not least due to the fact that it greatly increases the size of the recorded file. For some tools this part of the session is simply not included in the recording. Audio is maintained but the visuals remain blank. When desktop sharing is recorded, audio and visual is often out of sync, requiring the addition of a third party screen/audio capture tool.

3.5 Microphone Sharing: Most applications easily allow students the opportunity to speak privately with the tutor or corporately to the class with the lecturer granting access each time. *Microsoft Office Communicator* includes a feature whereby the webcam image of the current person speaking is streamed to the all other participant screens creating a very natural effect. However for all tools in low bandwidth situations, webcam video can interfere with VoIP quality and is better temporarily disabled.

3.6 File Upload and Exchange: The ability to upload and share a variety of file formats with students is fundamental to a successful virtual classroom session. Uploading should be as quick as system specifications allow and should be possible both before and during the session. Standard files such as documents and presentations along with video and other media are important for a differentiated learning experience. Fortunately most tools do in fact provide for uploading a variety of formats at various stages of a session.

3.7 Sufficiently Sized Whiteboard: Whiteboards should be of high quality in that they are sufficiently sized and a full set of tools is provided for all standard classroom requirements. Ability to save the images of the whiteboard is crucial, especially for subjects such as mathematics. Again this is a way that using a whiteboard in an online classroom relieves students of any note taking that exists in a physical lecture. Of course while interactive whiteboards installed in many college classrooms can do this, online classroom whiteboards are a less expensive option.

3.8 Instant Messaging (IM): It is often claimed in the marketing strategies of courses taught with virtual classrooms that students, who would otherwise hesitate to speak up, are given a voice online. In the case of larger classes however, instant messaging might actually serve as a distraction, as waves of questions are posted arbitrarily on the message board interrupting the flow of the lecture. This would be the equivalent of many students calling out questions at the same time in a real world classroom.

Using a system whereby students raise a virtual hand prior to posing their question would seem more appropriate then instant messaging. Microphone sharing allows the student to address a question as if in a real world classroom. It seems counter-productive that students would gain more from a situation where on one hand they continually bombard the message board and on the other, insist on private messaging the teacher during a class. Surely if proper interactivity is the goal, IM should be used in clarifying communications rather than being the primary method. It is telling that the original purpose of these tools was for business purposes rather than educational when features such as visible hand raising and emoticons suited to students are generally only being added now to the later versions. The student interaction features of *Elluminate* stand far beyond its competitors for ease of use of visible hand rising with equivalent emoticons and alternative ways to pose questions. This type of

interaction when using these tools in an educational setting is one area where further research and refinement is necessary.

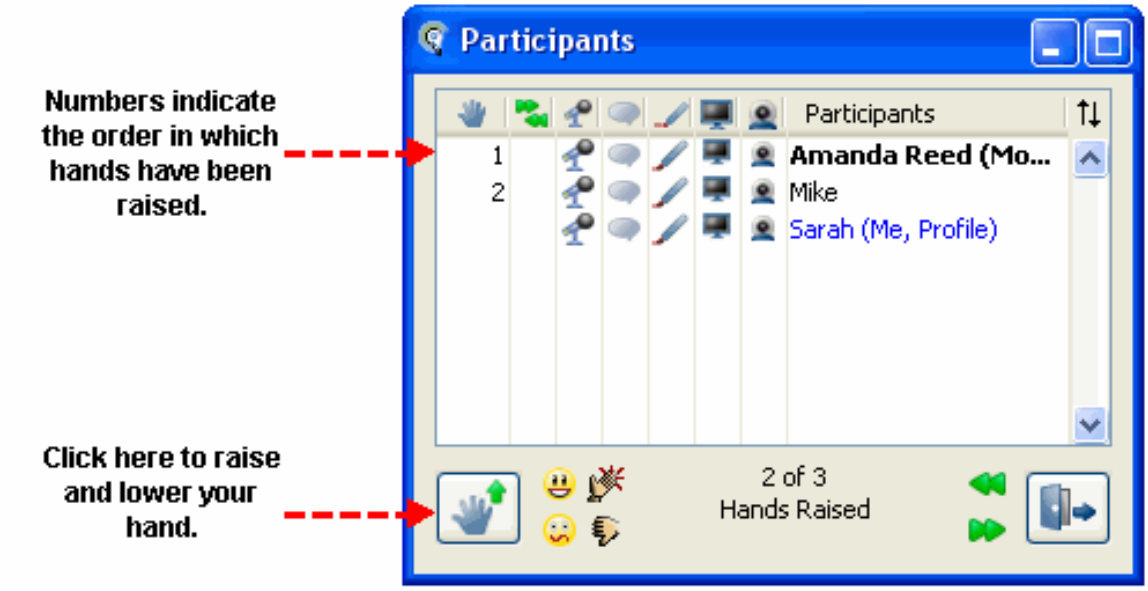

Figure 4: Elluminate's participant's window with list of raised hands and corresponding emoticons. [Elum RH 2006]

3.9 Costs: Costs vary with each vendor but usually hosted account holders are offered discounts depending on the intended number of participants and the number of classrooms required. There are educational discounts but the primary overhead is not in classroom hosting, it is for the cost of storing recordings. There are free online classrooms: *DimDim*, *Wimba* and *WizIQ*. However there is usually a cap of up to 5 participants per class and very few recordings are hosted for free accounts. Adobe Connect Pro offers a wide range of options for hosted and non hosted accounts. *Office Communicator* provides a basic educational version for a low cost, but fees increase with addition of advanced features.

4 Conclusion

This paper examined some of features an online classroom tool should feature if it is to be successful in both simulating and enhancing a natural classroom environment. Whether or not further software or class preparation is required on the part of the lecturer or the tool is easy to use, the same can results can generally be achieved. Due to the importance of VLEs to higher education, it seems reasonable that an online classroom should integrate easily into the environment. The need for breakout rooms should not be overlooked considering the increasing emphasis on collaborative learning. With the rising popularity of hand held mobile phone devices, it seems also reasonable that online classrooms become compatible with them for both playback and streaming.

When considering which tool to use, the college's IT infrastructure, student audience and technical competence of the facilitator must all be considered. From a teaching and learning perspective, there is much scope to incorporate any teaching methodology within a virtual classroom. As long as differentiated learning is achievable, there is no reason why such tools cannot at least provide the same quality as a traditional classroom. Of course, progress is

better served by trying to enhance the learning environment with technology rather than merely simulating a standard classroom.

Unlike traditional teaching, there are still no official quality assurance standards in place for teaching online. This is likely to change as the market expands. Smaller groups seem well suited to online classes as demonstrated by the many one to one tuition services. A possible niche is thus in the provision of industry standard qualifications. Courses leading to certifications in *Cisco*, *Microsoft* etc. are generally delivered to smaller groups of adult learners who can afford little disruption to their schedules. If virtual classrooms are to have a positive effect on students, further research and pedagogical studies are necessary towards optimising teaching and learning within them. The profile of a successful online teacher for example, might in the end look quite different from that of a successful classroom teacher. With the technologies currently available, such reflection is quite possible.

References

[Adobe 2010] *Adobe Connect Pro,* Adobe Systems Incorporated http://www.adobe.com/products/acrobatconnectpro last accessed June 2010.

[Besa 2007] *Personalised Learning in Schools*. British Educational Suppliers Association (BESA), conducted with the National Education Research Panel. July 2007 http://www.besa.org.uk/besa/documents/view.jsp?item=1131

[Blackboard 2010] Blackboard, Inc. http://www.blackboard.com last accessed June 2010.

[Dimdim 2010] Dimdim, Inc. http://www.dimdim.com last accessed June 2010.

[Elluminate 2010] Elluminate, Inc. http://www.elluminate.com last accessed June 2010.

[Elum BR 2006] Elluminate Live. Breakout Rooms. Quick reference Guide for Moderators.

[Elum RH 2006] Elluminate Live. Orientation. 2006 Raising Hands

[Hmelo-Silver et al 2006] Hmelo-Silver , C. E. & Barrows, H. S. *Goals and strategies of a problem-based learning facilitator*. Interdisciplinary Journal of Problem-based Learning, 1. 21-39. (2006).

[Hiltz 1990] Hiltz Roxanne*, Collaborative Learning: The Virtual Classroom Approach.* T H E Journal (Technological Horizons In Education), Vol. 17, 1990

[Moodle 2010] The Moodle Trust. http://www.moodle.org last accessed June 2010.

[OCS 2010] Office Communicator 2007, Microsoft Corporation. http://office.microsoft.com/en-us/communicator last accessed June 2010.

[OU 2010] Sclater, Niall, Case Study 2010. *OU Selects Elluminate Live!*® for Synchronous Collaboration http://www.elluminate.com/Resources/Case_Studies/Detail/7/?id=218

[SourceForge 2008] *Dimdim open source community edition, version 4.5*. SourceForge.net Dec 2008 http://sourceforge.net/projects/dimdim/files/Dimdim%20v4.5%20Release/

[Schullo et al. 2007] Schullo S, Hibelink A, Venable M, Barron AE. *Selecting a Virtual Classroom System: Elluminate Live VS Macromedia Breeze* Journal of Online Learning and Teaching (JOLT) Merlot. Vol. 3, No.4, December 2007

[Tutor.com 2010] Tutor.com, Inc. http://www.tutor.com last accessed June 2010.

[TutorVista 2010] TutorVista.com http://www.tutorvista.com last accessed June 2010.

[WizIQ 2010] authorGEN Technologies http://www.wiziq.com last accessed June 2010.

[Wimba 2010] Wimba, Inc. http://www.wimba.com last accessed June 2010.

Personality Variable of Self-Esteem and EFL Reading Comprehension

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Abstract

The contribution of psychology to the process of learning, in general, and language learning, in particular, is so pervasive that there is hardly an aspect of language learning/teaching which could not be related to psychology. Among the psychological variables involved in language pedagogy, personality factors can have great significance. The aim of the present study is to determine if there is any association between the crucial personality factor of self-esteem (self-concept) (along with the sex variable) and the reading comprehension achievement of English major university students. The instruments used were Beck Self-Concept Scale (1967), the TOEFL (Test of English as a Foreign Language, 1992), and the Nelson Standard Reading Test (1977). The findings of the analysis of two-way ANOVA revealed that the independent variables of self-esteem and sex have a significant effect on students' performance in EFL reading comprehension although their interaction (self-esteem/sex) was not significant.

Psychology and Language Learning

The need for more systematic psychology research on language learning was fully recognized and clearly expressed by Carroll in the fifties. Carroll (1953) remarks, "we are fundamentally ignorant of the psychology of language learning." He believes that educational psychology might provide helpful answers to pedagogy by carrying out research on specific questions of language learning.

Among the psychological factors affecting the language learning process, the role of the 'affective' (Brown 1973; Scovel 1978; Brown 1987; Brown 1994), or 'learner' (Swain 1977) variables can never be neglected. Chastain (1976) suggested that there appear to be different types of factors which influence the learner: in other words, "learner variables can be divided into two subcategories: intrinsic learner variables and extrinsic ones. Schwartz (1972) lists the intrinsic motivators as anxiety, need to achieve, self concept (self-esteem), and aspiration; and the extrinsic motivators as socio-cultural influences and social reinforcers. Personality characteristics (e.g., self-esteem), then, are a subdivision of the intrinsic affective or learner variables. According to Chastain (1988), the affective domain plays a large role in developing second language skills than does the cognitive because the emotions control the will to activate or to shut down the cognitive functions. Chastain (1988) believes that of all the learner variables, the most influential are those related to the learners' emotions, attitudes, and personalities. As Rivers (1981) points out, once language learning becomes more than the study of rules and paradigms, and moves toward real communication of ideas, emotions, and aspiration, dynamic and personality psychology have a contribution to make.

Although the personality factor is one of the most important attributes of a human being, its study was until recently ignored by most psychologists. Some Scholars believe that personality is what we refer to as the 'self'. Lindgren (1953), for instance, maintains that the 'self' which is the result, in part, of biological and social inheritance, and which is shaped by situations in which it finds itself, is what psychologists call the 'personality'. A distinction has been made between personality traits and personality states. Nearly all of the adjectives that can be used to summarize people's behaviour can refer either to characteristic differences

between people (traits) or to temporary fluctuations or moods within the same individual i.e. by personality we refer to traits rather than states.

Although it is interesting simply to describe and to assess personality, it is also important to determine its origins and the causes of permanence and change. It is generally believed that a great deal more of normal personality functioning is due to genetic influences (e.g., Goldsmith 1983, Roediger et al. 1987). Bouchard et al. (1990) in a study of adult identical twins who were separated at birth and raised apart concluded that although the emotional environments in which these identical twins were brought up differed notably, their profiles on objective personality questionnaires are very similar and they are more similar than genetically unrelated individuals who are reared in the same home. In another interesting study by Gupta (1990) it was shown that the individual's blood group, as a genetically-based characteristic, is closely related to the personality variables and can be a determining factor in predicting one's behaviour.

Some psychologists (e.g., Cook 1984) believe that personality is what we call as self-esteem or self-concept. In fact, humans have two gifts animals lack: one is language, the other is self-awareness. Humans after the age of two or so, start to have some ideas of who they are and how they want others to see them i.e. they develop a concept of 'self'. Cook (1984) asserts that personality is not an elusive set of traits or factors, nor a vast bundle of habits, nor the ever-shifting phenomenal field; it is how the person sees himself or herself i.e. his or her self-concept. According to Brown (1987), people derive their sense of self-esteem from the accumulation of experiences with themselves and others from the assessments of the external world around them.

The concept of self-esteem can be very much related to the learning process, in general, and language learning, in particular (Krashen 1988, Heyde 1987, Lu 1983, Oller et al. 1977, Brodkey & Shore 1976, Gardner & Lamber 1972). Second or foreign language learning situations are not an exception i.e. the association between self-concept and second language learning is so pervasive that the learner starts to develop a new 'language self or ego' while learning a new language and its four skills. The relationship between self-concept and reading as an important language skill has been investigated by a few researchers (e.g., Wattenberg & Clifford 1964, Lamy 1965, Strang et al. 1961, Weingarten 1958) who are mostly concerned with children learning to read their native language rather than with learners involved in learning to read in a second or foreign language. In the present research study an attempt is made to investigate if there is an association between the EFL students' reading comprehension achievements and the concept they have developed of their own selves and their sex variable.

Method

Subjects: The participants under study were 180 university students (90 male & 90 female, each with 45 low self concept & 45 high self concept subjects) from different English language departments in Tehran. The subjects were randomly selected from a large group of 578 undergraduate students majoring in English as a foreign language and were matched on intermediate level of language proficiency based on the scores they obtained on the 1992 version of TOEFL (Test of English as a Foreign Language). The students served as the subjects of the present investigation were categorized into four male and female high/low self-concept groups on the basis of their scores on Beck Self-Concept Scale (1967).

Instrumentation: To fulfill the objective of this study i.e. to determine if there is any correlation between the EFL students' level of reading comprehension ability and their self-concept (self-esteem) along with the sex variable, the following instrumentations were utilized:

1. The Test of English as a Foreign Language (TOEFL) (1992) was employed to match the students on intermediate level of language proficiency. The test was in multiple-choice form with 150 items consisting of listening comprehension (50 items), structure and written expression (40 items), and vocabulary and reading comprehension (60 items) sections.

2. To determine the students' level of self-concept as a personality variable, Beck Self-Concept Scale (1967) was used. This psychological test of self-concept had 25 items each with five choices. There was no right or wrong answer and the choices acted as independent items i.e. the test actually had 125 items. All the choices were in the form of sentences and were given weights ranging from 1-5. The lowest score of the test was 25 meaning that the student with this score selected all the choices with he weight of 1 and, therefore; had the lowest level of self-concept, and the highest score was 125 i.e. the student who obtained this score selected all the choices with the weight of 5 and had the highest level of self-concept among the subjects. The self-concept test validity and reliability established by psychologists are given in the following Table (Table 1). The self-concept test was validated with Rosenberg Self-Esteem Scale (1979).

Reliability	Internal Consistency	0.80
	Test-Retest	0.80
Validity	Concurrent	0.55

Table (1): Beck Self-Concept Scale Reliability & Validity

3. To investigate the students' reading comprehension ability, the level C version of the Nelson Standard Reading Test (1977) was utilized. The test was in multiple-choice form and consisted of 70 items (29 vocabulary & 41 reading comprehension items).

Design

As the study consisted of two main independent variables (self-concept & sex) each with two levels and one dependent variable (reading comprehension), a two by two factorial design was worked out to determine the effect of not only each individual variable but also the two variables interaction on EFL students' reading comprehension. The design can be schematically represented as follows:

Sex Self-Concept	Male	Female
High	G1	G2
Low	G3	G4

G1 = Group 1 = High Self-Concept Male Students
G2 = Group 2 = High Self-Concept Female Students
G3 = Group 3 = Low Self-Concept Male Students
G4 = Group 4 = Low Self-Concept Female Students

Procedures

To be on the safe side three null hypotheses were formulated. The null hypotheses indicate that there is no correlation between the two independent variables (self-esteem & sex) or even the interaction of these two variables and the dependent factor of reading comprehension achievement. To collect the data required for rejecting or supporting the null hypotheses stated in the study, the three tests (the Beck Self-concept Scale, TOEFL, & Nelson Reading test) were administered among the EFL students. One week before test administration, the students' instructors were consulted and arrangements were made. In addition, the research project and the procedure for administering the tests were explained in detail for them. The subjects were already informed that they would be given some tests and to make sure that they answer the TOEFL and reading comprehension test carefully, they were also informed that the tests would affect their class grades. The administration of the tests took place in two sessions with one week interval. In administering the tests, the extraneous factors such as time and classroom were controlled and the necessary directions and instructions for completing each test were explained for the participants and they were asked to indicate their sex and age on their answer sheets. To assure the students of the anonymity of their responses on the psychological test of self-concept which consisted of private questions regarding their personality characteristics, the subjects being assigned identification (code) numbers were required to write their names just on TOEFL and reading test and not on the self-concept scale. In this way students could answer the psychological test questions more honestly. The researcher, too, could match the three tests through the identification numbers on them.

Results & Discussion

After providing separate tables of frequency for the four groups, the mean and standard deviation of each group self-concept and reading scores were computed (Table 2). The maximum and minimum scores of the students on Beck self-concept scale and reading test are presented in Table (3). Table (4) demonstrates the statistical analysis of two-way ANOVA for the students' scores in reading comprehension ability in the four groups related to self-concept and sex.

Group	Self-Concept (Self-Esteem)		Reading	
	Mean	SD	Mean	SD
G1	89.84	7.55	40	13.92
G2	83.80	6.98	34.53	14.86
G3	70.20	7.33	29.40	11.89
G4	65	10.26	23.80	10.40

Table (2): Mean & Standard Deviation of the Four Groups' Self-Concept & Reading Scores

	Self-Concept (Self-Esteem)		Reading	
Group	Max. Score	Min. Score	Max. Score	Min. Score
G1	103	76	61	8
G2	116	76	63	11
G3	75	43	58	7
G4	75	37	55	5

Table (3): Maximum & Minimum Self-Concept & Reading scores of the Four Groups'

Source of Variation	Sum of Square	Degree of Freedom	Mean Square	F-ratio observed	Signif. of F (P Value)
Between Groups	6497.800	2	3248.900	19.552	.000
Self-Concept (A)	5120.000	1	5120.000	30.813	.000
Sex (B)	1377.800	1	1377.800	8.292	.004
A × B	.200	1	.200	.001	.972
Within Groups	29245.20	176	166.166		
Total	35743.20	179	199.683		
P < .05	**n = 180**		**F critical = 3.89**		

Table (4): Two-Way ANOVA for Gains in Reading Comprehension Ability of the Students in the Four Groups related to Self-Concept & Sex

A careful study of the ANOVA Table (Table 4) shows that the F-ratio observed for the personality variable of self-esteem (self-concept) (factor A) is 30.813 which is much greater than the F critical value of 3.89 at .05 probability level. This indicates that the null hypothesis (the EFL students' self-concept has no significant impact on their reading comprehension ability) can be rejected with the significance of F or probability value of .000 which is much less than .05 probability level. Therefore, self-concept has an important effect on EFL students' performance in reading comprehension.

The F value of 8.292 for the second independent variable or better to say moderator variable of sex (Factor B) exceeds the F critical value (3.89) which justifies the researcher to claim that female and male students have made different gains in reading comprehension. In this way, the second null hypothesis (the sex of the EFL students has no significant role in their reading comprehension performance) in the present study is rejected with significance of F or probability value of .004 which is again less than .05 probability level. The third hypothesis (the combination of self-concept and sex has no significant effect on EFL reading comprehension), however, cannot be rejected since the probability value (significance of F) equals .972 which is much greater than the probability level of .05. In addition, the F-ratio of .001 does not exceed the F critical value. Consequently, the researcher can safely assume that the interaction of self-concept and sex has no significant impact on EFL students' reading comprehension ability. This provides a stronger support for the significance of each independent variable effect on the dependent variable of this study.

Although up to this point it was supported that there is a significant association between the personality variable of self-esteem and sex and the language skill of reading, it was not clearly determined where the difference was i.e. it was not known which of the four groups performed significantly different from the rest. To investigate where exactly the difference or the significant effect took place, Case II t-test statistical technique (Hatch & Farhady, 1982) was employed twice. The results of the first t-test analysis which was performed to compare reading comprehension mean scores of the high self-concept male students (Group 1) and high self-concept female students (Group 2) are demonstrated in Table (5) below:

Group	Mean	SD	t-observed	2-tail Probability Value
G1	40	13.92	1.80	.075
G2	34.53	14.86		
P < .05	n = 90		d. f. = 88	t-critical = 1.98

Table (5): T-test for Comparing Reading Comprehension Gain Scores of Male and Female High Self –Concept Groups

As the findings of Table (5) indicate, the t-observed value of 1.80 is not greater than the t-critical value (1.98) with 88 degrees of freedom and the 2-tqil probability value is .075 which exceeds the probability level of .05. These results reveal that high self-concept male students did not perform significantly different from the students in high self-concept female group. To compare the performance of low self-concept male students (Group 3) and low self-concept female students (Group 4) in EFL reading comprehension, the second t-test analysis was carried out. The findings are presented in the following Table (6).

Group	Mean	SD	t-observed	2-tail Probability Value
G3	29.40	11.89	2.38	.020
G4	23.80	10.40		
P < .05	n = 90		d. f. = 88	t-critical = 1.98

Table (6): T-test for Comparing Reading Comprehension Gain Scores of Male and Female Low Self –Concept Groups

As clear from Table (6), the t-observed value of 2.38 exceeds the critical value and the 2-tail probability value of .020 is much less than .05 probability level. This indicates that low self-concept male students' performance in reading comprehension was significantly different from that of low self-concept female students.

As the findings of the analysis of two-way ANOVA in the present study demonstrate, the first two null hypotheses were rejected i.e. the personality variable of self-esteem and sex have significant correlation with the EFL students' reading comprehension performance. However, the third hypothesis regarding the interaction effect of the two independent variables (self-esteem & sex) on reading achievements, was not rejected, which, provides a stronger support for the significance of each independent variable effect. The results of the two t-test analyses reveal that male students benefiting from having a higher level of self-esteem obtained higher mean scores in the reading test than the female students, although the highest self-concept and reading scores among the subjects in the study were obtained by female students. The significant difference took place in the low self-esteem groups (G3 & G4) where low self-concept male students' performance in reading comprehension was significantly better than low self-concept female students.

Implications

The first implication of the present study is for curriculum and syllabus design. As Mouly (1976) maintains, there is a need to set the curriculum more in line with self-concept of students. According to him, education which limits itself to the manipulation of the external

environment and does not take the psychological and personality characteristics of the students particularly their phenomenal self-esteem into consideration, is doomed to failure. Much of the trouble in schools curriculum stems from attempts to work at activities which do not provide enhancement of the personal 'self' or which provide enhancement through such indirect means as grades and external rewards to the point that the learner is ego-involved in the rewards but not in the learning. If curriculum development is directed toward enhancing the students' self-esteem, even if there are some problems concerning the educational materials, facilities, etc., students will be successful in learning a foreign language and its reading comprehension skill which is sometimes considered as the most important language skill in foreign language learning situations. Along the same lines, designing a syllabus i.e. the specification of the content of a course of instruction and the order of presenting the content should provide the students with different ways of psychological and personality development and forming an appropriate language ego.

The results of the present study also carry some important implications for materials development especially in the area of reading comprehension which is the main concern of the study. Providing the students with materials geared to their independent and instructional levels and directing them toward obtainable goals will give them opportunities to achieve success, to enhance their level of self-concept, and as a result improve in reading comprehension.

The present study can have practical implications for teachers and language teaching methodology development. In educational environments, the learner is the center of all learning activities and any teaching method which does not take the learner and his individual characteristics into consideration will turn out to be a failure. Unfortunately, so far self-esteem significance has not been fully appreciated by teachers. Traditional methods of teaching language paid more attention to the features of language, the materials taught, or the way they were presented rather than to the learner and his individual characteristics. Recently with the increasing awareness regarding the 'learner variables' and the crucial role of the psychological and personality characteristics of the learners in educational activities, new techniques and methods of teaching should be devised.

References

Beck, A. T. 1967. **Depression: Clinical, Experimental, Theoretical Aspects**. New York: Harper & Row.

Carroll, J. B. 1953. **The Study of Language: A Survey of Linguistics & Related Discipline in America**. Cambridge, Mass.: Harvard University Press.

Brown, H. D. 1973. "Affective Variables in Second Language Acquisition." **Language Learning**, 23: 231-244.

Brown, H. D. 1978. **Principles of Language Learning & Teaching**. Englewood Cliffs, N. J. Prentice-Hall, Inc.

Brown, H. D. 1994. **Principles of Language Learning Teaching** (Third Edition). Prentice-Hall, Inc.

Scovel, T. 1978. "The Effect of Affect on Foreign Language Learning: A Review of the Anxiety Research." **Language Learning**, 28 (1): 129-142.

Chastain, K. 1976. "First-Language Learning." In K. Chastain, **Developing Second Language Skills: Theory to Practice** (2nd ed.). Boston: Houghton Mifflin.

Chastain, K. 1988. **Developing Second Language Skills**. Harcourt Brace Jovanovich, Inc.

Schwartz, L. 1972. **Educational Psychology: Focus on the Learner**. Boston: Holbrook

Press.
Rivers, W. M. 1981. **Teaching Foreign Language Skills**. University of Chicago Press.
Lindgren, H. C. 1953. **The Art of Human Relations**. New York: Hermitage House.
Goldsmith, H. H. 1983. "Genetic Influences on Personality from Infancy to Adulthood." **Child Development**, 54 (2): 331-355.
Roediger, H. L., P. Rushton, E. Deutschcapaldi, & S. G. Paris. 1987. **Psychology**. Little, Brown & Company.
Bouchard, T.J., D. T. Lykken, M. McGue, N. Segal, & A. Tellegen. 1990. Sources of Human Psychological Differences: The Minnesota Study of Twins Reared Apart. **Science,** 250, 223-228.
Gupta, S. 1990. "Blood Groups & Personality Characteristics." **Personality & Individual Differences**, 11 (3): 317-318.
Cook, M. 1984. **Levels of Personality**. Holt, Rinehart & Winston, Inc.
Krashen, S. D. **Second Language Acquisition & Second Language Learning**. Prentice-Hall International (UK) Ltd.
Heyde, A. 1987. "The Relationship Between Self-Esteem & Oral Production of a Second Language." In H. D. Brown (Ed.), **Principles of Language Learning & Teaching**. Englewood Cliffs, N. J.: Prentice-Hall, Inc.
Lu, C. 1983. "The Self-Concept Characteristics of Gifted Students." **Bulletin of Educational Psychology**, 15 (1-3) 111-126.
Oller, J., A. Hudson, & P. Liu. 1977. "Attitudes & Attained Profiiency in ESL: A Sociolinguistic Study of Mexican-American in the Southwest." **TESOL Quarterly**, 11: 173-183.
Brodkey, D., & H. Shore. 1976. "Student Personality & Success in an English Language Program." **Language Learning**, 26: 153-159.
Gardner, R. C. & W. E. Lambert. 1972. **Attitudes & Motivation in Second Language Learning**. Rowley, MA: Newbury House Publishers.
Wattenberg, W. W. & C. Clifford. 1964. "Relation of Self-Concept to Beginning Achievement in Reading." **Child Development**, 35: 461-467.
Lamy, M. W. 1965. "Relationship of Self-Perception of Early Primar Children to Achievement in Reading." In I. J. Gordon (Ed.), **Human Development: Reading in Research.** Chicago: Scott, Foresman & Company.
Strang, R., C. M. McCullough, & A. E. Traxler. 1961. **The Improvement of Reading**. McCraw-Hill Book Company, Inc.
Weingarten, S. 1958. "Reading as a Source of the Ideal Self." In O.S. Causey (ED.), **The Reading Teacher's Reader**, Ronald Press Company.
Rosenberg, M. 1986. "Self-Concept From Middle Childhood Through Adolescence." In J. Suls & A. G. Greenwald (Eds.), **Psychological Perspectives on the Self,** (Vol. 3). Hillsdale, NJ: Erlbaum.
Mouly, G. J. 1967. **Psychology for Effective Teaching**. Holt, Rinehart & Winston, Inc.

The Noun Phrase in Bamunka: Towards a Complexity Analysis.

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Abstract

A member of the the Grassfields Bantu family, the Bamunka language of Western Cameroon is spoken by approximantely 31, 000 speakers. Having begun the process of transcribing the lanaguge into written form just six years ago the principles and intricacies of its grammatical system are becoming evident. This paper will look in particular at the noun phrase in Bamunka and draw some conclusions as to the distribution of complexity found therein.

1. Introduction

One common assumption in linguistics is that all human languages are equally complex and that when taken as a whole, no language can be called "simpler" than another (Edwards, 1994). It has been proposed that "all languages have a complex grammar: there may be relative simplicity in one respect (e.g. no word endings), but there seems always to be relative complexity in another (e.g. word-position)" (Crystal,1987:6-7) From this point of view, it is generally supposed that these differences must "even out" as one considers entire linguistic systems (ibid). This equal complexity hypothesis has come under scrutiny in recent times however, notably in McWhorter's (2001) claim that "creole grammars are the world's simplest grammars," McWhorter argues that while one language may be more complex than another in terms of a particular area of grammar there is no a prioi reason to assume that all languages ultimately "tally" in terms of areas of typologically unusual complexity (McWhorter, 2005:40). He examined these under the headings such as syntax, grammaticalsed expression and inflectional morphology (McWhorter, 2005).

We will examine the layered structure of the Bamunka noun phrase in light of a number of these aspects of linguistic complexity. The language data was collected during a field trip to the Bamunka village in the Ndop plain of Cameroon. Two native speakers acted as language informants providing a diverse range of material suitable to the relevant grammatical categories. This preliminary study[1] at the focused level of the noun phrase may prove a starting point for more in depth future research in the field of Bantu langauges and complexity.

2. Bamunka and the Bantu Languages

2.1 The Bamunka language

The Bamunka language is one of 279 indigenous languages of Cameroon. Cameroon is situated in West Africa, it has a population of approximately 18 million people and its official languages are French and English. It is the second most linguistically diverse country in Africa, the first being Nigeria with approximately 450 languages. The Bamunka language is spoken in the village of Bamunka and is one thirteen languages spoken in the Ndop Plain. The Bamunka villages, one of the thirteen villages in Ndop, has a population of 200, 000 people.

[1]I am indebted to Jon Blackwell of SIL for his contribution to the research, in particular for our joint work on the Adjective in Bamunka.

Figure 2.1: Map of Africa/Cameroon

The Ndop Plain, in the North West Province of Cameroon, is at an altitude of 1150 metres, surrounded by mountains which in the North rise to 1700 metres. It is approximately 30 km square and has a number of lakes. The plain has about 200, 000 inhabitants and the village of Bamunka comprising just over 30, 000 of these.

Figure 2.2: Cameroon [The Ndop plain is found in the northwest in proximity to Bamenda]

Bamunka is a part of the Niger-Congo family of the Grassfields Bantu languages. It is a minority language which is mutually understood in the various quarters in which it is spoken. It is estimated to have 31,000 speakers (Ethnologue, 2008). Bamunka remains the mother tongue in the areas which it is spoken. As families move towards the town of Ndop, however, a number of the children do not learn Bamunka as their first language (Sorsamo, 2008).

The Bamunka orthography was developed between the years 2004 and 2006. Over a period of six years a growing lexicon of words and an increasingly refined noun class system has been developed. While there is on-going work on the language, a completed grammar sketch has yet to be conducted.

The word order in Bamunka is generally SVO. As noted by Sorsamo (2008:3) morphological processes of verbs include tense and aspect marking by using auxiliary verbs and grammatical tone. In addition to past, present and future tense divisions, these may be further subdivided. For instance, six past tenses have been identified ranging from the simple past tense (ST), to the progressive past tense (PP), to the far past (P4) (actions/events that have occurred at some point in the distant past). New verbs in this language may be derived from verb roots by using various suffixes (Sorsamo:2008). Bamunka nouns are organised using a class system based on Bantu noun classification. These are expressed using different affixes which are attached to nouns and noun phrases.

2.3 The Bantu language family

2.3.1 The Bantu language group

The Bantu language group covers the area from Southern Cameroon to almost the whole of Southern Africa, including then Eastern and Central Africa. This is a family of hundreds of languages whose number of speakers is close to 240 million. Nearly one third of all Africans speak a Bantu language as their native language (Nurse, 2001). The majority of Bantu languages are tonal and many have complex tonal phonologies (Nurse and Philippson,2003).

2.3.2 Grassfields Bantu

Grassfields Bantu (GB) is a cluster of over fifty languages spoken in the West and North-western Provinces of Cameroon (Watters, 2000). In terms of the external classification of the GB languages findings suggest that there is no clear boundary between traditional Bantu and GB Bantu (Henrici, 1973). It is commonly accepted however that, alongside a number of language clusters in the Cameroon-Nigeria region, GB languages are the nearest cousins of Guthrie's Bantu (Watters, 2000). The internal unity of GB is largely accepted with Stallcup (1980a:54) suggesting a 60% lexical similarity, while Piron (1995:16) claims a 41% similarity. Watters and Leroy (1989) proposed a graded division of these languages as illustrated by the following diagram. This was later supported by Piron (1995).

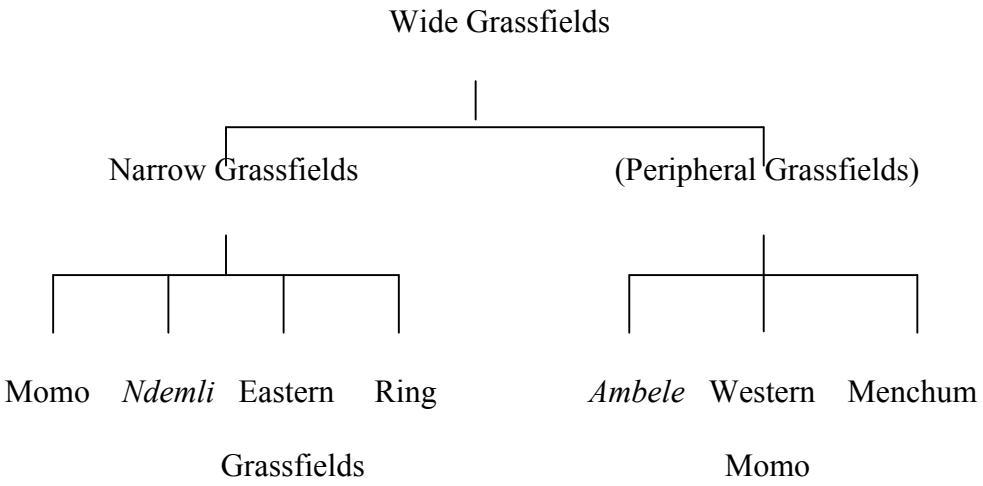

Figure 2.1: Piron's internal classification of Wide Grassfields (branch average method) (Individual languages in italics.) From Watters, 2000:5.

With regard to vowels, Elias et al (1984:41) identified seven vowels which are the most likely proto-system for Grassfields Bantu overall. Watters (2000) outlines commonalities in the system as follows. Long vowels and diphthongs are common in GB. In terms of consonants, stops usually involve the opposition between the voiceless set / p t k / and the voiced set / b d g /. Fricatives include / f s / with some varieties also using / v z ɣ /. Semi-vowels (glides) are almost universal. The nasal set can include /m n ɲ ŋ/. The palatal nasal /ɲ/ occurs less frequently and its phonological status is often unclear. The above consonants all occur in the initial consonant position of the syllable. In contrast, the final consonant position of syllables, and stems, limits the consonants. Rather than fifteen to twenty-five consonants, only one to eight occur in the final position (ibid:20).

Grassfields Bantu languages exhibit highly complex tone systems. They have generally been divided into a tone system of two tone levels, High (H) and Low (L) (Greenberg 1948 and Meeussen 1967:84). Verbs are divided into two classes: those with High tone and those with Low tone while nouns have been divided into four classes, all with Low tone prefixes: L-LL, L-LH, L-HL, L-HH (Watters, 2000).

2.3.3 The noun class system

One distinct feature of the GB languages is its complex method of classifying nouns. Noun classes are used across the Bantu languages to categorise their nouns and allow for a clear organisation of people, things and concepts. Whereas the original Bantu class system was based on commonalities in meaning, today classes are distinguished along the lines of grammatical categorisation (SIL Cameroon, 2005). Such critieria encompass the form of a noun and its agreeing elements.

A common 'pattern of agreement' across Bantu classes would include a group of nouns with a common affix along with common modifiers. Most nouns can occur with both a singular and a plural affix. Singular and plural noun classes of the same noun root may be grouped into a pair known as 'gender paring'. Gender in the case of noun classes refers to grammatical rather than biological gender (SIL Cameroon, 2005). Bantu noun class

numbering systems have been designed to enable linguists to make general observations as to the degree to which the noun system of Bantu are similar (ibid). The following outline lists the types of nouns which are usually found within particular Bantu genders. However other types are possible and, as has been noted, nouns should not be classified in this way on the basis of meaning.

Classes	Common Types of Nouns
1/2	Names of persons
3/4	Trees
5/6	(Paired) body parts
6a	Liquids, noncountable goods
7/8	Tools, plants and things made
9/10	Animals, kinship terms
14	Abstract notions
15	Actions (verb infinitive)
19	Small things

Table 2.1: Bantu Noun Classes (SIL Cameroon, 2005)

2.4 Summary

The Bamunka language, also commonly known as 'Ngiemәkɔ'kə', is spoken in the village of Bamunka in NorthWest Cameroon. A member of the Bantu family, which stretch from Southern Cameroon to Southern Africa, it will provide the data for this study of language complexity within the parameters discussed. Next we will examine the Bamunka Noun Phrase in greater depth.

3. The Noun – Layered Structure of the NP

3.1 Introduction

A common feature of the Bantu languages is its class based noun system. Nouns are grouped together on the basis of common affixes and concord consonants. This is present in the Bamunka language. Common features include the attachment of class based affixes on root nouns in order to form possessives and demonstratives. Various other aspects of the noun including number and comparison will also be discussed.

3.2 Noun class system

Bamunka has a complex system of declension in that nouns decline depending on what noun class they fall into. The noun class system used is based on that of the Bantu noun class numbering system, discussed above. There are different classes for the plural as opposed to the singular but they are also grouped together into gender pairs. A preliminary outline of the Bamunka noun class system is as follows:

Class	Affix	Concord Consonant	Concord Tone
1	∅	Y	Falling
2	bə-	B	Level
5	∅	Y	Level
6a	-mə	M	Level
7	-kə	K	Level
8	-bə	B	Level
9	∅, n-	Y	Falling
10	-hə	H	Level
13	-tə	T	Level
19	-hə	H	Level

Table 3.1: Bamunka Noun Class System

Nouns may be further subdivided into singular and plural classes as in Table 3.2

Singular Classes	Plural Classes
1	2
5	6a
7	8
9	10
	13
19	

Table 3.2: Singular and Plural Classes in Bamunka

Gender pairings refer to the particular pairing of a singular noun class with a plural noun class. That is to say that nouns from a specific singular class 'pair up' with nouns form a specific plural class to form a gender (SIL Cameroon, 2007). Nouns that belong to the same singular class may pair with different plural classes. This is common across Bantu languages that genders are not referred to as 'masculine' or 'feminine' but rather are identified by the

numbers of the classes that are paired together. The gender pairings in Bamunka are as follows.

Gender pairings
1 /2
5 / 2
9 / 2
7 / 8
9 / 10
19 / 6a

Table 3:3 Gender Pairings in Bamunka

As mentioned previously, while nouns which fall into the same category may have similar meanings, their allocation into a particular class should not be on this basis. The justification for choosing each of the above noun classes is based on criteria such as similar affixes and concord elements.

Having examined the aspects of the Bamunka noun class system we will now go on to look at the category of case.

3.3 Case

Case is a grammatical category determined by the syntactic or semantic function of a noun or pronoun (SIL.org:2010). The following is a preliminary look at the category of case in the Bamunka language.

Nominative

This case is straightforward in its expression with the use of a determiner followed by the appropriate noun.

(1) Mbʉ chu lɔŋ
The:det mouth:N fence:N
LIT: The mouth (of the) fence.
The gate

(2) Mbʉ wo
The:det man:N
The man

Genitive

The marking of the genitive case appears to be a matter of order. One noun follows the other with the context disambiguating as to whether the genitive case is being used or not.

(3) Mbʉ ŋkwe chu lɔŋ
The:det handle:N mouth:N fence:N
LIT:The handle (of the)mouth fence
The handle of the gate.

(4) Mbʉ tia mbʉ wo
The:det head:N the:det man:N
The head of the man

(5) Mbʉ fuŋkə tyʉkə
The:det feather:N tree:N
The leaf (of the) tree

(6) Mbʉ kefuŋ kətyʉ
The:det feather:N tree:N
The leaf (of the) tree

It is notable to see there is noun reversal in example 6 above. This phenomenon will be discussed further under section 4.9 Adjectives.

Dative

In order to indicate the noun to whom something is given, the most common method in Bamunka is to use the preposition tə.

(7) Mɔ kɔ shia-ɔ tə Sam
I give:V:ST hat:N-my:Poss to Sam:N
I gave my hat to Sam

(8) Mɔ mɔ' mbʉ botə tə-ɔŋ
I throw:V:ST the:det ball to-him:Pr
I threw the ball to him

Accusative

(9) Ɔ kwɔŋ Tom
He hit:V:ST Tom:N
He hit Tom

Ablative

(10) Mɔ tənə mbʉ chu lɔŋ
I stand:V:ST near mouth:N fence:N
LIT:I stood near mouth (of the) fence
I stood (by) the gate

(11) Ɔ to' ghɔŋ Joe
He walk:V:ST with Joe:N
He walked with Joe

(12) Mɔ yu nə bəŋkə
I eat:V:ST with spoon:N
I ate with (a) spoon

It is important to note that another word, nə, is used here for with. Possible reasons could include alternate usage for animate vs. inanimate nouns, though this has not been confirmed. The above observations of Case, as has been noted, are merely a preliminary look at this topic. The cases mentioned do appear to exist in the language. However it seems that in certain situations the context is used to disambiguate which case is being used as we see in the Genitive case above.

3.4 Number

The noun exists in both singular and plural form. Plurals may be formed by the attachment of an affix or in some cases an alternative word is used, as in (b), Table 3.4, below. Plural nouns must agree with the plural noun class into which they fall. For example, the plural of book (ŋwɔ'nə) in example (a) below takes the class 2 plural prefix bə. We see similar grammaticalisations in (c) and (d) below with the use of class based plural marker tə, mə and hə respectively. Example (b) illustrates a rarer case in which the plural takes a different form completely to the singular noun.

	Singular	**Plural**
(a)	ŋwɔ'nə	bəŋwɔ'nə
	book:N	PM:book:N
	book	books
(b)	wo	bʉə
	man:N	men:N
	man	men
(c)	fʉəŋ	fʉəŋtə
	Leg:N	leg:PM:N
	leg	legs
(d)	nuɔhə	nuɔmə
	bird:N	bird:PM:N
	bird	birds

Table 3.4: Singular and Plural Bamunka Noun

3.4.1 Numerals

Both cardinal and ordinal numbers are utilized in the Bamunka language. They are not based upon the noun class system and can both precede and follow the noun in question.

3.4.1.1 Cardinal Numbers

Numbers appear to both precede and follow the noun. The numbering system does not appear to be based on class, nor does there appear to be a human/non-human distinction in this system.

Class 1

(13)	Wo	mɔ'	nɔ	bɛ	səfia
	Person:N	one	is	be:V	road:N
	One man is on the road				

Class 2

(14)	Bətambʉətə	nɔ	bɛ	mu	yu	mbuuə	itia.
	Doves:N	is	be:V	in	sky	number	three
	There are three doves in the sky						

(15) Mɔ nɔ kie beliŋ itia bɛ bəke
I is have:V sibling:N three be women
I have three sisters

One must specify the gender in example (15) here as the same root word is used for brother/sister.

Class 3

(16) Mbʉ njaa nɔ kie chyusiitə itaa
The:Det house:N is have doors:N five
The house has five doors

Class 19

(17) Buu bʉə nɔ bɛ mutɔ
Two people:N is be:V field
Two people are in the field

3.4.1.2 Ordinal Numbers

Ordinal numbers exist from first to third. After that, the sentence is structured so that the number that has gone before are used to indicate the person/objects etc numeric position in the context given. Again ordinal numbers can both precede or follow the noun, the reasons for one position or the other is not clear and it may just depend on dialect or personal preference.

(18) Mbʉ fəŋ kəchi skul nɔ bɛ Mbikʉə
The:Det first day school:N is be Mbikʉə
The first day of school is Mbikʉə.

In the above example, due to the presence of an eight day week in the village of Bamunka, the day of the week mentioned cannot be directly translated.

(19) Mary nɔ' kə bɛ biitə wokə
Mary:N P5 be second person:N
ndɔmə gɛ
who/that leave
Mary was the second person to leave

Alternatively, one could say:

(20) Biitə wokə nɔ' kə bɛ Mary ndɔ mə
Second person:N P5 be Mary RC1 one
gɛ
leave
Mary was the second person to leave

(21) Mɔ nɔ' kə bɛ gwe bɔŋ bʉə tia ndɔ
I P5 be come behind people three RC1
mə yu
one eat
I was the fourth person to eat

3.5 Comparison

The positive, comparative and superlative exist in Bamunka. They do not exist in all words however, such as, loud/louder/loudest or fast/faster/fastest. The latter cases are generally disambiguated by the given context of the conversation. Some commonly found examples are illustrated in table 4.5 below

(a.)	gʉə	kwa gʉə	kɛŋ gʉə
	big big	Com:big bigger	Sup:big biggest
(b.)	tʉə'	kwa tʉə'	kɛŋ tʉə'
	small small	Com:small smaller	Sup:small smallest
(c.)	die	kwa die	kɛŋ die
	heavy heavy	Com:heavy heavier	Sup:heavy heaviest

Table 3.5 Positive, comparative and superlative in Bamunka

3.6 Articles

The definite and indefinite article are present in Bamunka. These have no relation to class and are the same in all noun classes. The use of mbʉ for definite article is optional and will be understood as such even if left out. As we will see in section 4.9, Adjectives,there is an inversion of the noun with the use of the definite article in some situations and classes.

	Indefinite	**Definite**	**Generic**
(a)	mbu bi	mbʉ bi	bi
	a:Indef goat a goat	the:Def goat The goat	goat goat
(b)	mbu ŋwɔ'nə	mbʉ ŋwɔ'nə	ŋwɔ'nə
	a:Indef book a book	the:Def book the book	book book
(c)	mbu wo	mbʉ wo	wo
	a:Indef man a man	the:Def man the Def	man man
(d)	mbu fʉəŋ	mbʉ fʉəŋ	fʉəŋ
	a:Indef leg a leg	the leg the leg	leg leg

Table 4.6: The definite and indefinite articles.

3.7 Demonstratives

Demonstratives, this, these, that and those, are expressed in Bamunka using various suffixes attached to the noun. These affixes are determined by the class grouping of the noun in question. The Class 1 noun ŋwɔ'nə (book), for example, will take the Class 1 demonstrative suffix ɔŋ, resulting in ŋwɔ'nə-ɔŋ meaning this book. This and further class based examples are illustrated below.

Class 1 suffixes: ɔ, ɔŋ (this or these) ɛ, e, iŋ, ɛŋ (that or those). These are attached to the appropriate root noun found in class 1.

(22) Lɛnə ŋwɔ'nə-ɔŋ
Look book:N-this:D
Look at this book

(23) Lɛŋə ŋwɔ'nə-i
Look book:N-that:D
Look at that book

Class 2 suffixes: bɔ̀ŋ, biŋ
As with class 1 above, class 2 demonstrative suffixes attach to the root noun in question to form the appropriate demonstrative.

Class 3 suffixes: ɔ, ɔŋ, ɛ, i, ɛ́ŋ

(24) Lɛnə chusii-ɔ
Look door:N-this:D
Look at this door

(25) Lɛnə chusii-i
Look door:N-that:D
Look at that door

The pattern of affixation onto the end of the root noun from the suitable noun class follows throughout all classes. The following is a list of the various affixes appropriate for each class.

Class 7 suffixes: kɔ̀ŋ, kiŋ
Class 6a suffixes: mɔ̀ŋ, miŋ

Class 8 suffixes: bɔ̀ŋ, biŋ
In the class 8 examples we see the demonstrative affixes being used with a plural noun once again.

(26) Lɛnə bətambʉət-bɔŋ
Look doves:N-these:DPl
Look at these doves

(27) Lɛnə bətambʉətə-biŋ
Look doves:N-those :DPl
Look at those doves

Class 9 suffixes: ɔ, ɔ̂, ɔ̂ŋ, e, ɛ, i, iŋ, ɛŋ

Class 10 suffixes: hɔ̂ŋ, hîŋ, hi
Again, in class 10, we see the formation of a demonstrative using the plural noun as per example (31) below.

(28) A kɯɯ ŋgo'hə-ɔŋ mɛ?
You like stones:N-these:DPl QM?
Do you like these stones?

Class 13 suffixes: tɔ̂ŋ, tiŋ

Class 19 suffixes: hɔ̂ŋ, iŋ
There appears to be no use of the class based suffix system in demonstrative pronouns as illustrated by the contrasting answers to the following question. The words yɔŋ and yiŋ are used to refer to this and that. Bɔŋ and biŋ refer to these and those.

Class 1
(29) Bɛ yɔŋ ŋwɔ'nə ndɔ-a kɯɯ?
Be which book:N RC1-you like?
Which book do you like

(30) Yɔŋ ŋwɔ'nə
This:D book:N
This book

(31) Yiŋ ŋwɔ'nə
That:D book:N
That book

(32) Yiŋ-yɯ
This:D-one
This one

(33) Yɔŋ-yɯ
That:D-one
That one

Class 9
(34) A kɯɯ yɔŋ ŋgo'hə?
You like which stone:N?
Which stone do you like?

(35) Mɔ kɯɯ ŋgo'-e
I like stone:N-that
I like that stone

(36) Mɔ kɯɯ ŋgo'-ɔ
I like stone:N-this:D
I like this stone

This class based system is in contrast to the following non-class based examples:

(37) Yiŋ yʉ
That:D one
That one

(38) Yɔŋ yʉ
This:D one
This one

Class 2
We see the same pattern in examples (40) and (41) in the plural.

(39) Bɛ yɔŋ bəŋwɔ'nə ndə a kʉʉ?
Be which books:N that you like?
Which books do you like?

(40) Bɔŋ bə
These:DPl ones
These ones

(41) Biŋ bə
Those:DPl ones
Those ones

The outline above has illustrated the common method of forming the demonstrative in Bamunka using the root noun and a class based affix. However it also became apparent that in the case of the demonstrative pronoun this class based system is not utilised but rather that fixed affixes are used across classes.

3.8 Possessives

As is the case with demonstratives, possessives are expressed using affixes which are attached to the noun based on the class system. The possessive affix appears to always take the form of a suffix, following rather than preceding the noun. There does not seem to be any difference along the lines of emphatic versus non emphatic possessives. Emphasis is often shown by a repetition of the demonstrative at sentence initial and final position. This is illustrated in examples (42) and (43).

(42) Nɔ ŋwɔ'nə-ɔŋ nɔ
This book:N –my:PossSg this
This is my book

(43) Nɔ bəŋwɔ'nə-bʉ’ bə'nɔ
These books:N-ours:PossPl Pl:these
These are our books

The following are examples from various classes:

Class 1

(44) Kɔ ŋwŋ'nə-ɔŋ tə-mɛ
Give book:N-my:PossSg to-me
Give me my book

In order to emphasise ownership an alternate form of possessive may be used.

(45) Anyushi-i nɔ bɛ yɔŋ-yʉ
Onion:N-that:D is be my-own
That is my onion

Class 3

(46) Nɔ bɛ fia-ɛ
That:D be road:N-his:PossSg
That is his road

(47) Lɛnə chusii-i
Look door:N-her:PossSg
Look at her door

The formula of affixation to the root noun holds for plural as well as singular classes.

Class 8

(48) Lɛnə tʉ-bʉə
Look heads:N-their:PossSg
Look at their heads

Class 9

(49) Nɔ bɛ ndyi-a nɔ
This be cloth:N-your:PossSg this
This is your cloth

This is contrasted with the plural possessive form found in the sentence.

(50) Nɔ bɛ ndyi-i nɔ
This be cloth:N-your:PossPl this
This is your(pl) cloth

Class 10

Here in example (54) we, again, see the double use of the plural demonstrative at the beginning and end of the clause. This may be an indication of emphasis as to the ownership of the items but this is yet unclear.

(51) Nɔ bɛ ŋgo'hə-ɔŋ nɔ'hə
These be stones:N-my:PossSg these
These are my stones

(52) Lɛnə ŋgo'hə-a'
Look stones:N-our:PossPl
Look at our stones

Emphasis appears to fall on the negative aspect of a clause rather than the positive when used in contrast, see example (53).

(53) Nɔ ŋwɔ'nə ya' ka yi-yʉ
This:D book:N our:PossPl not his:PossSg-own
fɛ ka
NM not
This is our book, not his book.

We see in the following example that a difference in emphasis/contrast does not appear to play a role in the formation of possessive pronouns.

(54) Lɛnə ŋwɔ'nə-ɔŋ
Look book:N-my:PossSg
Look at my book

(55) Lɛnə bəŋwɔ'nə ya'
Look PM:books:N our:PossPl
Look at our books

In the plural form of the personal pronouns there is a dual inclusive/exclusive distinction. These are marked by class based suffixes attached to the root of the noun. In some cases tonal marking is used to highlight whether the speaker is referring to the inclusive or exclusive form. In other cases, however, no tonal distinction has been made and further research is required to assess whether any marking to make such a distinction is present in these cases. This lack of marking in some cases may be class based or it could be a case of the tone difference not having yet been identified. Class 3 exemplifies this with a tone distinction.

Class 3

(56) Fyia-ya’
Road:N-our:PossInc (we two)
Our road

(57) Fyia-yâ’
Road:N-our:PossExc (we two, not yours)
Our road

(58) Fyia-yʉ̃’
Road:N-our:PossPL
Our road

The following examples are currently without a tone distinction and relevant differences are disambiguated by the context of the conversation.

Class 9

(59) Ŋgo'yâ’
Stone:N our:PossInc
Our stone

(60) Ŋgo'yâ’
Stone:N our:PossExc
Our stone

(61) Ŋgo'yʉ̃
Stone:N our:PossPl
Our stone

The use of class based affixes, again, are the general rule for the formation of possessives. Alternate forms may also be used for the purpose of emphasis. Next we will look at the use and formation of another modifier of the noun in Bamunka, the adjective.

3.9 Adjectives

Adjectives are used to modify nouns. Their use is not based upon the noun class system and it appears that they usually follow the noun. They may precede the noun in some cases however. With regard to size, for example, small and big can come before the noun along with a number of other examples. The reasons for this are as yet unclear. Synonyms can be utilised for emphasis, ’small little man’ for example. This may cause an adjective that usually follows the noun to precede it. This is illustrated as follows.

(62) Vaa fia
Small:Adj road:N
Small road

(63) Fia tietie
Road:N little:Adj
Little road

(64) Vaa tietie fia
Small:Adj little:Adj road:N
Small little road

There does not appear to be any agreement in terms of class or sing/plural. The order seems to appear in a similar order to English when several are used. However there doesn’t see, to be a fixed order.

(65) Mɔ bɔŋ mbʉ fia luuhə tietie
I build:V:ST the:Def road:N green:Adj small:Adj
I built the small green road

(66) Mɔ bɔŋ mbʉ fia tietie luuhə
I build:V:ST the:Def road:N s mall:Adj green:Adj I
built the small green road

In all of the following, the use of mbʉ for the is optional and will be understood as such even if left out. These examples illustrate the use adjectives across various classes.

Class 1

(67) Mbʉ ŋwɔ'nə kəmbuu
The:Def book:N red:Adj
The red book

(68) Mbʉ ŋwɔ'nə kənduɔŋ kəmbuu
The:Def book:N old:Adj red:Adj
The old red book

(69) Mbʉ ŋwɔ'nə kwɛ'təŋ kənduɔŋ kəmbuu
The:Def book:N big:Adj old:Adj red:Adj
The big old red book

It is evident throughout these illustrations that adjectival modification is not class based.

Class 3

(70) Mbʉ chusii kəmbuu
The:Def door:N red:Adj
The red door

(71) Mbʉ chusii dədə kəmbuu
The:Def door:N tall:Adj red:Adj
The tall red door

(72) Mbʉ chusii kwə'təŋ kəmbuu dədə
The:Def door:N big:Adj red:Adj tall:Adj
The big tall red door

Class 9

(73) Mbʉ ŋgo' kəfʉəŋ
The:Def stone:N black:Adj
The black stone

(74) Mbʉ ŋgo' kəfʉəŋ tietie
The:Def stone:N black:Adj small:Adj
The small black stone

There does not appear to be a specified order in the use of adjectives, however size related modifiers do tend do come before colour based modifiers as seen above.

Class 10

Here we see that plurality and, as above, class show no agreement with the adjective. As with others they can however be infixed into the noun in certain cases.

(75) Mbʉ bəŋwɔ'nə kəmbuu
The:Def books:N red:Adj
The red books

(76) Mbʉ bəŋwɔ'nə kənduɔŋ kəmbuu
The:Def books:N old:Adj red:Adj
The old red books

In the following example the adjective kəfʉəŋ 'black' is infixed into the word bəŋgo'hə meaning 'stones'. This will be discussed in more detail in section 3.9.1.

(77) Mbʉ bəŋgo' kəfʉəŋhə
The:Def stones:N:Prefix-Root black:Adj-stones:Affix
The black stones

Again, in the next illustration both tietie and kəfʉəŋ, the adjectives small and black, respectively, have been infixed into the noun in question.

(78) Mbʉ bəŋgo' tietie
The:Def stones:N:Prefix-Root small:Adj
kəfʉəŋhə
black:Adj-stones:Affix
The small black stones

Where multiple qualifiers are present, a descriptive phrase may be used to avoid ambiguity. This may be used to clarify that the second qualifier is referring to the head noun rather than the first qualifier. This is exemplified in (82) below.

(79) Mɔ tənə mbʉə mbʉ kefʉəŋ
I stand:V:ST beside the:Def stool:N
bəlʉʉ kwɛ'təŋ ndə i bɛ kəfʉəŋ
bamboo:Adj big that it be black:Adj
LIT: I stand beside the stool bamboo big that it be black
I stood beside the big black bamboo stool

3.9.1 Adjective infixation into the noun

As we have seen above, the adjective may be infixed into the head noun in certain cases. The reasons for this are not fully known as of yet. However, a possible class based explanation has been observed in that classes 7 and 10, and possibly others, demonstrate this phenomenon. In such cases, adjectives which would usually follow the noun are infixed between the noun root and its suffix. As in example (80) below.

This is not the case, however, when the suffix of the noun has migrated to become a prefix. In such a case the adjectives follow or precede the noun in the usual manner. This will be discussed in further detail later.

(80) a. Fɔŋkə:N:stood bəlʉʉ:Adj:bamboo kwɛ'təŋ:Adj:big
b. Mɔ du' ndə fɔŋ bəlʉʉ kwɛ'təŋ
I sit:V:ST on stool:N:Root bamboo:Adj big:Adj
kə
stool:N:Affix
I sat on the big bamboo stool

3.9.2 Migration of suffix

In certain circumstances the suffix of classes 7 and 8 may migrate to become a prefix. The reasons are yet unclear but the following observations have been made.

Where the noun is the subject and does not have the definite article attached, the suffix does not migrate.

(81)	Fɔŋ	bəlʉʉ	kə
	Stool:N:Root	bamboo:Adj	stool:N:Suffix
	Bamboo stool		

Where the noun is the subject and does have the definite article attached, the suffix does migrate.

(82)	Mbʉ	nkwe	kefɔŋ	bəlʉʉ	kəfʉəŋ
	The:Def	big:Adj	stool:N	bamboo:Adj	black:Adj
	The big black bamboo stool				

In the case of the head noun being a direct or indirect object, which is not qualified and does carry the definite article, the suffix does migrate.

(83)	Mɔ	chʉ'	mbʉ	kəfɔŋ
	I	make:V:ST	the:Def	stool:N
	I made the stool			

Where the noun, is not qualified, is a direct or indirect object, and does not carry the definite article, the suffix may or may not migrate. Both are acceptable.

(84)	Mɔ	du'	ndə	kəfɔŋ
	I	sit:V:ST	on	stool:N
	I sat on the stool			

The case in which the noun is a direct object and is qualified by a single qualifier, the suffix does not migrate. However it appears possible for the adjective to reverse in this case.

(85)	Mɔ	chʉ'	fɔŋkə	lʉʉbə
	I	make:V:ST	stool:N	bamboo:Adj
	I made the bamboo stool			

Where the head noun is an indirect object and is qualified by a single qualifier, the suffix may or may not migrate. Either is acceptable.

(86)	Mɔ	du'	ndə	mbʉ	kefɔŋ	bəlʉʉ
	I	sit:V:ST	on	the:Def	stool:N	bamboo:Adj
	I sat on the bamboo stool					

Or

(87)	Mɔ	du'	ndə	mbʉ	fɔŋ	bəlʉʉ
	I	sit:V:ST	on	the:Def	stool:N:Root	bamboo:Adj
	kə					
	stool:N:Aaffix					
	I sat on the bamboo stool					

Where there is more than one qualifier either may apply. Data has yet to be compiled on the case of the direct or indirect objects without the definite article. With regard to qualifying nouns, the suffix always migrates in such cases.

We have seen that the use of adjectives is not class based in the Bamunka language. While there does appear to be a more commonly used order of adjective types at times, the reasons for this are not clear. The infixation of adjectives into the noun with the use of the definite article and the reversal of nouns when modified by an adjective in certain cases are unique features of this language. A possible area for further research would be the area of adjectival use with regard to direct and indirect objects without the definite article.

3.10 Pronouns

That data collected has focused on three forms of personal pronoun in Bamunka. These are the subject, direct object and indirect object pronouns. In some cases these are not class based while others are. Those that are class based are formed on the basis of the noun class system by attaching the relevant suffix to the root noun in question.

3.10.1 Subject pronouns

These are not class based and tend to occur in sentence initial position.

(88)	Ɔ	chii	mbʉ	bəfɔ
	She	make:V:ST	the:Det	food:N
	She made the food			

Or:

(89)	Ɔ	chii	fɔbə
	She	make:V:ST	food:N
	She made the food		

Again see the reversal of noun in example (89) above with use of the definite article.

(90)	Ba'	to'	gɛ	mu	njaa	vyii
	We	walk:V:ST	go	to	house:N	market:N
	We walked to the market					

(91)	Bɔŋ	chʉ'	gɛ	mɛ?
	They	early	go	QM?
	Did they leave early?			

(92)	Ɔ	yu	fɔbə-ɔŋ
	She	eat:V:ST	food:N-my:PossSg
	She ate my food		

3.10.2 Direct object pronouns

Unlike other Bantu languages there is no distinction made between human and non-human nouns in the use of the direct object pronoun.

(93) (a) Jenny nyɔŋ fɔbə.
Jenny buy:V:ST food:N.
Jenny bought food
(b) Mɔ yu
I eat:V:ST
I ate it.

(94) Tom nɔ’ kie bushi. Mɔ nɔ' kə nyiɛ
Tom P2 have cat:N. I P5 see:V
Tom had a cat. I saw it.

In (95) and (96) below we see the use of a class based suffix attached to the root noun. As was mentioned, there is no human vs non-human distinction made in the formation of the pronoun.

(95) Tom nɔ’ kie bushi. Mɔ nɔ' kə nyiɛ-ɔŋ
Tom P2 have cat:N. I P5 see:V-him
Tom had a cat. I saw him (Tom)

(96) Jenny ghɔŋ* Tom nɔ kie bushi.
Jenny and Tom P2 have cat
Mɔ nɔ' kə nyiɛ-ɔŋ.
I P5 see:V-it.
Jenny and Tom had a cat. I saw it.

It is notable that the conjuction * ghɔŋ can mean and or with depending on the context.

3.10.3 Indirect object pronouns

(97) Kɔ fɔbə tə mɔ
Give food:N to me
Give me food.

(98) Kɔ ntɔŋhə tə mɔ
Give fruit:N to me
Give me fruit.

(99) Mbʉ wo kə chlʉə' bɔŋ
The:Def man:N is laugh them
The man is laughing at them.

Next, we will look at the co-ordination of NP’s in Bamunka.

4.11 Co-ordination of noun phrases

Co-ordinate noun phrases consist of two or more nouns taking constitunent position in a sentence which function together in forming one phrase. In Bamunka noun phrases are co-ordinated using the conjuctions lɛ'nə and ghɔŋ. These can both mean and or with alternatively anf there apperars to be no disticntion of usage with regard to the co-ordination of human versus non-human nouns.

(100) Mbʉ bushi kwɛtuoŋ lɛ'nə mbʉ bu
The:Def cat:N big:Adj and the:Det dog:N
Tietie nɔ' kə gɛ mbʉ vyii
Small P5 go the:Def market
The big cat and the small dog went to the market

(101) Bəluŋ bətia lɛ'nə bəkĕ bəbu nɔ' gɛ mbʉ
Men:N three and women:N two P2 go the:Def mutɔ
farm:N
Three men and two women went to the farm

In example (102) below we see the use of both lɛ'nə and ghɔŋ. The meaning appears to be the same with ghɔŋ possibly emphasising the fact that the dog is accompanying John.

(102) John lɛ'nə ghɔŋ bu-I nɔ' kə
John and with dog:N-his P5
gɛ mbʉ vyii
go:V the:Def market:N
John and his dog went to the market

(103) John lɛ'nə Kate nɔ' kə gɛ yəŋ kwɛ'təŋə
John and Kate P5 go:V place big
John and Kate went to town

With regard to a singular subject and plural subjects both ghɔŋ and lɛ'nə can be used interchangeably as is evident below.

(104) John ghɔŋ bətieŋkɔŋ-bi nɔ kə gɛ yəŋ kwɛ'təŋ
John and friends:N-his P5 go:V place big
John and his friends, went to town

(105) Kate lɛ'nə bəliŋ-bi tʉ gɛ mbʉ mutɔ
Kate and sisters-her PRP go the:Def farm:N
Kate and her sisters are going to the farm

There appears to be little, if any, difference in the meaning and use of the conjuctions ghɔŋ and lɛ'nə. Both may be used interchangeably with ghɔŋ possibly being utilized to emphasise the accompaniment of one subject with another. There is no human/non-human or singular/plural distinction made in the use of these connecting words.

3.12 Co-ordination of pronoun and noun phrase

Again, we see the use of conjuction lɛ'nə in the co-ordination of pronoun and noun phrase. Ghɔŋ does not appear to be common in this context while an alternative word for with, ba'a, is regularly used. The pronoun tends to come at the beginning of the sentence in such cases.

(106)	Mɔ	lɛ'nə	Kate	yu	baakə
	I	and	Kate	eat:V:ST	fufu:N
	Kate and I ate fufu				

(107)	Mɔ	lɛ'nə	le-ɔŋ	nɔ' kə	gɛ	mbʉ	mutɔ
	I	and	sister-my	P5	go	the:N	farm:N
	My sister and I went to the farm						

The use of ba'a, an alternative for the conjuction with is utilsed in the following examples.

(108)	Mɔ	nɔ'	yu	baakə	ba'a	Kate
	I	P2	eat:V	fufu:N	with	Kate
	I ate fufu with Kate					

(109)	Mɔ	nɔ' kə	gɛ	mbʉ	mutɔ	ba'a
	I	P5	go	the:DEF	farm:N	with
	le-ɔŋ					
	sister-my					
	I went to the farm with my sister					

4. Description and Analysis of the phenomena

4.1 Noun

4.1.2 No.of cases

The expression of various cases in Bamunka is straightforward and relatively simple with appropriate tenses and clause structuring used which often allows the case to be disambiguated by the given context.

In the genitive case, for example, marking seems to be a matter of order. One noun follows the other with the context disambiguating as to whether the genitive case is being used or not.

(3)	Mbʉ	ŋkwe	chu	lɔŋ
	The:det	handle:N	mouth:N	fence:N
	LIT:The	handle	(of the)mouth	fence
	The handle of the gate.			

Bamunka does not go into the detail of other languages, such as that of Latin.

4.1.3 Number

The formation of the plural is more complex in Bamunka than in others, such as English or French, in that there are a variety of plural markers which are utilized based on the noun class in question.

The following two examples are taken from Table 4.4.

(a) **Class 1:**	ŋwɔ'nə	Class 2:	bəŋwɔ'nə
	Book:N		PM:book:N
	book		books

Furthermore, in some cases, the plural of a noun may involve using an alternate word.

(b) **Class 1:**	wo	Class 2:	bʉə
	Man:N		men:N

The expression of number may be viewed as simple in with regard to the formation of cardinal numbers. Cardinal numbers are straightforward in that they can precede or follow the noun and are not class based.

The expression of ordinal numbers is more complex in that they exist from first to third. After this however the sentence must be restructured so that the number that have gone before are used to indicate the ordinal position of the person/object etc in question.

4.1.4 Definiteness

Bamunka makes a distinction between entities, which are specific and indefinable in two ways, using the definite and indefinite article mbu and mbʉ. The definite and indefinite articles in Bamunka could also be termed as simple in comparison to other languages such as French and Spanish in that they are not gender based but rather the respective mbu and mbʉ are the same in all situations.

4.1.5 Gender

A number of languages such as English have no grammatical gender however there are some traces to be found such as are observed in the suffixes –er and ess in waiter/waitress. While Bamunka does not have a grammatical gender in the sense of masculine/feminine, we will see in the following section that the gender categories of Bamunka are based on a complex noun class system.

4.1.6 Declension

This refers to the inflection of nouns, pronouns, and adjectives in categories such as case, number, and gender. This is not prominent in all languages.

We see clear evidence of complexity in Bamunka's Bantu based noun class system. Bamunka has a more complex system of declension in that nouns decline depending on what noun class they fall into. The noun class system used is that of the Bantu noun class numbering system. With ten classes of noun, based on commonalities in affixes and concords consonants, which include people, things and concepts this is a highly complex area of the language in question. Single and plural classes exist and these may be further grouped into gender pairings as we saw in *section 3.2*. The formation of clauses, sentences, possessives and demonstratives are all influenced by this noun class system.

Section 3.7 illustrates the formation of various demonstratives based on this system. The following two examples contrast the use of different demonstratives affixes based on the class that the noun in question falls into.

Class 1

(22) Lɛnə ŋwɔ'nə-ɔŋ
Look book:N-this:D
Look at this book

Class 3

(24) Lɛnə chusii-ɔ
Look door:N-this:D
Look at this door

This is again highlighted in the class based formation of possessives, section 4.8, in Bamunka. See the comparison between the following singular and plural examples.

(45) Nɔ ŋwɔ'nə-ɔŋ nɔ
This book:N –my:PossSg this
This is my book

(46) Nɔ bəŋwɔ'nə-bʉ' bə'nɔ
These books:N-ours:PossPl Pl:these
These are our books

5. Evaluation

With regard to grammatical complexity two notable headings suggested by McWhorter (2005) are that of syntax and inflectional morphology. We will now examine the Bamunka Noun Phrase through the lens of these categories.

5.1 Syntax

Having looked at the noun in Bamunka under various headings we do see some level of balance. The area of case and definiteness, *sections 3.3* and *3.6*, appear relatively straightforward and simple. The depth of detail that is found in other languages, such as Latin, was not seen here. A higher level of complexity is clearly seen in the area of noun classes. The formation of demonstratives and possessives using class based affixes exemplifies this. The formation of the plural is also more complex than that of other langauges such as English in that it involves class based morphological change unlike English which would use the common affixes of 's' and 'es' across nouns with the exception of a minority. The formation of ordinal numbers beyond the third involves restructuring of the sentence thus heightening the difficulty level. In the area of word order the SVO pattern is generally seen in the definite clause, however when it comes to interrogatives or expressing the topic of a sentence using fronting or dislocation we see increased levels of complexity. It is therefore evident that we see both simplicity and complexity across various areas, indicating a general balance in complexity thus far.

5.2 Inflectional morphology

While we have seen a degree of complexity in number in *section 5.1* above there is simplicity to be found here also in that there is not a high degree of inflection found in the formation of numbers. Cardinals numbers are straightforward in that they can precede or follow the noun and are not class based. The expression of comparison, as per *table 3.5*, is also simple in terms of morphology in that with the same comparative and superlative markers are used in

all cases. As discussed in section 8.2.1.5 the class based morphological changes see in the Bamunka noun indicate a high degree of complexity when compared with other languages such as French or English in this area. With regard to declension, McWhorter (2005:46) notes that "inflection also complexifies a grammar when it encodes distinctions between noun classes or verb classes". In light of these headings an introductory look at the Noun Phrase in Bamunka appears to support a general 'tallying' of complexity as supposed by the invariance of complexity hypothesis.

6. Conclusion

This study aimed to examine the layered structure of the Noun Phrase in Bamunka with specific reference to the theme of grammatical complexity. Language complexity has become an area of increasing interest and indeed controversy in recent years. Upon examination of the Bamunka data it would appear that there is a 'balancing out' of complexity in this aspect of the language. This lends support to the findings of adherents to the invariance of complexity hypothesis such as Jackendoff (1993) and Bane (2007). These findings do not negate McWhorter's (2005) strong argument that some languages may indeed be simpler than others in terms of grammatical complexity as the language in question is not a creole nor was it very recently developed to the author's knowledge. A more in depth study of Bamunka, along with a comparison of Bamunka with other Bantu languages and those outside of the Bantu family, as suggested by Nichols (2009), may give further insight into the complexity of this language and the strength of the invariance of complexity argument as a whole.

References

Crystal, David. 1987. *The Cambridge encyclopedia of language*. pp 6-7. Cambridge: Cambridge University Press.

Edwards, John. 1994. *Multilingualism*. London: Penguin.

Elias, P., Leroy, J., & Voorhoeve, J. 1984. *Mbam-Nkam or Eastern Grassfields*. Afrika und Übersee, LXVII, pp. 31-107.

Ethnologue 2008. http://www.ethnologue.com. Website consulted October 2010.

Greenberg, Joseph H. 1948. "The classification of African languages". *American Anthropologist*, 50: 24–30

McWhorter, John, H. 2005. *Defining Creole*. New York. Oxford University Press.

McWhorter, John, H. 2001. What did people ask David Gil and why: Rejoinder to the replies. *Linguistic Typology*, 5(3/4): 412.

Meeussen, Achille. 1967. Bantu grammatical reconstructions. *Africana linguistica* 3, Annales van het Koninklijk Museum voor Midden-Africa 61: 79-12.

Nurse, D. 2001. A Survey Report for the Bantu Languages. *SIL International.*

Nurse, D and Philippson, G. 2003. *The Bantu Langauges*. Routledge. London.

Stallcup, Kenneth L. 1980a. A brief account of nominal prefixes and vowel harmony in Esimbi. In *L'expansion bantoue*. Vol. 2, 435-441. Paris: Société d'Etudes Linguistiques et Anthropologiques de France

Piron, Pascale. 1995. Identification lexicostatistique des groupes Bantoïdes stables. *Journal of West African Languages*, 25(2): 3–39.

SIL Cameroon. 2007. Introduction to Noun Classes. Version 3. Summer Institute of Linguistics. http://www.sil.org/ retrieved 2010.

Sorsamo, H. 2008. The Phonology of Bamunka. SIL Cameroon.

Watters, J.R. & Leroy, J. 1989. South Bantoid. in Bendor-Samuel (ed.).

Watters, John. 2003. Grassfields Bantu, in D. Nurse and G. Philippson (eds.), The Bantu Languages. London: Routledge. pp.225-256.

Construction Grammar as applied to core English modality

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Abstract

The current study seeks to apply Construction Grammar to the phenomenon of modality. To facilitate a thorough application and analysis, examples of both epistemic and root modal verbs of English are considered. Specifically, those verbs of English chosen for the current study are CAN/MAY and MUST/SHOULD. Motivation for these choices is provided as well as a brief look at the other types of modal verbs existent in the language. In applying Construction Grammar to modality, the research poses the following hypotheses: 1) there are varying types of modality in English; 2) these modal variations are realized uniquely and; 3) an accurate and effective account of these unique modalities and corresponding marking systems can be provided within the Construction Grammar (CxG) framework. In order to ascertain these hypotheses, the current study asks the questions: 1) what are the modal variations of English; 2) how are these variations realized and; 3) what would a Construction Grammar analysis of modality in English look like?

To answer these questions, various examples of modality are analysed and the differences and similarities between the expressions gauged. A schema similar to that of RRG is then applied while assuming the postulates of Construction Grammar. Bearing these goals in mind, the phenomenon of modality itself as well as an overview of the salient points of Construction Grammar are examined. Construction Grammar is then applied to the examples and visually represented in a Role and Reference Grammar-style schema. The successes of both the application of Construction Grammar as well as the proposed schema are examined. It is found that, in keeping with the hypotheses presented, expressions of modality in English offer as many ambiguous interpretations and unique realizations as there are conversational situations in which they could be uttered. The modality of English is shown to be heavily context and in some cases subject dependant. It is also found that, as hypothesised, Construction Grammar is a suitable framework within which to analyse modality in both languages. In addition, the proposed schema proves adequate in visually representing the relationship between the pragmatic, semantic, morphological and syntactic levels of the modal expression. These findings are significant in that they promote the increasing acceptance of Construction Grammar as an appropriate and sufficient grammar theory as well as advancing the understanding of linguistic modality.

1.0 Introduction

Fortunately for those who enjoy popular fiction, snappy one-liners and bad puns, language is not tidy[2]. Unfortunately for past generations of linguistic theorists, this fact demands a migration from the heavily ordered, almost prescriptive approach to grammar accepted in such theories as Generative Grammar (Michaelis, 2006) to a theoretic framework which accounts for the meaning of utterances as constructions at the syntactic, morphological, phonological, semantic and pragmatics levels, regardless of their length, pattern or technical grammaticality. This shift in approach has been heralded as an important step towards understanding the everyday use of natural languages, as natural language users are almost unanimously, spontaneously inventive in natural speech.

[2] By "not tidy," it is meant that language does not follow an unyielding, unchanging set of rules. Usage and meaning are not predictable and speakers often employ words or phrases which appear to vary, or even contradict, their prescribed "basic" definition.

1.1 Hypothesis and Research Questions

The current study poses the following hypotheses: 1) there are varying types of modality in English; 2) these modal variations are realized uniquely and; 3) an accurate and effective account of these unique modalities and corresponding marking systems can be provided within the Construction Grammar (CxG) framework. In order to ascertain these hypotheses, the current study asks the questions: 1) what are the modal variations of English; 2) how are these variations realized and; 3) what would a Construction Grammar analysis of modality in English look like?

To answer these questions, the current study analyses examples of modality in English and gages the differences and similarities between the expressions of traditional and non-traditional modality. A schema similar to that of RRG is then applied while assuming the postulates of CxG.

1.2 Data

To facilitate the study of modality in English, examples found in relevant literature as well as instances of American English and Irish English modality gathered from actual conversations. Though a comparison of other dialects of English, such as British English or Australian English, would no doubt prove to be interesting research, such an undertaking is simply beyond the current study's scope.

1.3 Construction Grammar

Though a more comprehensive account of CxG is provided in Section 3, it is worthwhile here to briefly describe the theory. Prompted by the advancement of Cognitive Semantics in the mid-1970's, the seedling studies of CxG eventually took root as a fully developed theory in the 1980's due to the accomplishments of linguists such as Charles Fillmore, Paul Kay and George Lakoff (Contributors, 2009). Central to the CxG approach is the assumption that all constructions are equally important in the development of utterance construction and meaning, and that no piece of an utterance, such as a word or morpheme, is more basic than any other (Fried, 2010).

As language is not tidy, neither, then, is any theory of grammar tidy or flawless. Though the established approach to construction representation in CxG has until recently consisted of a "layered" approach implementing various "slides" of thematic roles and operators laid on top of each other embedding pragmatic, semantic and syntactic layers within one another (Michaelis, 2006), these schema representations are often cumbersome and intractable[3] or are unable to capture the relationship of form and function in a visually obvious way[4]. The schema description of Role and Reference Grammar (RRG), however, offers a concise, agile structural representation which has recently been successfully applied to CxG (Nolan, 2008). RRG's linear schema structure offers a valuable alternative to CxG's embedding proposal as it effectively illustrates the CxG claim that syntax and the lexicon form the poles of a syntax-lexicon continuum (Croft, 2000), thus displaying once again the pairing of form and meaning in words and complex constructions alike.

[3] For an example of this, see (Leino, 2005).
[4] Even Michaelis' representations can be awkward. See (Michaelis, 2006).

1.4 Modality

It seems fitting, therefore, to examine the complex system of modality within a framework such as CxG which can parallel its gradient nature (Traugott, 2006). Though Perkins points out that "the number of modalities one decides upon is to some extent a matter of different ways of slicing the same cake" (Perkins, 1983), this study will use the definitions of modal categories as defined by Lyons (Lyons, 1977), and these categories will be referred to as *epistemic modality* and *root modality*. As quoted in Palmer:

> "Epistemic modality...is concerned with matters of knowledge, belief, or opinion rather than fact."

And later, on root modality, "...is concerned with the necessity or possibility of acts performed by morally responsible agents."[5] (Palmer, 1986)

These two distinctions are acknowledged in both linguistic and logical studies of modality. For centuries philosophers have considered the study of modality to encompass necessity, possibility and impossibility and the relationships between the three (Perkins, 1983). Conceptually, modality "construes talk about possible worlds as talk about ways in which we could conceive the world to be different" (Haack, 1978: 191, as quoted in Perkins, 1983). In linguistics, the study of modality is centred around "the linguistic phenomenon whereby grammar allows one to say things about, or on the basis of, situations which need not be real" (Portner, 2009).

2.0 Methodology

Before an application of CxG to modality is attempted, a description of the methods and materials used in the research is due.

2.1 Modal Verbs Chosen

This research examines the use of modals CAN/MAY and MUST/SHOULD in English. The verbs chosen are a portion of the so-called "core" modals and are addressed in this study as they form the fundamental level of the expression of modality in both languages. By "core" modal, it is meant those modal verbs which express modality using only the modal verb itself and a bare infinitive of the action verb accompanying it.

The modal verbs above were chosen for the current study as they represent classic examples of core modality in English and are commonly found in natural speech. Also, because they are popular conveyors of modality, they offer ample examples of ambiguity and realizational variation. The analysis of semi-modals, those fixed idiomatic expressions which are similar to modals in meaning but not in syntactic realization, is beyond the scope of this study and therefore is not attempted.

[5] While Lyons actually uses the term "deontic" in this definition, the current study will use the same definition to describe the preferred term "root."

2.2 Why CxG?

Central to the current study is the application of the theories of CxG to modality. In entering upon a study of the phenomenon of modality, it becomes obvious that modal verbs and the manifestation of modality in communication involve a strikingly rich system of expression. While a verb of action or accomplishment may simply derive its full meaning from a lexical entry, verbs of modality are shaded by each level of language, from the pragmatic to the syntactic. Because CxG postulates that meaning is a product of the full construction, the pairing of form and function, it is better able than other theories of grammar to capture the nature of modal verbs.

The CxG idea of the *construction* also efficiently explains the ambiguous interpretations of modal verbs often present in natural speech. It is true that many leading linguists, some of whom are quoted in the current study, advocate a lexically-driven description of modality or a "fuzzy set" approach in which core modals are offered as the best examples of modality while semi-modals or non-core modals populate an outer fringe of fundamental modality. Though herself not a proponent of a CxG approach, Anna Papafragou succinctly captures the failings of ambiguity-based modality theories:

> "...although the fundamental point of the ambiguity-based approach is the rigid distinction between the epistemic and various non-epistemic 'meanings' of the modals, [these theories] are forced to recognise a wide range of intermediate cases, where for a variety of reasons the proposed semantic distinctions prove inert, indistinguishable or insufficient" (Papafragou, 2000: 25).

If each slightly non-core case of modality along the phenomenon's heavily-graded meaning continuum is to be regarded as a outlier case which demands a tailored semantic content, the semantic component of meaning encoding becomes quite large: larger than is intuitively probable. Instead, CxG allows for the interpretation of individual constructions with unique meanings based on input from all levels of communication.

As discussed briefly in Chapter One, these modal verbs are studied within a CxG framework while visually represented in a RRG-style schema. Though the CxG formal representationmay prove useful in certain contexts, it is acknowledged by leading CxG scholars that the theory's schema is often cumbersome and unnecessarily bulky as the nested boxes can often seem belaboured and over-complicated at first glance (Michaelis, *forthcoming*). The shortcomings of the CxG schema are amplified when an application to modality is attempted; the open-ended, imprecise organization of features applied to each category fail to capture the nuances of modality at the semantic and pragmatic levels of speech.

For these reasons, it is necessary in this study to borrow the schema of a grammar theory which is similar to CxG in its assumptions of meaning composition, but which offers a formal representation that is both easy to comprehend and suited to the imposition of CxG theories. RRG meets these criteria nicely, as it attempts to "lexically decompose" the meanings of the words themselves so that each lexical entry is represented by the combination of several "semantic primes" (Cruse, 2000). Indeed, the entire movement is based on an international, motivated research effort to create a grammar model capable of encompassing the syntactic, semantic and pragmatic nuances of each utterance with the diverse languages of the world (Van Valin, 2007).

Most modern linguists will agree that a grammar model based solely on the nominative-accusative, SVO languages such as English only represents a portion of the world language picture. For example, while grammars built upon English and syntactically similar languages take the notion of the "subject" as a matter of fact, Asian languages offer many examples where the "subject" idea as the western world knows it is nonexistent. It's no surprise, then, that post-Chomsky grammarians have become increasingly interested in building a truly universal grammar model, one that might accurately represent languages ranging from English to Tibetan to Idoma. As traditional representations of the clause structure are often narrow in the scope of applicable languages, RRG reconfigures the depiction to embody the idea of the "layered structure of the clause" (LSC). The LSC is composed of the 'NUCLEUS which contains the predicate(s); the 'CORE' which contains the nucleus and the predicate arguments; and the 'CLAUSE.' As evidenced by Figure 2.1, features of each speech entity are then plugged into the meaning of the construction as a whole at various levels.

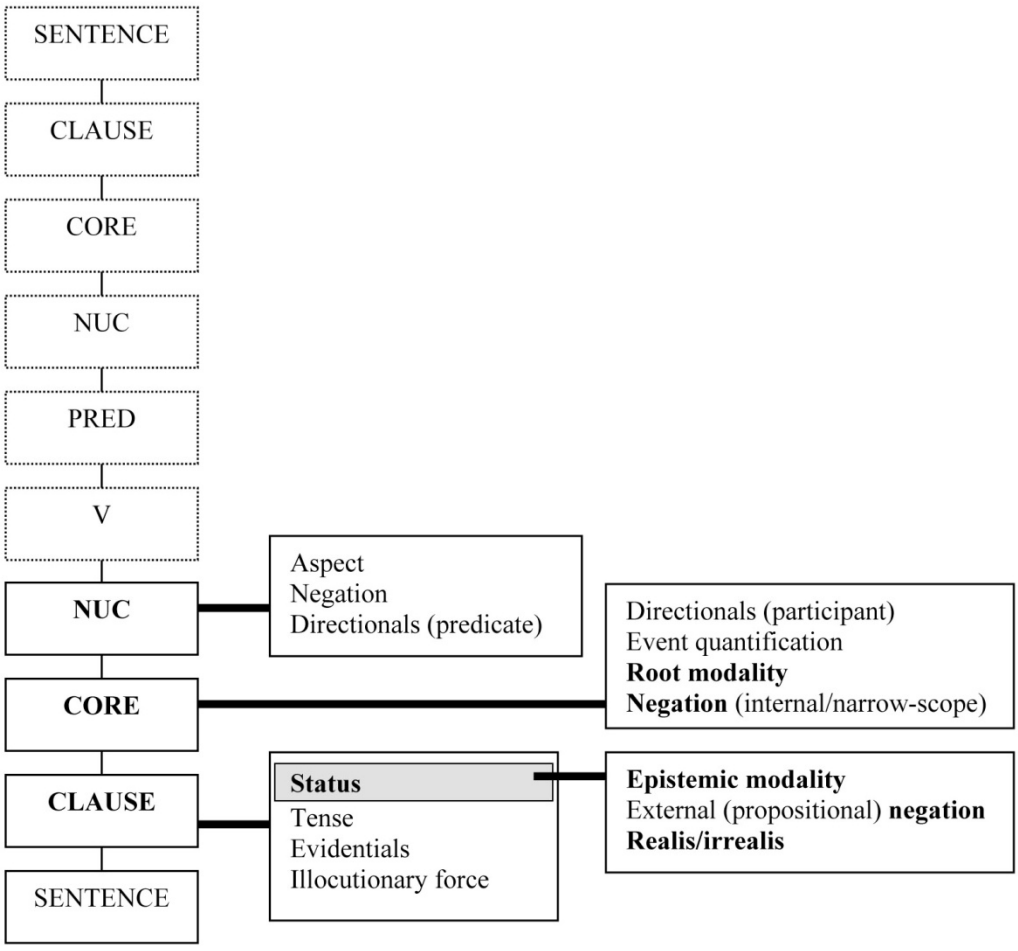

Figure 1: Diagrammatic representation of the layered structure of the clause (Nolan, 2008)

Here it is shown that complex semantic operators such as tense, aspect, illocutionary force and, most importantly for the current study, modality influence an utterance at various levels (Van Valin, 2005). As depicted in Figure 1, root modality is an operator which modifies the CORE of an utterance, while epistemic modality modifies the utterance at the CLAUSE level as a sub-operator of Status (Nolan, 2008). These relationships are based on the tendency of root modality to modify the relation between the actor and the action, and that of epistemic modality to influence the clause as a whole (Van Valin, 2005). In later chapters, the

importance of noting modality's influence over the entire utterance is explored in further detail.

Also fundamental to the aims of RRG is an attempt to "lexically decompose" the meanings of the words themselves so that each lexical entry is represented by the combination of several "semantic primes" (Cruse, 2000) rather than assuming any "deep" and "surface" structures posited by Chomsky. An important part of understanding the encoding of meaning in a construction begins with dissecting the construction at a semantic level. In an RRG representation, the logical structure of a verb is scrutinized according to the individual class, called *Aktionsart* classes, of each verb: whether the verb is a STATE, ACTIVITY, ACHIEVEMENT, SEMELFACTIVE, ACCOMPLISHMENT, ACTIVE ACCOMPLISHMENT or CAUSATIVE. The STATE and ACTIVITY verbs are assumed to be a basis of lexical decomposition from which the other classes are derived. The RRG logical structures for the classes of verbs discussed in the current study are represented in the table below:

STATE	**predicate'**(x) or (x,y)
ACTIVITY	**do'**(x[**predicate'**(x) or (x,y)])
ACHIEVEMENT	INGR **predicate'**(x) or (x,y)
	INGR **do'**(x[**predicate'**(x) or (x,y)])
ACCOMPLISHMENT	BECOME **predicate'**(x) or (x,y)
	BECOME **do'**(x[**predicate'**(x) or (x,y)])

Table 1: Lexical representations for verb classes

In Table 1 above, state verbs have bare predicates. This includes verbs such as *know* and *dead*. An activity verb contains the element of **do'**, such as **do'**(x[**cry'**(x)]) for the verb *cry*. Achievement verbs, those denoting an immediate change of state or start of activity such as the verb *shatter*, contain an ingressive operator, coded here as INGR. Finally, accomplishment verbs like *melt* (that is, those which are non-punctual changes of activity or state) include the operator BECOME. The 'x' and 'y' in the lexical representations in Table 2.1 are place-holders for the subjects of the sentence.

3.0 CxG

The use of a construction-based theory of grammar[6] assumes that the construction itself is a grammatical object, perhaps best represented by single-clause patterns. The examples of modal constructions provided in the current study, therefore, are mostly of the above-mentioned type. To understand the treatment of modality in CxG, a brief overview of the theory's terminology and the basic premises are in order. As the current study prefers the formal model used in RRG to represent the theories of CxG, the CxG formal model is briefly included solely for the sake of providing a more thorough description of the theory.

3.1 CxG Foundations

One of the most significant postulates of CxG is that it offers a departure from the lexical licensing approach of Lexical Function Grammar (Bresnan, 2001), Head-Driven Phrase Structure (Pollard & Sag) and Role and Reference Grammar (Van Valin & LaPolla, 1997).

[6] Grammar theories predating Chomsky's Transformational Grammar of the 1980's and 1990's acknowledged the construction's central role in utterance meaning (Goldberg, 1995).

These theories hold that the fundamental scene described by a sentence is controlled by the lexical entry of the head verb. "Linking rules" exist within the lexical entry of the verb which prescribe the verb's intended interpretation for each unique instance of use. The concept is widely popular and has been central to the argument structure in most formal theories (Michaelis & Ruppenhofer, 2001). Unfortunately, these rules often prove insufficient to account for each nuance of a verb's interpretation. Take (1) below:

(1) a Two women stood in the plaza.
b In the plaza stood two women. (Michaelis & Ruppenhofer, 2001)

The different syntactic structures of (1)a and (1)b above display, when assuming a lexical licensing approach, two argument-structure frames for the verb *stand.* The linking rules postulated by this approach, however, make it difficult to explain the locative inversion displayed in (2) below:

(2) Through the window on the second story was shooting a sniper.
(Michaelis & Ruppenhofer, 2001)

Sentence (2) presents problems in a lexical licensing framework as the verb *shoot* does not possess a locative role or a theme role in its lexical entry, and yet, it is acceptable for *shoot* to appear in the locative-inversion configuration shown above. To account for this disparity, lexical licensing theories assume 'overlay themes,' but these devices are impromptu at best and insufficient in describing a living grammar used by natural speakers, as there are as many instances of 'deviant' verb usage in natural speech as 'core' usage. If the head verb of each sentence determined the argument structure of that sentence, a special verb sense for each instance of use would necessarily be assumed. Obviously, this is unrealistic when one considers the diversity of verb usage in natural speech (Michaelis & Ruppenhofer, 2001).

Central to the CxG claim that grammar is driven by the patterning of constructions is the idea that a construction provides meaning that is beyond the scope of the lexical entries of the words in an utterance. This refers to the conceptual "instructions" that a construction provides in sentence interpretation. The CxG definition states:

> "C is a CONSTRUCTION iff$_{det}$ C is a form-meaning pair <F_1, S_1>
> such that some aspect of F_1 or some aspect of S_1 is not strictly
> predictable from C's component parts or from other
> previously established constructions." (Goldberg, 1995: 4)

A construction is considered in CxG to be a meaning-bearing element, such as a derivational marker or a prepositional phrase. The construction assumes the postulated OVERRIDE PRINCIPLE which states that in the event of a lexical and structure conflict arising in a sentence, the semantic characteristics of the lexical item conform to the grammatical structure accompanying it. This is not to say that linking patterns are unimportant: in fact, by acknowledging the OVERRIDE PRINCIPLE, proponents of CxG also acknowledge that linking rules contribute schematic semantic specifications of the verb. A construction analysis, however, assumes that linking patterns are only a part of the overall construction which interact with other specifications existing in the phrase to encode overall meaning (Michaelis & Ruppenhofer, 2001).

Also fundamental to the theory of CxG is the idea that there are no 'core grammar' structures within language: that all grammatical structures are equal and equally vital to meaning encoding and interpretation. This thought developed from the observation that much of the

corpus analyzed in the development of CxG contained 'non-core' grammatical structures. Hence, CxG theorists came to realize that the 'felicitous' use of language is an obvious indicator of one's grasp of a language and that native speakers of a language, presumably the most competent users of that language, employ these creative constructions in natural speech more often than the 'core' structures.

3.2 CxG Basics and Modality

It is important to realize that the CxG approach views grammar rules as descriptions of grammatical categories, not as the procedure itself (Michaelis, *forthcoming*). These categories are taxonomically ordered and are referred to in CxG as *inheritance networks*. Inheritance networks encompass the full spectrum of the construction's features so that a construction can belong to several inheritance networks at once, implying that constructions can display similar semantic and syntactic properties without assuming that each construction is an individual derivation of a "core" grammatical structure. In an application of CxG to modal constructions, this point is significant as it enables linguists to assume a common semantic thread in all modal forms, even in representations as seemingly diverse as epistemic and root modalities, while acknowledging that the variety of syntactic realizations reflect a wide array of specific construction meaning. However, root and epistemic modalities are often realized identically syntactically but are non-synonymous in interpretation. For instance, (5):

(5) That should be Liam at the door.

The normal interpretation of (5) does not include a moral obligation for Liam to be at the door. Instead, a hearer of (5) would assume that the speaker is basing her utterance upon situational knowledge and would therefore suppose an epistemic interpretation. CxG is able to account for the two different meanings of the same syntactic form by regarding them as "two different collections of form-meaning licensers," (Michaelis, *forthcoming*), or as two different groups of constructions.

When entering upon a CxG approach to modal verbs, it is essential to recall the basic postulate of the theory: that the construction (in this case, the modal construction) offers an insight of meaning beyond that of the lexical entry alone and that derivations of that meaning are possible through linking rules in the semantic structure of the construction. In fact, it is even posited by some experts in modality that the basic definitions of the lexical entries of the modal verbs have dissipated over the centuries to almost nothing (Palmer, 1986), which would indicate that hearer interpretation of modal constructions is derived from the semantic structure as well as the syntactic realization of the utterance. In the following sections, this idea is expanded to include the root and epistemic modal constructions of English.

It is also imperative to be aware of the existing theories regarding the phenomenon of modality itself. To that end, the following section, Section 4, is dedicated to the definition and description of the modals analyzed in the current study, root and epistemic, according to the works of leading modality scholars, both within linguistic and cognitive studies frameworks.

4.0 Modality

The study of modality in linguistics, that is, the pragmatic, semantic and syntactic processes involved in its realization, has become increasingly more popular in recent years, paralleling the advent of Cognitive Linguistics as well as constructionalist grammars. Interest in the

subject of modality and its implications to language, however, is as ancient as the study of philosophy itself. Modality has enjoyed a long and heavily-debated history as a subject of logical discussion by classical philosophers such as Aristotle and Socrates (Perkins, 1983).

By definition, modality is the denotation of mood, manner or mode (Matthews, 2007). In linguistics, the study of modality concentrates on the means of expressing those qualities and the encoding process involved in that expression. This study can include core or semi-modals which express a range of modal shadings, from personal feelings or attitudes to judgements or assessments based on the speaker's knowledge of the world around her (Biber, 1999).

4.1 Root Modality

Though, as mentioned in Section One, there are any number of ways to divide and label the various semantic types of modality, the current study will use the "root" and "epistemic" distinctions preferred by Coates, Palmer and a host of other experts in the field of both linguistic and logical modality (Palmer, 1986), (Coates, 1983)[7].

Root modality can be divided into root possibility and root necessity, and is usually associated with the "deontic" sense, meaning that the modal verbs in question convey a sense of moral obligation, or the "dynamic" sense in which the modal verbs describe one's ability or opportunity. These two classifications are further divided by some (notably, (Portner, 2009)), but for the current study, no further distinctions are necessary.

Modality is a useful tool in linguistic hedging and the deontic modals can range from a weak suggestion to a strict command depending upon the modal used, the subject matter discussed and the context in which it is uttered. Instead of asserting absolutely that such and such is the case, a speaker may – perhaps for reasons of uncertainty, tact or politeness – indicate that the truth of what one has to say is by no means assured; that it is based merely on conjecture or that it can be verified only as some point in the future (Perkins, 1983). For example, note the strength of the obligational differences in the sentences below:

(6) a You should pay for that.
b You must pay for that.

Modals *should* and *must* are common conveyers of obligation. Here, *should* encodes a sense of possibility by weakly implying that one has a responsibility to pay, while *must* speaks quite clearly of necessity, expressing a requirement to pay. It is interesting to note that at the semantic level there is an understanding that *should* speaks to a hypothetical world in which the act of paying is preferred, while *must* is an unmistakably concrete command to pay, now, in this world. This realis/irrealis distinction demonstrates the complexity of both the sentential realization of modality as well as the concept of modality which exists in the speaker's mind.

Dynamic modality often subtly hedges a statement of belief, however, just as moral conviction is hedged in deontic modality. For example, sentences (7)a and (7)b below:

[7] Portner prefers a further division of modal verbs into "sentential," "sub-sentential" and "discourse" modality to mark the level of communication at which the modality in question operates. The current study is solely concerned with the "sentential" realizations of modality, and will therefore disregard this otherwise intelligent division scheme.

(7) a Hudson drives.
b Hudson can drive.

The syntactic variation between the sentences in (7) is slight, but the semantic meaning behind the two is vastly different. While (7a) asserts that Hudson does drive on a regular basis and in fact, may be currently driving, the dynamic modal verb *can* in (7b) merely indicates that Hudson has the ability to drive, though he may never use this ability for the rest of his life. Sentence (7b) serves to affirm the speaker's knowledge of Hudson's possession of the skill of driving, but does not make the further assertation that Hudson ever employs it, and so the speaker is able to commit to a slightly less ambitious statement. If Hudson never actually drives, (7b) is still true.

4.2 Epistemic Modality

Following the preferred classification scheme of both Portner and Perkins (Portner, 2009)[8] and (Perkins, 1983), the other main classification of modality is epistemic, in which a speaker may state a fact-based opinion. Epistemic modality, though related to root modality, is concerned with stating a fact or opinion based upon knowledge which the speaker may possess.

The realis/irrealis distinction discussed above is further demonstrated when examples of epistemic modality are considered. As established in Section One, epistemic modality is concerned with the beliefs or opinions a speaker may express based on her knowledge of the world around her, and the linguistic realization of those beliefs can reflect either a realis (real-world) possibility or an irrealis ("other" world) possibility. Consider the sentences in (8) below:

(8) a {upon learning Ken won the prize} That should be Mary.
b {upon hearing a knock at the door} That should be Mary.

The examples in (8) demonstrate the modal verb *should* as describing irrealis root modality as in (8a) and realis epistemic modality as in (8b). Though the syntactic realizations are exactly the same, the context of the utterances determines very different interpretations for the hearer. While (8a) represents the type of modality discussed in 4.2, that is, root modality depicting an assertation of what is morally correct in another or a "perfect" world, (8b) exemplifies epistemic modality in which the speaker asserts her belief that Mary is at the door based on her knowledge of the exact, real-world situation, such as the fact that she is expecting Mary to arrive soon or that she has seen Mary's car pull into the drive.

The statement of the speaker's beliefs based on the knowledge of the world around her is the crux of epistemic modality, but like the deontic and dynamic root modality, epistemic modality allows speakers to make statements of gradient levels of truth assurance. Consider (9):

(9) a Zannie may win State.
b Zannie must win State.

[8] It should be noted, however, that Portner labels his "root" modals as "non-epistemic" and calls the "deontic" class "priority." The semantic distinctions which dictate their classifications, however, are the same as those employed in the current study, though I have chosen to use the traditional terms.

An interpretation of (9a) might read: Zannie has a good chance at winning State; while (9b)'s interpretation would more accurately be realized as: Zannie will almost certainly win State, if no unforeseen difficulties arise. Again, the use of modal verbs, in this case epistemic modals, lets speakers encode understated and yet precise semantic meaning.

4.3 Modality in Theory

In understanding modality, it is essential to acknowledge the many theories surrounding the phenomenon as well as the ways in which the types of modality relate to one another. For the purpose of establishing the basic links between epistemic and root modality, consider Figure 2 below:

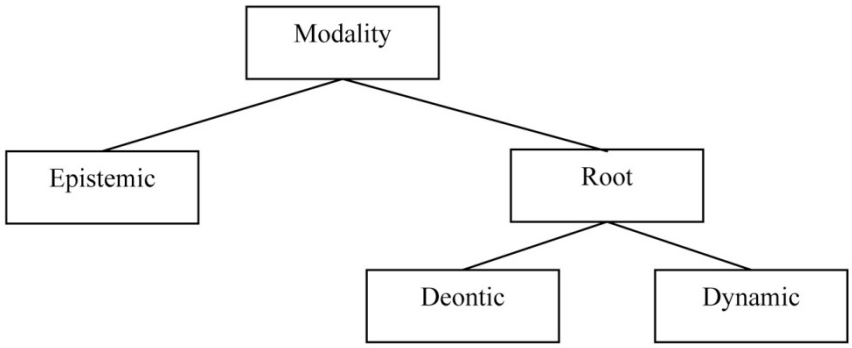

Figure 2: Relationship of modalities, as drawn in (Nolan, 2008), based on (Coates, 1983)

As Figure 2 illustrates, epistemic modality and root modality are branches of the same tree, with root modality further branching into deontic and dynamic modality.

4.3.1 Modal Orientation

The two types of modality, root and epistemic, can be further delineated with regard to the orientation of the modality occurring in the individual utterance. Agent-oriented modality (AOM) refers to those instances of modality in which the agent performing the action of the clause is influenced in some way. This includes modality of obligation, necessity, ability and desire. Motivation in modality can initiate with the speaker as well. Speaker-oriented modality (SOM) refers to clauses in which the speaker enables the condition, as in instances of directives, imperatives, prohibitions, optatives, admonitions and permissions (Nolan, 2008).

The diagram in Figure 2 above is extended to illustrate AOM and SOM below:

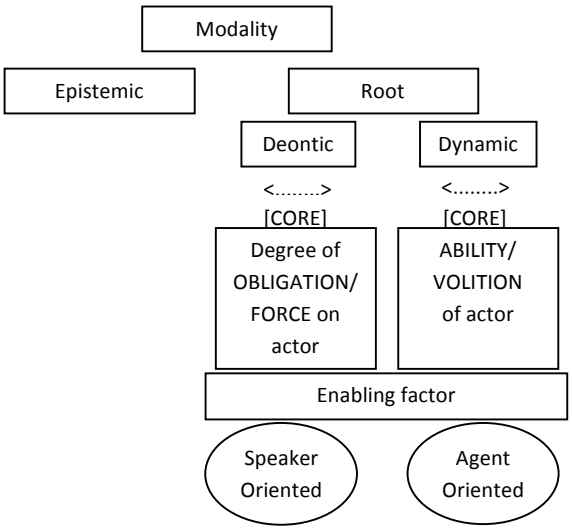

Figure 3: Extended relationships between modalities to include AOM and SOM enabling factors (Nolan, 2008)

The distinctions between AOM and SOM are relevant when considering illocutionary force, or the speaker's combination of grammatical elements, background social or cultural knowledge and awareness of the immediate conversational context. Illocutionary force is regarded as a domain of the pragmatic level of communication and can include communicative encoding of the purposes or aims of the speaker. This is significant in a study of modality within a CxG framework in investigating the points at which modality is encoded at each level of the construction.

Some linguists suggest that the semantics involved in root modality can be defined in terms of force dynamics, as in the linguistic representation of the forces and barriers existent in the real or irrealis worlds (Talmy, 1981, 1988). The theory posits that modals are commonly used for hedging purposes, the "clearer" force-dynamic modals such as *must* representing a stronger psychological barrier than those which carry less impact such as *could*.

4.3.2 Modal Strength and Argument Structure

Much of the theory involving modality revolves around the "strength" of the modal verbs in question. In these theories, modality serves mainly as a tool of quantification whether universal, in the case of necessity, or existential, in the case of possibility. This is perhaps due to the fact that the primary language of interest in the study of modality has remained within the confines of English. "Confines" seems an appropriate word when considering the fact that in some languages, a "weak" modal, usually associated with existential quantification, can actually embody universal quantification while encoding a limited scope of reference based on their context (Portner, 2009).

Also pertinent to the examination of modality's syntactic representations are the theories surrounding its argument structure. In generative syntax theories, it has been assumed that epistemic modals always take a single propositional argument and that root modals take two propositional arguments. It is true that some modals do display a raising predicate while others employ control predicates, but these distinctions cannot be neatly bound to the root/epistemic division lines.

Popular, too, among generative grammarians is the idea that the different semantic categories of modal verbs are realized through different positions in the syntax, and reside at higher or lower positions in the tree structure of the generative grammar formal schemata: specifically, that epistemic modality always exists higher in the structure than root modality. A CxG approach to communication, however, would assume that each constructional realization of modality is able to dictate a unique position in the internal structure, depending upon the distinctive combination of syntax and semantics involved in the utterance. Following chapters of this work address the matter of modality's position within the framework of meaning construction in a CxG-modified RRG schema.

The current study regards the above generative grammar approaches to modality as insufficient based on the acknowledgement established in Section One: language is not tidy. The epistemic/root distinction is merely only a system of labelling a phenomenon which is quite complex. For example, (10):

(10) a May I have a word with you?
b I may have a word with you.

In (10), it is obvious that two different types of modality are represented, but it is not immediately obvious where to draw the epistemic/root modality division. While (10a) can almost directly be recognized as an appeal for permission, it is not entirely accurate to label the sentence root deontic, as a case could be made for considering the sentence epistemic in the sense that the speaker is appealing to her knowledge of the current situation and that of the hearer to ascertain whether she may have a word. The same arguments apply to (10b). Though it initially appears to be solely epistemic, one could argue that a sense of duty is implied in the utterance, making it root deontic. It is this inherent feature of natural language to produce as many "marginal" examples of constructions as it does "core" phrases which proves that a CxG grammar is an intuitive approach to grammatical organization.

4.3.3 Modal Logic

A discussion of modality is incomplete without a nod to the long tradition of studying modality within the realm of logic. Indeed, even the most purely linguistic approach to modality is well served by an acknowledgement and familiarity with the modal operators involved. When approaching modality from the perspective of linguistic theory, a few modal operators and characteristic modal sense must be introduced in Table 2.

The linguistic operators in Table 2 will prove useful in the application of a formal schema in which it is necessary to display the source, type, sense and characteristic of modality encoded in each sentence. Operators and their corresponding characteristics are closely related to the purely logical approach to modality in which formal semantic theory is more constrained and stringent. Though logical theories of modality are certainly more inflexible, this strict methodology offers the same freedom of displaying encoded modality accurately. Take the logical operators as defined in (11) and (12) below:

(11) L operator indicates that a statement is *necessarily* true

(12) M operator indicates that a statement is *possibly* true

Modality Type	Modal Characteristic	ϕ Operator	Modal Sense
Deontic	Force	forc	*Must*
	Obligation	obl	*Must*
	Permission	perm	*Let/allow*
SOM	Imperative	imp	*Must do*
	Prohibitive	proh	*Must not do*
	Optative	opt	*Wish*
	Hortative	hor	*Should do*
	Admonitive	adm	*must*
	Permissive	perm	*Let*
Dynamic	Volition	vol	*Can/may*
	Ability	abl	*Can/may*
AOM	Obligation	obl	*Must*
	Necessity	nec	*Need*
	Desire	des	*Want*
Epistemic	Belief	bel	*Believe*
	Knowledge	know	*Know*
	Possibility (possible worlds)	pos	*May*
	Probability	prob	*Should*
	Inferred certainty	infc	*Must*

Table 2: Modality types with associated operators and characteristic modal senses (Nolan, 2008)

Operators such as these lend another dimension in accurately and succinctly logging modalities encoded in an utterance. Thus, when noting the modality of a sentence, it can be presented as:

(13) Newton knows it is dinnertime.
L(**be'**(dinnertime, Newton))
Newton knows that it is *necessarily* dinnertime.

In this way, extra logical information is represented. This application of modal operators can be extended to if-statements, such as that below, where ∂ is some proposition and **ww** is a world accessible from **w**:

(14) L (∂) is true in **w** if ∂ is true in all **ww** accessible from **w**
M (∂) is true in **w** if ∂ is true in at least one **ww** accessible from **w**

Here, the logical *true* is different in each possible world, and each world is accessible through a mutual accessibility relation. As Nolan writes, examining modality logically can contribute to the linguistic understanding of the phenomenon as the logical approach:

> "...allows us to link to the theoretical machinery associated with the (RRG) actor-undergoer hierarchy, for the determination of states of affairs and aktionsarten." (Nolan, 2008: 8)

By providing a logically-based account of the role of modality in a sentence, the linguistic analysis of said modality's input in the meaning construction of an utterance is more accurately realized within the representational schema. According to Portner, a consideration of the semantics of modal verbs offers insights into the study of reasoning by allowing for a better understanding of concepts such as implication, obligation and necessity. As Portner, 2009 states:

> "...A semantic theory which does not attend to modality will be radically simpler than one which does, and so will provide a much less accurate overall picture of the nature of meaning in human language." (Portner, 2009: 11)

For these reasons, the current study's proposed schema will include the use of modal operators as introduced in Table 4.2. By exposing the type of modality encoded in the sample sentences as well as the origin of that modality, a clear and complete schema is achieved.

5.0 CxG and English Modality

In this section, CxG is first applied to examples of "traditional" modality; that is, straightforward cases of modality in which no ambiguity or verb form variations occur. The ambiguous and varied instances are then considered within the CxG framework and with an application of a CxG schema.

Though Section Four detailed the phenomenon of modality, it is useful to quickly note the common features of English verbs in general, and more specifically, the English modal verbs. Modal verbs in English are heavily grammaticalized and do not share many common morphological properties with lexical verbs, such as sensitivity to aspect (Abraham, 2002). In essence, modality in English behaves in most ways like modality in other languages: it serves to allow speakers to talk of necessity, possibility, ability, permission, obligation and the like. However, modality in English presents several "idiosyncratic difficulties" (Palmer, 2003; 1) which are unparalleled in other languages. For instance:

(15) *I'm surprised that you should say that.*
I:PRN be:V-1sg.prt surprise:V-prt that:PRT you:PRN should:V-mdl.prt say:V-inf that:PRT
(F. Palmer, 2003)

The modality in sentence (15) presents a typological problem. It could arguably be classified as epistemic *should* on the basis that the speaker is expressing to the hearer surprise at his statement based on her knowledge of the context. It could also be argued as root deontic, *should* here encoding a sense of moral surprise or concern that the hearer uttered something with which she disagrees. Intuitively, however, neither of these explanations 'feels' right.

A study of the modal verbs of English does not end with the scrutiny of the verbs' encoding of logical notions such as obligation, permission and necessity. Analyzing the modal verbs of English also includes examining the ways in which they express subtle conversational nuances such as condescension, politeness, tact and irony, as exemplified in (16):

(16) *You can go now.*
You:PRN can:V-mdl.prt go:V-inf now:ADV
(Leech, 1987)

A straightforward analysis of (16) would imply very simply that the speaker intends to grant permission to the hearer to leave. A native speaker of English, however, would immediately recognize the inherent condescension encoded in a sentence a command such as (16). Indeed, one can almost imagine the speaker's utterance of (16) accompanied by a flippant wave of the hand and icy manner. Similarly, speakers encode great politeness with the use of phrases such as "Would you mind..." or "Would you like to..." to prove that they value a listener's opinion (Leech, 1987). Discovering from where these implications originate remains a popular field of linguistic study.

5.1 Application of Schema to Traditional English Modality

To begin the application of CxG theories to modality in English, an example of traditional English modality is provided in (17).

(17) a *I must reply to Steve and Chrissy.*
I:PRN must:V-mdl.prt reply:V-inf to:PP Steve:N and:CONJ Chrissy:N

b *You must reply to Steve and Chrissy.*
You:PRN must:V-mdl.prt reply:V-inf to:PP Steve:N and:CONJ Chrissy:N

The example in (17a) above is a classic example of root deontic modality. The speaker feels a sense of moral or social obligation to send an overdue reply to the subjects, Steve and Chrissy. As proposed below, the enhanced schema succinctly captures the modality of the sentence in example Figure 4 below:

PRAGMATICS	SUB: me CONTEXT: have obligation, reply OBJECTS: Steve, Chrissy
SEMANTICS	mustROOT{ϕadm, ϕimp [**do'**(1sg) **reply'**(1sg, Steve & Chrissy)]}
MORPHOLOGY	I:PRN must:V-mdl.prt reply:V-inf to:PP Steve:N and:CONJ Chrissy:N
SYNTAX	*I must reply to Steve and Chrissy.*

Figure 4: Sentence (17)a as represented in proposed schema

The syntactic realization of sentence (17) is simple and tied to the morphological level of speech: the modal verbs of English do not follow the tense changes characteristic of the general English verbs. This fact is interesting in that rather than encouraging specific and inflexible meanings for each modal verb as one might assume from a system which depends solely on the modality encoded by the word itself, ambiguity and varied uses arise. The role of the construction then becomes increasingly important in discerning an accurate interpretation of the modal expression.

The PRAGMATICS level displays the contextual considerations acknowledged by the speaker at the onset of sentence formulation. The SEMANTICS level, the domain of the modal verb, is the level of interest in the present example. Displayed here in Figure 6.1 are the key clues to accurately capturing modality in speech. First, it is shown that root modality originates from the SEMANTICS level of the utterance. Second, the verb MUST is shown to be of root modality, with the optional reading of either ϕadm (admonitive) or ϕimp (imperative). These two choices are equally available to the speaker and hearer, though the definition of the verb MUST has remained intact.

It is interesting to note here that in the same vein, a ϕforc (force) or ϕobl (obligation) modal operator would be available if the subject of the sentence were changed from first person singular *I* to second person singular *you,* as shown in sentence (17b) and displayed in Figure 5 below:

PRAGMATICS	SUB: me CONTEXT: have obligation, reply OBJECTS: Steve, Chrissy
SEMANTICS	mustROOT{ϕforc, ϕobl [**do'**(1sg) **reply'**(1sg, Steve & Chrissy)]}
MORPHOLOGY	You:PRN must:V-mdl.prt reply:V-inf to:PP Steve:N and:CONJ Chrissy:N
SYNTAX	*You must reply to Steve and Chrissy.*

Figure 5: Sentence (17)b as represented in proposed schema

As CxG posits, this is due to the fact that the meaning of the sentence is not driven by the lexical entry of a few key verbs and arguments but rather, the meaning is derived from the entire construction, the pairing of the meanings of the words as well as the form and order in which they appear. With the substitution of *I* for *You,* the orientation of the obligation shifts from agent-oriented in Figure 4 to speaker-oriented in Figure 5, though the rest of the sentence has remained unchanged. The diagram below represents the shift:

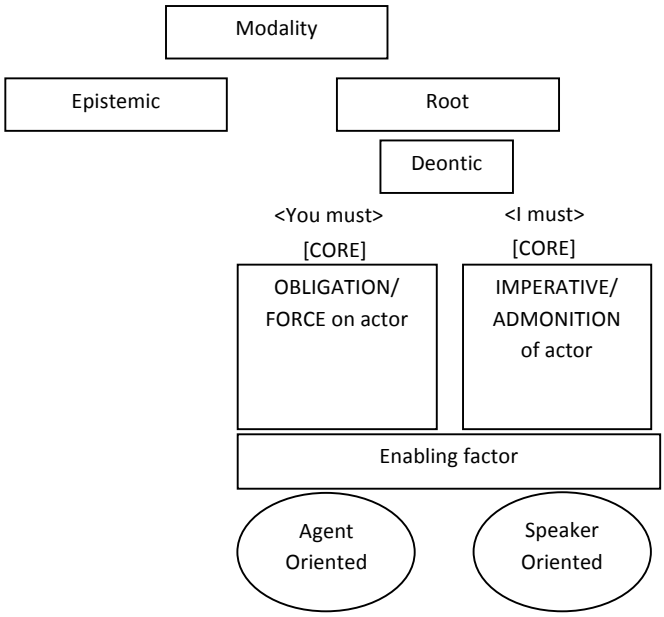

Figure 6: Relationships between agent-oriented and speaker-oriented modality in (17)a and (17)b

Through a change of pronoun, an important change in the modal operations at work in the utterance follows. It seems there is little room for substitution of the arguments involved in English modal expressions.

This is especially evident in English sentences which rely heavily upon word order for meaning. The modal examples in Figures 6.1 and 6.2 show that the modal verb MUST, exhibiting influence over the verb REPLY by its location in the utterance, does not need to alter its lexical entry for an accurate reading of obligation or modal imperative: the modal operators offer these choices for the speaker and hearer. Finally, these modal operators are

shown to have influence over the entire utterance, thus shading the utterance with a root deontic reading. The speaker, who feels strongly about the obligation to reply to the friends, is able to encode this strong feeling simply by choosing the modal verb MUST instead of another, weaker modal such as SHOULD.

Consider another example of traditional English modality in (18) below:

(18) *That must have been all they had.*
That:PRN must:V-mdl.prt be:V-per all:N they:PRN have:V-pst

The verb involved is again MUST, but this time with an epistemic reading. As represented in the proposed schema:

PRAGMATICS	SUB: this object CONTEXT: necessarily is entire stock
SEMANTICS	mustEPIST{ϕinfc [**have been'**(3pl, all)]}
MORPHOLOGY	That:PRN must:V-mdl.prt be:V-per all:N they:PRN have:V-pst
SYNTAX	*That must have been all they had.*

Figure 7: Sentence (18) as represented in proposed schema

Though the modal verb in sentences (17) and (18) is the same, the meaning and modality of each is very different. As displayed in Figure 7, the modality captured in the MUST of (18) is epistemic in nature. This is seen in the semantics level and encoded with the modal operator ϕinfc which means "inferred certainty." The speaker is certain that "that" is "all they had" because of her knowledge of the world around her. That modal certainty is expressed syntactically as "must," though this verb is also available for use in root modality as well. The dual functions of MUST can coexist within the CxG framework without the need for a separate scheme of linking rules to explain or account for each one. Following the same logic, epistemic modality is expressed in both of the verbs MUST and SHOULD, though to varying degrees of certainty. Consider the next example:

(19) *This should work.*
This:PRN should:V-mdl.prt work:V-inf

Sentence (19) is a classic example of epistemic modality involving the verb SHOULD. In the proposed schema, the modality can be captured as below:

PRAGMATICS	SUB: this action CONTEXT: probably will be successful
SEMANTICS	shouldEPIST{ϕprob, ϕpos [**do'**(3sg[**work'**(3sg)])]}
MORPHOLOGY	This:PRN should:V-mdl.prt work:V-inf
SYNTAX	*This should work.*

Figure 8: Sentence (19) as represented in proposed schema

Again, the modality of the utterance has been encoded semantically. In this case, the modal verb SHOULD offers the interpretational options of ϕprob (probability) and ϕpos (possibility). Though both the modal verbs MUST as used in (18) and SHOULD as used in

(19) denote the epistemic modality of belief or knowledge of the world, they do so with different shades of conviction. Within the mind of the speaker in (18), little doubt as to the truth of her statement has been left; the speaker of (19) is not so confident. This is a fascinating characteristic of modality: the sliding scale of merely believing to actually knowing. Though none but the speakers of (18) and (19) could accurately explain their evidence for knowing or believing their statements, the proposed schemata in Figures 7 and 8 *are* able to accurately predict the modality encoded as well as display the types and scope of the modality operating within the utterance. According to the CxG framework, this is useful in that the modality of the entire construction is represented.

Note as well the influence of the subject in the modal interpretation of each verb. If, for instance, the subjects of sentences (18) and (19) were replaced a personal pronoun such as the first person plural *we*, the type of modality encoded becomes root deontic instead of epistemic. When a human subject, as *we* would encode, is applied rather than the impersonal *that* or *this*, the sentence becomes an appeal to the sense of duty: it becomes more human. Again, CxG capably accounts for this shift in meaning interpretation by allowing for the equal input from all levels of meaning encoding, including the syntactic realization of the utterance. Though traditional instances of modality in English are useful in establishing a basis for the application of the proposed schema, it is the untidy samples of language, the natural, non-core use that proves the most interesting in linguistic study. Therefore, in the next section, variations of modality within English are examined.

5.2 Application of Schema to English Modal Variations

If CxG is to be cited as an appropriate framework in which to describe modality, it must stand the test of non-traditional applications. Distinctions such as ambiguity and variations in usage are the modality of the native, natural speaker, and no application of a grammar theory would be complete without addressing them. Therefore, the section below offers examples and analysis of the discrepancies found in English modal expressions.

5.2.1 Modal Ambiguity

As noted in the brief history of modality provided in Chapter Four, the modal verbs of English have evolved from holding distinct lexical meaning to serving an assortment of syntactic, semantic and pragmatic functions. This polyfunctional nature ensures that modal verbs in English are often misinterpreted due to ambiguity. For example, consider sentence (20) below:

(20) *If Cillian isn't busy, he may go.*
If:COND Cillian:N be:V-1sg.prt not:NEG busy:V-prt he:PRN may:V-mdl.prt go:V-inf

At first glance, example (20) is a simple case of deontic modality. This type of modality would accurately be represented in Figure 9:

PRAGMATICS	SUB: Cillian CONTEXT: possesses permission, IF not busy THEN go
SEMANTICS	mayROOT{ϕperm [[**busyNEG'**(Cillian)]^[**do'**(Cillian[**go'**(Cillian)])]}
MORPHOLOGY	If:COND Cillian:N be:V-1sg.prt not:NEG busy:V-prt he:PRN may:V-mdl.prt go:V-inf
SYNTAX	*If Cillian isn't busy, he may go.*

Figure 9: Deontic modality of sentence (20) as represented in proposed schema

As interpreted in Figure 9, sentence (20) would hold an initial interpretation that Cillian is under some obligatory work schedule during which he might be too busy to go. However, consider the schema in Figure 10:

PRAGMATICS	SUB: Cillian CONTEXT: possesses ability, IF not busy THEN go
SEMANTICS	mayEPIST [[**busyNEG'**(Cillian)]^ {ϕpos [**do'**(Cillian[**go'**(Cillian)])]}
MORPHOLOGY	If:COND Cillian:N be:V-1sg.prt not:NEG busy:V-prt he:PRN may:V-mdl.prt go:V-inf
SYNTAX	*If Cillian isn't busy, he may go.*

Figure 10: Epistemic modality of sentence (20) as represented in proposed schema

The difference in the two interpretations of (20) is the scope of the modal verb MAY. Note that in Figure 9, MAY is shown to have scope over the entire utterance. However, in Figure 10, MAY only has scope over the second portion of the sentence: "he may go." Taking these scopal considerations into consideration, the representation in Figure 10 could be interpreted as, "In the event that Cillian is not busy, he may decide to go." The scope of the modality lies in the orientation of the modality. If there is an outside force such as represented in Figure 6.6 initiating the modality, the modal operator ϕperm (permission) will hold scope over the entire utterance. If, however, as in Figure 10 the modality is instigated from Cillian himself, the modal operator ϕpos (possibility) will dictate that based on a set of known circumstances, Cillian is able to decide to go. It is interesting to note here the influence of the conditional word *if*. In pragmatic logic, if-then statements such as sentence (20) can be represented in logical statements like (21) and decomposed into an easily-intelligible schema as in Figure 11 below:

(21) If q then p

q		**p**
T	→	T
F	→	T or F
F	←	F
T or F	←	F

Figure 11: Composite truth table as assumed by an epistemic reading of (20) (Huang, 2007)

Figure 11 displays the composite truth values for the two propositions expressed syntactically in (20) and represented logically in (21). When considering the scope of modality, the role of any logical operators existing in the sentence should not be ignored. In this case, the modality itself interacts with the influence of the conditional if-then to create the epistemic and root modal readings. Note that while all the truth conditions expressed in Figure 6.6 hold true for an epistemic reading, a deontic reading would require altered truth conditions, such as those in Figure 12:

q		**p**
T	→	T
F	→	F
F	←	F
T	←	T

Figure 12: Composite truth table as assumed by a deontic reading of (20)

Within a CxG framework, the interplay of the pragmatic and semantic elements of (20) is essential to meaning creation in the construction as a whole. CxG can account for the availability of both an epistemic and deontic reading of (20) and their corresponding truth values by allowing for a disparity in meaning based not on the lexical entries of the verbs and arguments involved in each sentence, but on the combination of the semantics and pragmatics levels and their contextual differences, which in this case override the sum of the parts to arrive at a complete construction meaning.

Another example of ambiguity in English modality is considered in (22), where the modal verb CAN is available for both a root deontic and root dynamic interpretation.

(22) *Jena can tell you everything.*
Jena:N can:V-mdl.prt tell:V-inf you:PRN everything:N

Depending on the context in which it was uttered, the sentence in (22) could bear the root dynamic interpretation along the lines of, "Jena is able to tell you everything, as she has all the necessary and pertinent information." A root deontic reading, however, would leave the hearer with the interpretation that, "Jena has been granted permission to tell you everything."

Both of these interpretations are coded in the semantic level of speech as displayed in Figure 13 below:

PRAGMATICS	SUB: Jena, you CONTEXT: possesses ability to tell all information
SEMANTICS	canROOT{ϕabl, ϕperm [**do'**(Jena)[**tell'**(you, everything)]]}
MORPHOLOGY	Jena:N can:V-mdl.prt tell:V-inf you:PRN everything:N
SYNTAX	*Jena can tell you everything.*

Figure 13: Sentence (22) as represented in proposed schema

As shown in Figure 13, the two possible interpretations of the modal verb CAN are encoded at the semantic level. It is the pragmatic or contextual level which offers the keys to deciphering the speaker's intended interpretation. Here, the situational nuances indicate that a root dynamic understanding is intended, but that is only realized by the cooperation of all levels of the utterance, as posited in the CxG framework. These levels do not exist in a top-down hierarchy but work together along a continuum of meaning to form a higher plane of interpretation: the construction. In that way, the two possible interpretations of CAN are able to coexist without the creation of additional, ad hoc linking rules. The conglomerate meaning of the construction is all that is needed to arrive at the correct interpretation.

It is worth noting here that the addition of a temporal descriptor such as *now* to sentence (22) narrows the interpretive choices to one: root deontic. Consider sentence (23):

(23) *Jena can tell you everything now.*
Jena:N can:V-mdl.prt tell:V-inf you:PRN everything:N now:ADV

To capture the change in meaning, Figure 14 displays the schema:

PRAGMATICS	SUB: Jena, you CONTEXT: possesses permission to tell all information
SEMANTICS	canROOT[now{ϕperm [**do'**(Jena)[**tell'**(you, everything)]]}]
MORPHOLOGY	Jena:N can:V-mdl.prt tell:V-inf you:PRN everything:N now:ADV
SYNTAX	*Jena can tell you everything now.*

Figure 14: Sentence (23) as represented in proposed schema

The temporal word *now* acts at the condition under which Jena is permitted to convey the information in question. As shown at the semantics level, *now* enjoys scope over the entire utterance, even over the modality of CAN. This is succinctly displayed in the proposed schema in the SEMANTICS line by placing *now* at the beginning of the string of operators, showing the temporal considerations to influence the sentence even above that of the modality. This ease of adaptability is a great advantage of the proposed schema.

The simplicity with which the schema is amended to suit the addition of *now* reflects one of the goals of the current study: to offer a straightforward schema for representing the CxG. By advocating that the meaning of each part of an utterance is submissive to the meaning of the construction as a whole, CxG lends itself to such an easily-adaptable schema which can concisely mirror changes in syntax, morphology, semantics or pragmatics.

5.2.2 Variations in Modal Realizations

Ambiguity is not the only variation in the realization of modality in English. Below are several examples of conversational situations in which the type of modality expressed is unclear or not obviously defined. Consider first sentence (24):

(24) *Should Tipperary win tomorrow, they'll*
Should:V-mdl.prt Tipperary:N win:V-inf tomorrow:ADV they:PRN+will:V-mdl.prt
play in the All-Ireland final.
play:V-inf in:PP the:DET All-Ireland:ADJ final:N

Upon reading (24), the instinctive interpretation is one of epistemic modality. That is, the speaker is making an assumption (that Tipperary will play in the final) based on information she possesses about the real world (the possibility of Tipperary winning). However, a closer examination reveals that there is another factor at work in (24). To capture it, consider the schema in Figure 15:

PRAGMATICS	SUB: Tipperary CONTEXT: possesses ability to play in final, if win tomorrow
SEMANTICS	shouldEPIST[IF{ϕprob [[**do'**(Tipperary)[**win'**(Tipperary, tomorrow)]]^THEN[**do'**(they)**play'**(they, final)]]]
MORPHOLOGY	Should:V-mdl.prt Tipperary:N win:V-inf tomorrow:ADV they:PRN will:V-mdl.prt play:V-inf in:PP the:DET All-Ireland:ADJ final:N
SYNTAX	*Should Tipperary win tomorrow, they'll play in the All-Ireland final.*

Figure 15: Sentence (24) as represented in proposed schema

Again modality's close ties to modal logic provide an example of modality which is perhaps best described in terms of the modal operators IF and THEN. As Figure 15 illustrates, the modality encoded in the modal verb SHOULD is affected and effectively distributed by the conditions of IF and THEN implied. The modal verb SHOULD in sentence (24) cannot truly be labelled an epistemic modal of probability; instead, logical constraints embedded in the verb itself both change the exact nature of the modality to that of a conditional and apply those conditions to both sentential clauses though neither the modality nor the conditional is overtly represented in the second clause of the sentence.

This example of non-traditional modality is easily accounted for within the proposed schema. No new linking rules are required; by the simple addition of a new logical operator the distinct modality of (24) is displayed accurately and elegantly. In keeping with the postulates of CxG, the 'irregular' modality is illustrated in the same manner as the 'regular,' as no construction or realization of the phenomenon should be considered more acceptable or normal than the other.

Another variation in the realization of English modals is exemplified in sentence (25) below:

(25) *You may want to close that window.*
You:PRN may:V-mdl.prt want:V-inf to:PP close:V-prt that:DET window:N

As was the case in the modality captured in sentence (24) above, the modality in (25) is somewhat difficult to describe. Ostensibly, the modal verb MAY in sentence (25) appears to encode an epistemic modality over the entire construction, but upon further consideration, it seems that the encoding of modality in this particular example is rather less obvious. To depict the subtle difference in the modality represented in (25), consider Figure 16:

PRAGMATICS	SUB: you CONTEXT: possibly possess desire to close window
SEMANTICS	mayEPIST{ϕpos[**want'**(you)}^**do'**(you[**close'**(you, window)])]
MORPHOLOGY	You:PRN may:V-mdl.prt want:V-inf to:PP close:V-prt that:DET window:N
SYNTAX	*You may want to close that window.*

Figure 16: Sentence (25) as represented in proposed schema

The element in sentence (25) which sets it apart from other examples of modality is that the sentence includes two sets of verbs and arguments: a) *you may want* and b) *close that window*. These two clauses are linked by the preposition *to* but not linked by a common modality. The modality encoded in the modal verb MAY extends only as far as the first clause, *you may want.* The second clause is not affected by the verb MAY. This fact contradicts an interpretation such as, "You will possibly close the window," or, "You have the ability to close the window." The scope of the modality in (25) is constrained specifically to the first clause. Therefore, a more accurate interpretation of the sentence in (25) is, "You possibly possess the desire to close that window." Finally, the sentences in (26) offer an altogether different variation in the realization of English modality than those analyzed above.

(26) a *She must be heading home*
She:PRN must:V-mdl.prt be:V-inf head:V-prt home:N
b *We must be heading home*
We:PRN must:V-mdl.prt be:V-inf head:V-prt home:N

The sentences in (26a) and (26b) present an interesting paradox in interpreting modality. While sentence (26a) encodes an epistemic reading which implies that the speaker knows that the subject is heading home based on the speaker's knowledge of the current situation as well as his knowledge of the subject (inferred certainty), with the alteration of just one word the modal verb in sentence (26b) encodes a completely different type of modality: namely, root deontic modality. Here, the speaker is commenting on the duty to and necessity of heading home. To capture these differences, the proposed schema is employed in Figures 17 and 18 below:

PRAGMATICS	SUB: she CONTEXT: possess knowledge of going home
SEMANTICS	mustEPIST{ϕinfc[**be'**(she)^**do'**(she[**head'**(she, home)])]}
MORPHOLOGY	She:PRN must:V-mdl.prt be:V-inf head:V-prt home:N
SYNTAX	*She must be heading home.*

Figure 17: Sentence (26a) as represented in proposed schema

Compare the epistemic modality encoded above to the root deontic encoded in Figure 18 below:

PRAGMATICS	SUB: we CONTEXT: possess duty, necessity of going home
SEMANTICS	mustROOT{ϕobl [**be'**(she)^**do'**(she[**head'**(she, home)])]}
MORPHOLOGY	We:PRN must:V-mdl.prt be:V-inf head:V-prt home:N
SYNTAX	*We must be heading home.*

Figure 18: Sentence (26b) as represented in proposed schema

In the sentences (26a) and (26b), once again a substitution of pronoun has wrought an important interpretational change, noted below by a relationship diagram:

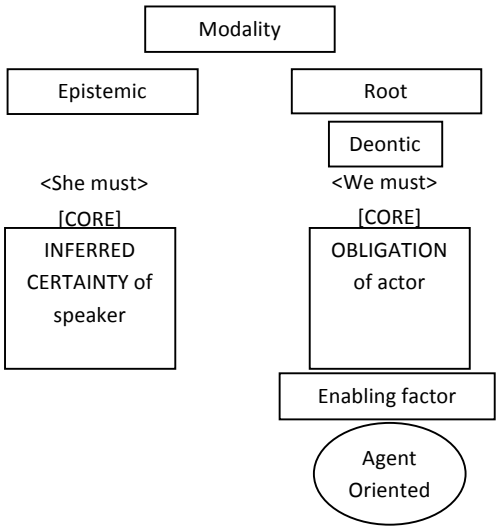

Figure 19: Relationships between agent-oriented and speaker-oriented modality in (26a) and (26b)

Here the substitution of *She* for *We* invokes a complete typological change. While sentence (26a) involves epistemic modality, sentence (26b) is an example of root deontic. The two types of modality encoded in sentences (26a) and (26b) display the fine lines of distinction that exist between the modal verbs of English. To understand how this change is achieved the schemata Figures 17 and 18 above offer clear visual representations. In these, the variation is captured neatly and concisely and in keeping with the essential ideas of CxG. Though the meaning of the sentence and of the modal verb MUST itself have changed completely, no new linking rules are necessary to prove the changes.

6.0 Conclusions

As the introduction to this research study established, language is not tidy. The fluctuations of prosodic features, syntactic and morphological realizations and semantic and pragmatic considerations involved in the natural usage of language prove this time and again, including those non-core examples provided above in the current study such as modal ambiguity and alternative realization.

To account for the natural variations in the form and even the function of parts of speech in a language, CxG provides a grammatical framework which accepts the variations in speech alongside and on equal footing with the so-called "core" usage examples. The pairing of form and function in the final realization of an utterance is dubbed a *construction*, and it is the construction, the combination of the meaning encoded by form and function in an utterance, which provides a complete interpretation exceeding that of an utterance's individual elements such as a verb's lexical entry or prescribed morphological patterning.

6.2 Discussion

The ability of CxG to allow for an unlimited number of variations in natural language usage proves it ideal in describing rich phenomena such as modality. The schemata of CxG, however, are unnecessarily laboured for the purpose of describing and illustrating sentential root and epistemic modality. Layer upon layer of large nested brackets containing the lexical specifications and thematic roles for an utterance's parts of speech prove cumbersome and unwieldy when attempting to concisely describe one specific occurrence such as modality. For these reasons, the current study proposes a cleaner, more elegant schema as detailed in Section Five. In the proposed schema, contributions from four of the levels of meaning input, the syntactic, morphological, semantic and pragmatic, are arranged in an order reminiscent of the syntax-lexicon continuum. In the case of the present study in which modality is the element of interest, the level of modal operation, the semantic, is enhanced to show exactly where and with what scope the modality operates over the entire utterance.

To claim a satisfactory application of CxG, however, it is necessary to re-examine the hypotheses and research questions posed in Section One. Once again, the hypotheses asserted by the current study are: 1) there are varying types of modality in English; 2) these modal variations are realized uniquely and; 3) an accurate and effective account of these unique modalities and corresponding marking systems can be provided within the CxG framework.

In Section Five, examples of both core and varied modality are provided. Variations included statements of ambiguous nature, as well as statements in which the modality realized could be altered by changing the pragmatic assumptions of the situation or the subject of the sentence. In this way, hypotheses 1 and 2 are proved. The third hypothesis is confirmed with the successful application of the proposed schema to the instances of modality documented in

Section Four. In each example, the schema successfully adapts to the unique modality in question, displaying its useful versatility in approaching modality through a CxG framework.

One interesting product of this study is the shift of the modal interpretations when the subject of an utterance is changed. It seems that the subject of the sentence places a heavy interpretational onus on the modality operating over the entire utterance. This further proves the CxG postulate that all parts of an utterance bear upon the meaning of a construction. A sentence simply cannot be a rigid amalgamation of lexical entries. The pronouns substituted for one another in the examples in Section Five above do not hold in their lexical definitions information which would change the meaning of a verb. However, as exemplified, the substitution of one pronoun for another has profound impact on the interpretation of modal expressions. As CxG posits, it is the pairing of the form of the utterance as well as the functions of the parts of speech involved which contribute to the overall meaning of the construction.

6.3 Implications

In applying CxG to the examples of English modality provided in Section Five, it is established that it is a sufficient theory for the description of modality. In the same section, the application of the schema describes modality within the CxG framework and in keeping with the goal established in the introduction chapter of creating a schema which is less cumbersome than that proposed by the CxG theorists. Both of these objectives have been achieved.

By applying CxG to instances of modality in English, the current study has provided both an important step in the advancement of CxG as well as a useful tool in the development of its theories. Approaching a description of modality in any theory of grammar is a move that can only enhance and serve to establish the theory to an even greater extent, as the subject of modality, as seen in Section Four above, is one of some importance among linguists and logicians alike. The implications of the current study for the advancement of CxG, therefore, are further proof of the theory's capability to describe any number of language phenomena. As shown in Section Five, traditional and varied examples of modality are accurately explained within the framework of CxG.

Even the proposal of an alternative schema to be used in the application of CxG to modality should be considered a progression of the theory. Use of the proposed schema not only presents a more attractive and manageable visual representation than the current layered bracket design, but also offers an alternative option for the description of individual phenomena, such as that of modality presented in the current study. Ultimately, this work's application of CxG serves to further linguists' knowledge and understanding of the modal phenomenon. In the preceding chapters, a theory and schema combination is offered which merges the dual advantages of flexibility and descriptive adequacy. CxG was developed with the natural language speaker in mind, and an amalgamation of a theory based on the creativity of natural speech with a representational schema so quickly and easily adjusted to the slightest nuance is a powerful tool that can contribute toward a fuller understanding of modality in language.

6.4 Recommendations

Further applications of the schema would greatly benefit both the increased influence and acceptance of the theories of CxG as well as a more accessible understanding of modality

within that framework. To achieve this, the schema should be tested in a variety of languages, preferably those without IndoEuropean roots. Also, a closer study and subsequent application of the theory to the set of modal verbs in English as well as other languages would achieve a balanced and complete depiction of the multiple and varied types of modality which exist in the world's languages. The current study, though attempting to thoroughly analyze the occurrences of root and epistemic modality in English as realized with core modal verbs, lacks the scope to endeavour a more comprehensive analysis.

References

Abraham, W. (2002). Modal Verbs: Epistemics in German and English. In S. Barbiers, F. Beukema & W. van der Wurff (Eds.), *Modality and its Interaction with the Verbal System* (pp. 19 - 50). Amsterdam: John Benjamins.

Biber, D. (1999). *Longman Grammar of Spoken and Written English*. London: Longman.

Bresnan, J. (2001). *Lexical-functional grammar*. Oxford: Blackwell.

Bybee, J., & Fleischmann, S. (1995). Modality in Grammar and Discourse: An Introductory Essay. In J. Bybee & S. Fleischmann (Eds.), *Modality in Grammar and Discourse*. Philadelphia: John Benjamins.

Coates, J. (1983). *The Semantics of the Modal Auxiliaries*. Kent: Croom, Helm Ltd.
Contributors, W. (2009, 12 November 2009). Construction Grammar Retrieved 1 April 2010, 2010, from http://en.wikipedia.org/w/index.php?title=Construction_grammar&oldid=325396463

Croft, W. (2000). Countability in English nouns denoting physical entities: a Radical Construction Grammar analysis. Retrieved from http://www.unm.edu/~wcroft/Papers/Count.pdf

Cruse, A. (2000). *Meaning in Language: An Introduction to Semantics and Pragmatics*. Oxford, UK: Oxford University Press.

Davies, M. (2002). Corpus del Espanol. from Brigham Young University http://www.corpusdelespanol.org/x.asp

Fried, M. (2010). Construction Grammar, 2010, from http://www.constructiongrammar.org/

Goldberg, A. (1995). *Constructions: a construction grammar approach to argument structure*. Chicago: University of Chicago Press.

Huang, Y. (2007). *Pragmatics*. Oxford: Oxford University Press.

Huddleston, R., & Pullman, G. (Eds.). (2002) The Cambridge Grammar of the English Language. Cambridge: Cambridge University Press.

Krugg, M. (2000). *Emerging English Modals: A Corpus-Based Study of Grammaticalizaiton*. Berlin/New York: Mouton de Gruyter.

Leech, G. (1987). *Meaning and the English Verb*. London: Longman.

Leech, G. (2003). Modality on the move: the English modal auxiliaries 1961-1992. In R. Facchinetti, M. Krug & F. Palmer (Eds.), *Modality in contemporary English*. Berlin: Mouton de Gruyter.

Leino, J. (2005). Frames, profiles and constructions: Two collaborating CGs meet the Finnish Permissive Construction. In J.-O. Ostman & M. Fried (Eds.), *Construction grammars: cognitive grounding and theoretical extensions* (pp. 89-120). Amsterdam: John Benjamins.

Lyons, J. (1977). *Semantics*. Cambridge.

Matthews, P. H. (2007). *The Concise Oxford Dictionary of Linguistics* (Vol. 2). Oxford: Oxford University Press.

Michaelis, L. (2006). Construction Grammar. In K. Brown (Ed.), *The Encyclopedia of Language and Linguistics* (2 ed., Vol. 3, pp. 73-84). Oxford: Elsevier.

Michaelis, L. (*forthcoming*). Making the Case for Construction Grammar. In H. Boas & I. Sag (Eds.), *Sign-Based Construction Grammar*. Stanford: CSLI Publications.

Michaelis, L., & Ruppenhofer, J. (2001). *Beyond Alternations: A Constructional Model of the German Applicative Pattern*. Stanford: CSLI Publications.

Nolan, B. (2008). Modality in RRG-Towards a characterisation using Irish data. In R. Van Valin (Ed.), *Investigations of the Syntax–Semantics–Pragmatics Interface* (Vol. 105). Amsterdam/Philadelphia: Benjamins Publishing Company.

Palmer, F. (2003). Modality in English: Theoretical, descriptive and typological issues. In R. Facchinetti, M. Krug & F. Palmer (Eds.), *Modality in Contemporary English*. Berlin: Mouton de Gruyter.

Palmer, F. (1986). *Mood and Modality*. Cambridge: Cambridge University.

Papafragou, A. (2000). *Modality: Issues in the semantics-pragmatics interface*. Oxford: Elsevier Science, Ltd.

Perkins, M. (1983). *Modal Expressions in English*. London: France Pinter Publishers.

Pollard, C., & Sag, L. *Head-driven phrase structure grammar*. Chicago: University of Chicago Press.

Portner, P. (2009). *Modality*. Oxford: Oxford University Press.

Talmy, L. (1981). *Force dynamics*. Paper presented at the Language and Mental Imagery, conference in Berkeley.

Talmy, L. (1988). Force dynamics in language and cognition. *Cognitive Science, 2*, 49-100.

Traugott, E. C. (2006). Historical Aspects of Modality. In W. Frawley (Ed.), *The Expression of Modality*. Berlin: Mouton de Gruyter.

Van Valin, R. & LaPolla, R. (1997). *Syntax: structure, meaning and function*. Cambridge, UK: Cambridge University Press.

Van Valin, R. (2005). *Exploring the Syntax-Semantics Interface*. Cambridge: Cambridge University Press.

Van Valin, R. (2007). A Summary of Role and Reference Grammar. Retrieved from Role and Reference Grammar website: http://linguistics.buffalo.edu/people/faculty/vanvalin/rrg.html

N + N compounds in German: An analysis within Role and Reference Grammar

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Abstract[9]

The aim of this paper is to analyze German N + N compounds consisting of nominal roots [hence N + N compounds] within the theory of Role and Reference Grammar [RRG] (Van Valin and LaPolla 1997, Van Valin 2005). The basis for this analysis of German N + N compounds is the Layered Structure of the Word [LSW] as developed in Nolan (2010). The LSW is analogous to the Layered Structure of the Clause [LSC] and the Layered Structure of the Noun Phrase [LSNP] as they are used in RRG. Besides the description of German N + N compounds, this paper investigates the role of the lexicon, the necessity of a semantic structure of lexemes - based on Pustejovsky's notion of qualia structures (Pustejovsky 1995) - and the use of inheritance hierarchies in a description of inflectional morphology and the use of interfixes. The paper also investigates the use of Constructional Schemas (CSs) as developed in Nolan (2010). These CSs are similar to the syntactic inventory in RRG. With help of CSs, which are part of the semantic representations of lexemes partially based on Pustejovsky's qualia structures, it will be possible to show how lexical entries for nouns are constructed. These lexical entries are stored in the lexeme store, which is part of the lexicon. The paper will show that the analysis of German N + N compounds based on the use of the LSW is compatible with the RRG-conception of the LSC and the LSNP.

1.0 Introduction

This paper has several goals. First, to give a detailed description of N + N compounds with nominal roots in German and second, to introduce a morphological theory for RRG based on this analysis. This work is based on Nolan's morphological analysis of the LSW of the Modern Irish word (Nolan 2010). I will propose situating the LSW within an RRG setting and motivate this by reference to N + N compounds in German and the processes which operate on them. When characterizing German N + N compounds I will constitute the part of RRG which is concerned with morphology and its relationship to the lexicon, thereby extending RRG to include a morphological part. The theory of RRG can be found in Van Valin and LaPolla (1997) and Van Valin (2005). here, the notion of the LSW and the LSNP are described in detail. Also, qualia theory is introduced (cf. Van Valin 2005: 51ff).

Throughout this paper I will assume that roots can have syntactic categories and that they are stored underspecified in the lexicon. I also assume that German N + N compounds basically consist of roots which are compounded. While the first argument constituent cannot bear any inflection, the head of a compound can have inflection. This is explained in detail in section 2.

This paper will basically deal with German compounds consisting of two constituents - although in German, N* compounds of infinite length are possible in general. The paper is organized as follows: In section 2 I will give a detailed description of German declension classes and the mechanisms of noun compounding in German. I will then concentrate on German N + N compounds. In the following, I will describe how noun inflection in German works and introduce the notion of compound markers based on Ralli (2008). In section 3 I

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will develop CSs for German N + N compounds and introduce a semantic description for nouns based on Pustejovsky's qualia theory (Pustejovsky 1995). I will also construct lexical entries for German nouns based on qualia theory and show how compounding operates on this semantic level. I will introduce inheritance mechanisms which explain how noun inflection operates in German. In section 4, the notion of LSW is introduced and a description of the LSW of German N + N compounds is given. Section 5 contains a summary of the paper's results.

2.0 Case Marking in German

German is a dependent marking language with a nominative-accusative case system. The German language has the cases nominative, genitive, dative and accusative. Case marking in German is realized with the help of articles. Additionally, inflection is used to mark case assignment. German has thirteen declension classes with three subclasses. An overview of these declension classes is given in table 2.0.1 – 2.0.13. German has a definite and an indefinite article. With respect to the indefinite article it shows inflection, too. German has a system of three genders: masculine, feminine and neuter and the two numbers singular and plural.

Table 2.0.1 declension class A

Case	class A (masc)	translation
nominative singular	der Fisch-Ø	fish
gentive singular	des Fisch-(e)s	fish
dative singular	dem Fisch-e	fish
accusative singular	den Fisch-Ø	fish
nominative plural	die Fisch-e	fishs
genitive plural	der Fisch-e	fishs
dative plural	den Fisch-en	fishs
accusative plural	die Fisch-e	fishs

(cf. Simmler 1998: 218)

Table 2.0.2 declension class B

Case	class B (fem)	translation
nominative singular	die Trübsal-Ø	misery
genitive singular	der Trübsal-Ø	misery
dative singular	der Trübsal-Ø	misery
accusative singular	die Trübsal-Ø	misery
nominative plural	die Trübsal-e	miseries
genitive plural	der Trübsal-e	miseries
dative plural	den Trübsal-en	miseries
accusative plural	die Trübsal-e	miseries

(cf. Simmler 1998: 218)

Table 2.0.3 declension class C

Case	Class C (neut)	translation
nominative singular	das Brett-Ø	plank
genitive singular	des Brett-es	plank
dative singular	dem Brett-e	plank
accusative singular	das Brett-Ø	plank
nominative plural	die Brett-er	planks
genitive plural	der Brett-er	planks
dative plural	den Brett-ern	planks
accusative plural	die Brett-er	planks

(cf. Simmler 1998: 218)

Table 2.0.4 declension class D

Case	Class D (neut)	translation
nominative singular	das Mittel-Ø	agent
genitive singular	des Mittel-s	agent
dative singular	dem Mittel-Ø	agent
accusative singular	das Mittel-Ø	agent
nominative plural	die Mittel-Ø	agents
genitive plural	der Mittel-Ø	agents
dative plural	den Mittel-n	agents
accusative plural	die Mittel-Ø	agents

(cf. Simmler 1998: 218)

Table 2.0.5 declension class E

Case	Class E (masc)	translation
nominative singular	der Besen-Ø	broom
genitive singular	des Besen-s	broom
dative singular	dem Besen-Ø	broom
accusative singular	den Besen-Ø	broom
nominative plural	die Besen-Ø	brooms
genitive plural	der Besen-Ø	brooms
dative plural	den Besen-Ø	brooms
accusative plural	die Besen-Ø	brooms

(cf. Simmler 1998: 218)

Table 2.0.6 declension class F

case	class F (fem)	translation
nominative singular	die Mutter-Ø	mother
genitive singular	der Mutter-Ø	mother
dative singular	der Mutter-Ø	mother
accusative singular	die Mutter-Ø	mother
nominative plural	die Mütter-Ø	mothers
genitive plural	der Mütter-Ø	mothers
dative plural	den Mütter-n	mothers
accusative plural	die Mütter-Ø	mothers

(cf. Simmler 1998: 218)

Table 2.0.7 declension class G

Case	Class G (masc)	translation
nominative singular	der Uhu-Ø	eagle owl
genitive singular	des Uhu-s	eagle owl
dative singular	dem Uhu-Ø	eagle owl
accusative singular	den Uhu-Ø	eagle owl
nominative plural	die Uhu-s	eagle owls
genitive plural	der Uhu-s	eagle owls
dative plural	den Uhu-s	eagle owls
accusative plural	die Uhu-s	eagle owls

(cf. Simmler 1998: 218)

Table 2.0.8 declension class H

Case	Class H (fem)	translation
nominative singular	die Mutti-Ø	mom
genitive singular	der Mutti-Ø	mom
dative singular	der Mutti-Ø	mom
accusative singular	die Mutti-Ø	mom
nominative plural	die Mutti-s	moms
genitive plural	der Mutti-s	moms
dative plural	den Mutti-s	moms
accusative plural	die Muti-s	moms

(cf. Simmler 1998: 218)

Table 2.0.9 declension class I

Case	Class I (fem)	translation
nominative singular	die Frau-Ø	woman
genitive singular	der Frau-Ø	woman
dative singular	der Frau-Ø	woman
accusative singular	die Frau-Ø	woman
nominative plural	die Frau-en	woman
genitive plural	der Frau-en	woman
dative plural	den Frau-en	woman
accusative plural	die Frau-en	woman

(cf. Simmler 1998: 218)

Table 2.0.10 declension class J

Case	Class J (masc)	translation
nominative singular	der Mensch-Ø	human
genitive singular	des Mensch-en	human
dative singular	dem Mensch-en	human
accusative singular	den Mensch-en	human
nominative plural	die Mensch-en	humans
genitive plural	der Mensch-en	humans
dative plural	den Mensch-en	humans
accusative plural	die Mensch-en	humans

(cf. Simmler 1998: 218)

Table 2.0.11 declension class K

Case	Class K (masc)	translation
nominative singular	der Staat-Ø	state
genitive singular	des Staat-es	state
dative singular	dem Staat-Ø	state
accusative singular	den Staat-Ø	state
nominative plural	die Staat-en	states
genitive plural	der Staat-en	states
dative plural	den Staat-en	states
accusative plural	die Staat-en	states

(cf. Simmler 1998: 218)

Table 2.0.12 declension class L

Case	Class L (masc)	translation
nominative singular	der See-Ø	lake
genitive singular	des See-s	lake
dative singular	dem See-Ø	lake
accusative singular	den See-Ø	lake
nominative plural	die See-n	lakes
genitive plural	der See-n	lakes
dative plural	den See-n	lakes
accusative plural	die See-n	lakes

(cf. Simmler 1998: 218)

2.0.13 declension class M

Case	Class M (masc)	translation
nominative singular	das Herz-Ø	heart
genitive singular	des Herz-ens	heart
dative singular	dem Herz-en	heart
accusative singular	das Herz-Ø	heart
nominative plural	die Herz-en	hearts
genitive plural	der Herz-en	hearts
dative plural	den Herz-en	hearts
accusative plural	die Herz-en	hearts

(cf. Simmler 1998: 218)

An overview of the declension of the indefinite article is given in the following table:

Case	masculine	translation	feminine	translation	neuter	translation
nom sg	ein-Ø Besen	broom	ein-e Frau-Ø	woman	ein-Ø Haus-Ø	house
gen sg	ein-es Besen-s	broom	ein-er Frau-Ø	woman	ein-es Haus-es	house
dat sg	ein-em Besen-Ø	broom	ein-er Frau-Ø	woman	ein-em Haus-Ø	house
acc sg	ein-en Besen-Ø	broom	ein-e Frau-Ø	woman	ein-Ø Haus-Ø	house

There are no declension classes for the indefinite article in German. However, the declension of the indefinite article is different for the three genders masculine, feminine and neuter. In the plural, the indefinite article is not assigned.

The classification of subclasses within a declension class is based on secondary criteria which take the following factors into consideration: first, the number of base morphemes is relevant, second, the internal phonological structure of the morphemes plays a role. Subclass (a) contains nouns with one single base morpheme. Subclass (b) contains nouns with a lenisfortis opposition and subclass (c) contains nouns with two base morphemes and a vowelumlaut alternation (cf. Simmler 1998: 216). Examples of the three subclasses are given in (2.0.14).

Table 2.0.14 subclass (a)

Subgroup	gender	A	C	K
1. base morpheme with final /t/, /s/, /š/	mask	Laut ‘sound’ Riss ‘cleft, Fisch ‘fish’, Boot ‘boat’, Maß ‘degree’	Geist ‘ghost’, Brett ‘plank’	Staat ‘state’, Schmerz ‘pain’, Bett ‘bed’
2. bas emorpheme with different final phonemes	neut	Aal ‘eel’, Jahr ‘year’	Ei ‘egg’	Fleck ‘blotch’, Ohr ‘ear’
1. base morpheme with final /ə/, /əl/, /ər/		Gabe ‘gift’, Schatel ‘box’, Feder ‘feather’	Hase ‘rabbit’	
2. base morpheme with different final phonemes		Frau ‘woman’	Mensch ‘human’	

(cf. Simmler 1998: 219)

Table 2.0.15 subclass (b)

Subgroup	gender	A	C
1. /d/: /t/	m n	Grad 'degree' Pfund 'pound'	 Bild 'picture'
2. /b/: /p/	m n	Dieb 'thief'	Leib 'body'
3. /g/: /k/	m n	Tag 'day'	
4 /z/: /s/	m n	Greis 'old man' Gas 'gas'	

(cf. Simmler 1998: 220)

Table 2.0.16 subclass (c)

Subgroup	A 2 base morphemes	B 2 base morphemes	C 2 base morphemes	D 2 base morphemes	E 2 base morphemes	F 2 base morphemes
1. /a/: /ɛ/	Ball (m) 'ball'	Kraft (f) 'power'	Mann (m) 'man' Amt (n) 'agency'	Apfel (m) 'apple'	Garten (m) 'garden'	-
2. /a:/: /ä:/	Bart (m) 'beard'	Naht (f) 'seam'	Bad (n) 'bath'	Nagel (m) 'nail'	Faden (m) 'wire'	-
3. /o/: /ö/	Bock (m) 'buck'	-	Gott (m) 'god' Dorf (n) 'village'	-	-	Tochter (f) 'daughter'
4. /o:/: /ö:/	Sohn (m) 'son' Floss (n) 'raft'	 Not (f) 'emergency'	-	Vogel (m) 'bird' Kloster (n) 'monastery'	Boden (m) 'ground	-
5. /u/: /ü/	Fuchs (m) 'fox'	Frucht (f) 'fruit)	Wurm (m) 'worm'	-	-	Mutter (f) 'mother'
6. /u:/: /ü:/	Hut (m) 'hat'	Schnur (f) 'string'	Buch (n) 'book'	Bruder (m) 'brother'	-	-
7. /ao/: /oi/	Traun (m) 'dream	Maus (f) 'mouse'	Kraut (n) 'herb'	-	-	-

(cf. Simmler 1998: 221)

The classification into thirteen different declension classes will be relevant for the development of inheritance mechanisms describing noun inflection in German and also for the design of the morpheme store which I will refer to later in this paper.

2.2 Gender in German: How to evaluate the gender of a German noun

The assignment of gender in German is a very arbitrary process. However, some regularities can be found. These regularities are described in table 2.2.1.

Table 2.2.1 Assignment of gender in German

masculine	translation	feminine	translation	neuter	translation
masculine persons der Mann	man	feminine persons die Frau	woman	letters das A	A
seasons der Frühling	spring	numbers used as nouns die Eins	one	nouns ending in *-lein* das Fräulein	miss
days der Montag	Monday	nouns ending in *-ung* die Endung	ending	nouns ending in *chen* das Mädchen	girl
month der Januar	january	nouns ending in *-schaft* die Mannschaft	team	nouns ending in *-ment* das Experiment	experiment
precipitations der Regen	rain	nouns ending in *-ion* die Diskussion	discussion	nouns ending in- *ma* das Thema	the topic
nouns ending in *ling* der Schmetterling	butterfly	nouns ending in-*heit* die Freiheit	freedom	nouns convered from verbs das Laufen	the run
nouns ending in *ich* der Teppich	carpet	nouns ending in *-keit* die Heiterkeit	amusement	nouns from English verbs ending in *-ing* das Timing	the timing
nouns ending in *ig* der Honig	honey	nouns ending in-*tät* die Identität	identity	Nouns conversed form adjectives das Neue	the new
		nouns ending in-*ik* die Musik	music		

2.3 Compounding in German: types of compounds with noun heads in German

The parts of speech [POS] in German are: noun, verb, adjective, adverb, preposition, pronoun, conjunction and interjection. Based on these eight POS it is possible to identify eight combination types of German compounds with a noun head (cf. Simmler 1998: 367):

morphological structure	lexemes	morphological connection type

(2.3.1)

a.	die Haustür the front door	das Haus, die Tür the house, the door	noun + noun = noun
b.	das Waschbecken the lavatory	inf waschen, das Becken inf wash, the bowl	verb + noun = noun
c.	das Hochhaus the multistory building	pred adj hoch, das Haus pred adj high, the house	adj + noun = noun
d.	die Auffahrt the driveway	prep auf, die Fahrt prep on, the drive	prep + noun = noun
e.	der Selbstzweck the self purpose	pron selbst, der Zweck pron self, the purpose	pron + noun = noun
f.	der Oder-operator the or-operator	konj oder, der Operator konj or, the Operator	konj + noun = noun
g.	das Aha-Erlebnis the aha experience	interj aha, das Erlebnis interj aha, the experience	interj + noun = noun
h.	der Innenraum the interior (cf. Simmler 1998: 367)	adv innen, der Raum adv inner, the room	adv + noun = noun

Examples in (2.3.1) show the second constituent in a German compound determines the POS of the compound. In addition, the second constituent determines the gender of the compound, as can best be seen in example (2.3.1a). *Die Haustüre* 'the front door' is a compound of the constituents *das Haus* 'house', which has neuter gender, and *die Tür* 'the door', which has feminine gender. The gender of *die Haustüre* 'the front door' is feminine, so the compound takes on the gender of the second constituent of the whole compound. An example of a compound consisting of a constituent in neuter gender and one in masculine gender is *der Buchrücken* 'back of a book', consisting of the constituents *das Buch* 'book' in neuter gender and of *der Rücken* 'back' in masculine gender. The compound *der Buchrücken* 'back of a book' has masculine gender, like its second constituent *der Rücken* 'back'.

In this context Simmler mentions that the first constituent in N + N compounds shows no ability to bear an article. Also, the first constituent in such a compound is not inflected and has no paradigmatic structure. Normally the first constituent in a German N + N compound does not bear inflection (cf. Simmler 1998: 364). These findings indicate that German N + N compounds are right-branching and the head of the N + N compound is found on the right hand side of the compound.

2.4 Interpretation of interfixes in German compounds

Following Gallmann (1998), morphemes which are the head of a compound have special morphosyntactic properties. These properties are case, number and gender. There are two different morphosyntactic licensing features. These features are either internal or external (cf. Gallmann 1998: 2). Internal features are licensed by the feature bearing morpheme itself. An example for such an internal feature is gender, which is a purely internal licensed feature as this feature is never assigned based on syntactic relations. An example for an externally licensed morphosyntactic feature is case, since this feature is assigned by the morphosyntactic function of the noun. If in German a noun is the subject of a clause it always

has nominative case. If it is a direct or indirect object it has one of the oblique cases like genitive, dative or accusative.

Concerning number there is an internal and an external feature licensing. In pluralia tantums plural is an internal licensed feature. Examples for these are *die Ferien* 'vacation', *die Trümmer* 'ruins' and *die Abruzzen* 'Abruzzoes' (cf. Gallmann 1998: 3). However, external licensing is also possible, as in example (2.4.1).

(2.4.1) Mulder und Scully sind FBI-Agenten.
Mulder and Scully be.pl.PRES FBI-agents.
'Mulder and Scully are FBI-agents'

In (2.4.1) plural is an externally licensed morphosyntactic feature since it is licensed by the use of the two NPs 'Mulder' and 'Scully' and by the use of the plural form of the copula.

In German, constituents of morphological complex word forms can show morphosyntactic features, too. However, there are two constraints on these complex word forms: Within a complex word form there is no external licensing of morphosyntactic features. This means in such a construction it is not possible for the head to license a feature of the non-head and for the non-head it is not possible to license morphosyntactic features of the head. A non-head cannot project morphosyntactic features on the whole complex word form or compound. It is also not possible for a compound to percolate features of the whole word form on the non-head (cf. Gallmann 1998: 3).

(2.4.2)

a. Mulder iss-t den Rind-er-braten.
Mulder eat-3sgPRES the.MsgACC roast beef
'Mulder eats the roast beef'

b. Mulder iss-t die Rind-er-braten.
Mulder eat-3sgPRES the.MplACC roast beefs
'Mulder eats the roast beefs.'

As can be seen in example (2.4.1) the non-head *die Rinder* 'beefs' does not transfer its seemingly plural number to the whole compound *der Rinderbraten* 'roast beef'. These features indicate two different interpretations: first, the non-head does not transfer its features to the head of the head or the compound as a whole, but is still a plural marker. The second interpretation is that the plural marker *–er* in *der Rinderbraten* 'roast beef' is not a plural marker at all. In this case, one would talk of an interfix. The second interpretation seems reasonable from an epistemic point of view, too, since a roast beef does not consist of several beefs but of only one single beef.

However, the analysis of interfixes in German is not as straight forward as it seems. There are different interfixes in German, some of which appear to be plural markers, as in example (2.4.2), and some of which appear to be genitive markers. This is the case in the following example (2.4.3):

(2.4.3)

Apollo mach-t ein-e Tag-es-reise.
Apollo make-3sg.PRES a.Fsg.ACC day-interfix-journey
'Apollo does a day's journey.'

In (2.4.3) it is possible to interpret the *–es* in *die Tagesreise* ‘day’s journey’ as either an interfix or a genitive marker. As example (2.4.4) shows, it is possible to paraphrase the compound *die Tagesreise* ‘day’s journery’ (it is not important that the dative case is used instead of the genitive).

(2.4.4)

Starbuck	mach-t	ein-e	Reise	von	ein-em	Tag
Starbuck	make3sg.PRES	a.FsgACC	journey	of	a.MsgDAT	day

‘Starbuck does a journey of a day’

Example (2.4.4) could indicate that the *–es* in *die Tagesreise* ‘day’s journey’ is a genitive, as it could be paraphrased as in (2.4.4), but there are also cases of interfixes used in a compound which are no grammatical genitive marker in German. This is the case in *der Schmerzensschrei* ‘cry of pain’, consisting of the elements *der Schmerz* ‘cry’ the interfix *–ens*, which is not a case marker in German, and *der Schrei* ‘cry’. One other fact indicating the morpheme used in such a compound is not a case marker is that there are compounds in German with the same non-head but with different interfixes:

(2.4.4)

a. Tag- esreise
day-interix journey
‚day`s journey‘

b. Tag-e werk
day-interfix task
daily task

c. Schmerz-ens geld
pain-interfix money
‘damages’

d. Schmerz patient
pain patient
pain patient

There are several interpretations of the use of interfixes in German. Simmler (1998) suggests that some interfixes are frozen genitive or plural forms and belong to a younger class of compounds in German. The other interpretation is that interfixes are used to ease pronunciation. However, this analysis is quite controversial.

Löbner (personal communication) holds the view that interfixes have neither lexical meaning nor grammatical function. Following Löbner, there are slots in the lexical entry of the noun which indicate the lexeme, when used in a compound, needs the compound form of it.

Gibbon takes a point of view similar to Löbner (cf. Gibbon 1992). He claims interfixes are morphologically relevant in composition rather than being conditioned phonologically, as Simmler (1998) suggests (cf. Gibbon 1992). Gibbon differentiates the following basic types of interfixes in German: zero-interfixes, as in der Schmerzpatient ‘pain patient’, regular /s/ or /es/ genitive of masculine or neuter argument constituents, as in *das Mannsbild* ‘man’ - consisting of the elements der Mann ‘man’, the interfix /s/ and the head *das Bild* ‘picture’. The third class of interfixes seems like a regular plural, as /er/ in *der Rinderbraten* ‘roast beef’ or in *der Frauenchor* ‘female choir’ - consisting of the elements *die Frau* ‘woman’, the

interfix /en/ and *der Chor* 'choir' (cf. Gibbon 1992: 44f). There are a few exceptions with respect to interfixes which need to be specified, like the /ens/ in der Schmerzensschrei /cry of pain/. In general I will adopt Gibbons position but I will not assume zero-interfixes.

In her typological analysis of interfixes, Ralli (2008) suggests interpreting interfixes as compound markers. She has analyzed several languages, for example Modern Greek, and notices that the interfix /o/ is used as default in all compounds. However, if the initial phone of the second constituent is one of the following vowels the interfix is not inserted:

(2.4.5) a´>>> a >>> é >>> e >>> ó >>> o >>> í >>> i >>> ú >>> u
(Ralli 2008: 3)

(2.4.6)

a.	agriánthropos <	agri-	ánthropos
	wild man	wild	man
	*agri-o-ánthropos		
b.	ladémboros <	lad-	émboros
	oil merchand	oil	merchand
	*lad-o-émboros		

(Ralli 2008: 3)

Based on her typological research Ralli suggests that fusional languages with an overt paradigmatic inflection bear what she calls compound markers (Ralli 2008: 5). Agglutinating languages such as Turkish do have compound markers, too, but these compound markers do not appear between the compound but as suffix of the second constituent of the compound:

(2.4.7)

a.	okul kitab-ı <	okul	kitap	
	locust (tree)	goat	horn	
b.	keçibonynuz-u<	keçi	boynuz	
	school book	school	book	
c.	anadil-I	< ana	dil	
	mother tongue	mother	tongue	
d.	taşk^mür-ü <	taş	k^mür	
	carbone stone	stone	carbone	

(Ralli 2008: 12)

Due to the fact that there is no consistent way to determine if interfixes have a grammatical function or not, Ralli calls these elements compound markers with the function of marking compounds. She sums up her analysis with the following observations: an overtly realized paradigmatic inflection triggers the presence or absence of the marker, depending on the case. If a stem based compounding is found, then it is related to the systematic form of a compound marker, while word-based compounding triggers form variation and the absence of a systematic pattern (Ralli 2008: 15).

With respect to an RRG-based analysis of N + N compounds in German I will adopt both Ralli's position that interfixes are in fact compound markers as well as Gibbon's (1992) and Löbner's (p.c) position that such compound markers only have morphological function, but neither semantic meaning nor phonological function (cf. Gibbon 1992: 44).

3.0 Development of Constructional Schemas

In this section I will develop Constructional Schemas [CSs] for German N + N compounds and introduce a semantic description for nouns based on Pustejovsky's qualia theory (Pustejovsky 1995). I will also construct lexical entries for German nouns based on qualia theory and show how compounding operates on this semantic level. I will introduce inheritance mechanisms which explain how noun inflection operates in German.

The development of CSs is based on Nolan's approach for CSs in Modern Irish (cf. Nolan 2010: 4). Following Nolan, derivation of a category is regarded to be a morphological construction device. It provides the POS-category type of the word it creates. For composition this means it has an input and an output. Lexemes and derived lexemes as compounds have semantics. These semantics are recorded in the lexical entry of the lexeme and are connected to the linking system of RRG. For composition the assumption is that each lexeme has a structure where the two input lexemes are morphologically fused to produce a new lexeme as output. In general, derivation creates new lexemes. Usually in German the head of a compound determines the POS of the whole compound. This was already shown in section 2. Inflection on the other hand creates different forms of the same lexeme for grammatical purposes (cf. Nolan 2010: 3). In German these are case, gender, agreement and number. With regard to N + N compounds, these grammatical purposes are case, gender and number. As explained in section 2, the grammatical form of the head determines the form of the whole compound. Nolan proposes the following assumptions regarding derivational morphology which are also true for composition:

(3.0.1)

1. The derivational category affix may be considered as a construction that contains skeletal structure (a 'slot') for an input lexeme in a sort changing derivation. By sort changing we mean that the 'part of speech' is usually changed from one category *type* to another.
2. Derivation operates over one argument 'slot' per derivation, while allowing for multiple derivations.
3. Compounds can be treated as equivalent to derivation (including both endocentric and exocentric compounds)
4. A general working assumption is that affixes that are not inflectional must be derivational.

(Nolan 2010: 4)

CSs as developed in Nolan (2010: 4) have the following form:

(3.0.2)

$$[\alpha_{argument\_lexeme}] \oplus [\beta_{category\_lexeme}]\varphi_{Type}$$

(Nolan 2010: 4)

In the CS in (3.0.2) the symbol $\oplus$ is used to denote some morphological template with the function of changing the type of the lexeme input as an argument to a specific type. This morphological CS takes two lexemes as input and produces a new compound lexeme with typically a new category type as output. In this framework a lexeme is a morpheme that is semantically meaningful. It has a lexical entry which uses a morphologically relevant version of a logical structure. It is represented with the use of qualia structures (cf. Nolan 2010: 4).

The first input argument lexeme [$\alpha_{argument\_lexeme}$] may occur in pre- or –post position, in fact in any affix position possible in the language under study. The operator $\oplus$ in the CS in (3.0.2) represents the morphological fusion of the input argument with the category lexeme. This yields a composed output lexeme as a type (cf. Nolan 2010: 4).

From a cross-linguistic viewpoint both derivational and inflectional affixes are applied according to a fixed order where the attachment order is significant (cf. Nolan 2010: 4). In (3.0.3) a generalized representation is given:

(3.0.3)

a. Derivation: [prefix-lexeme$_1$-[[[ROOT]-suffix-lexeme$_1$]-suffix-lexeme$_2$]]
b. Inflection: [prefix-morpheme$_1$[[[Lexeme]-suffix-morphe$_1$]-suffix-morpheme$_2$]]
(Nolan 2010: 4)

For German compounds the following generalized CSs can be proposed:

(3.0.4)
a. [Root] $\oplus$ [Root]φ_N
b. [Root] $\oplus$ [[Root] $\oplus$ [suffix-morpheme$_1$]]φ_N
c. [[Root] $\oplus$ [compound marker]] $\oplus$ [Root]φ_N
d. [[Root] $\oplus$ [compound marker]] $\oplus$ [[Root] $\oplus$ [suffix-morpheme$_1$]]φ_N

The CSs in (3.0.4) should be understood as follows: In (3.0.4a) two roots are compounded. The operator $\oplus$ fuses compound elements within the CSs. The head of a German compound is the constituent of a compound bearing inflection, which in German is realized as a suffix. Consequently, a suffix morpheme can attach to the root as in (3.0.4b) and (3.0.4c). In (3.0.4c) and (3.0.4d) a compound marker is involved, too.

After having introduced the notion of CSs and how they are used in connection with N + N compounds in German I will describe the semantic representation of nouns based on Pustejovsky's qualia structures (Pustejovsky 1995) and the use of CSs as they were described in this section. Via this approach I will first yield lexical entries for nouns within a framework of RRG and then describe how composition can be described on a semantic level.

3.1 Development of lexical entries for nouns in RRG

Morphological elements in grammar, which are language specific, have internal structure. This internal structure can be divided into the areas of the lexeme store and the morpheme store, both of which are parts of the lexicon. The morphemes which are conceptually meaningful and are therefore interpreted as lexemes are stored in the lexeme store, those which provide grammatical function only are stored in the morpheme store (cf. Nolan 2010: 6). Both lexemes and morphemes have lexical entries. However, these entries appear very different. In the following I will concentrate on lexical entries for lexemes. As shown in figure 3.1.1, the two parts of the lexicon are both via the merger connected with the morphological inventory, where the CSs for words, derived and inflected, are stored. In the merger, semantic structures of lexemes and morphemes are fused. CSs are filled with material from the lexicon via a linking algorithm and then the filled CSs are inserted into the grammar. The basic assumption with respect to the morphological inventory is that CSs - as

in (3.0.4) - are stored in the morphological inventory. The same is true for LSWs. I will refer to this fact in section 4.

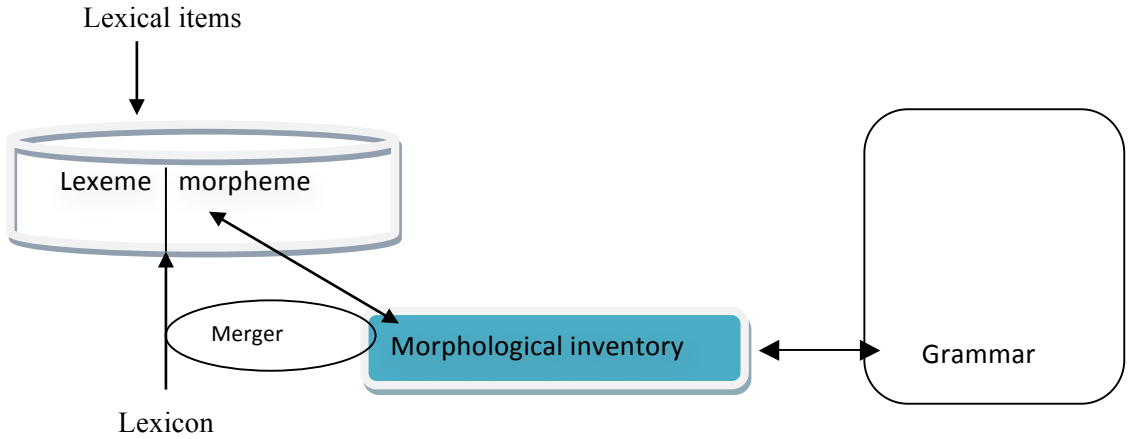


Figure 3.1.1 Architecture of the morphological part of RRG

Lexical entries for nouns in RRG are based on Pustejovsky's qualia structures (cf. Pustjejovsky 1995, Van Valin 2005: 51). Following Van Valin, a sentence like *Commander Adama began the novel* can be understood in different ways. First, it could mean *Commander Adama began to read a novel* or *He began to write a novel*. The question is: Where does this meaning come from? How does one know this sentence does not mean *Commander Adama began to eat a novel* as in the sentence *Starbuck started the hamburger*? The answer is the interpretation can be derived from the use of different object NPs in the two sentences. To capture these facts Pustejovsky (1995) developed the qualia theory of the semantics of nominals (cf. Van Valin 2005: 50). Pustejovsky summarizes qualia theory as follows:

(3.1.1) Qualia theory (Pustejovsky 1991: 426-7)

a. Constitutive Role: the relation between an object and its constituents, or proper parts
    1. Material
    2. Weight
    3. Parts and component elements
b. Formal Role: that which distinguishes the object within a larger domain
    1. Orientation
    2. Magnitude
    3. Shape
    4. Dimensionality
    5. Color
    6. Position
c. Telic Role: purpose and function of the object
    1. Purpose that an agent has in performing an act
    2. Built-in function or aim that specifies certain activities
d. Agentive Role: factors involved in the origin or "bringing about" of an object
    1. Creator
    2. Artifact
    3. Natural kind
    4. Causal chain

In an RRG-fashion and based on qualia theory a lexical entry for a noun like *novel* looks as follows:

(3.1.2) **novel** (y)
a. Const: **narrative´**(y)
b. Form: **book´**(y), **disk´**(y)
c. Telic: **do´**(x, [**read´**(x, y)])
d. Agentive: **artifact´**(y), **do´**(x, [**write´**(x, y) & INGR **exist´**(y)
(Van Valin 2005: 51)

Based on (3.1.2) the interpretation of the *sentence Commander Adama began a novel* is now clear. The first reading is based on the telic role of novel, while the other reading is derived from the agentive role.

My construction of lexical entries is based on the use of qualia theory in RRG. However I will extent these entries to some further slots, which contain further lexical knowledge. This insertion of further lexical slots is based on Chomsky's (1965) and Bloomfield's (1933) assumption that the lexicon contains all unusual and unpredictable word features (cf. Jackendoff 2002: 153).

These lexical slots are <gender>, <declension class>, <declension subclass>, <compound marker>. Although there are some regularities with respect to gender in German, it would be reasonable to insert the slot <gender> since, following Gallmann (1998), gender is an internal licensing feature which is not restricted by external syntactic features. This is the same with respect to declension class. Although declension is an external licensing feature, following Gallmann (1998) no regularity can be detected explaining which of the thirteen German declension classes is used. The slot <declension subclass> is optional since not every German noun belongs to a subclass.

With respect to the slot <compound marker> things are more difficult. The slot <compound marker> contains all compound markers which are used when the noun is part of a compound in German. This slot contains a set of compound markers the specific noun in German could have, connected with the distribution according to which the specific compound marker is used. An example of a lexical entry of a German noun is given in (3.1.3):

(3.1.3) Tag
day (y)
Const: **time´**(y)
Form: **timeline´**(y), **formless´**(y)
Telic: PROC **pass by´**(x)
Agentive: **abstract kind´**(y)
<gender>: masculine
<declension class>: A
<compound marker>: {[/es/: - reise, - geld, …], [/e/: - blatt, - werk, …]}

The idea is that lexemes like *der Tag* 'day' are stored in the lexeme store. However, morphemes, like the compound markers, are stored in the morpheme store. In both the lexeme store and the morpheme store elements are stored in neighborhood clusters, where lexical entries of lexemes are stored in inheritance networks. Neighborhood clusters as they are introduced in Gottschalk (2010) contain lexemes which share some lexical meaning. So a

lexeme like *der Tag* 'day' would be stored in a neighborhood cluster together with *die Minute* 'minute' or *die Sekunde* 'second'. The development of the neighborhood cluster to which *der Tag* 'day' belongs is out of the scope of this paper and would be a topic for future research.

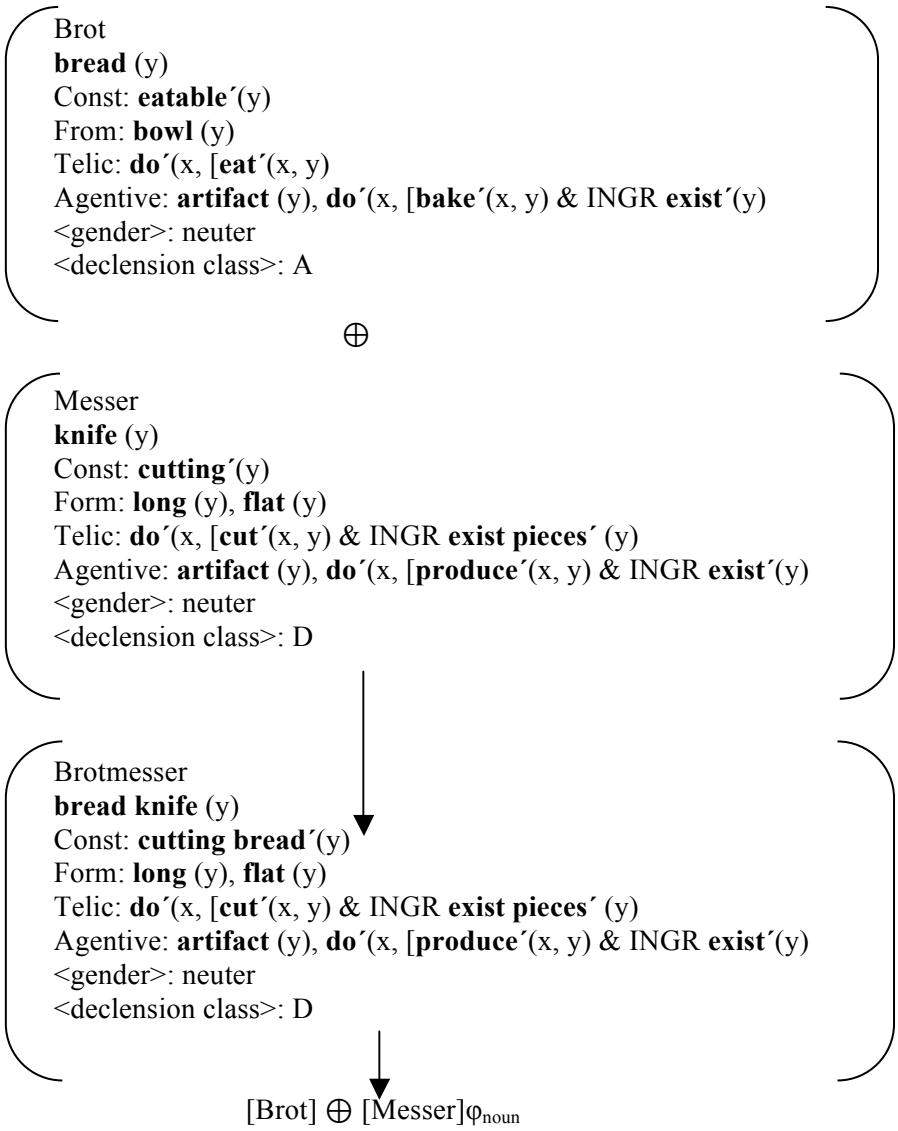
For a lexical structure as in (3.1.3), the framework proposed in Gottschalk (2010) has some further consequences: the assumption is that the lexemes in an inheritance network are stored in an underspecified way. This means the most basic lexeme or primitive of a neighborhood cluster is the root of the inheritance network which forms a neighborhood cluster. This root contains all relevant lexical information and inherits this information to its daughter nodes in the inheritance network by non-monotonic inheritance. Daughter nodes do not contain the specific information they have inherited form their mother node, but they contain slots displaying that this information is inherited from the mother node. Only features which are specific to the lexeme in question are added to the lexical entry of the lexeme. In most cases these are information like <gender>, <declension class>, or <compound marker>, which are specific to each lexeme in the neighborhood cluster. In fact lexical entries can only be viewed in the context of the whole neighborhood cluster and a lexical entry like (3.1.3) is the abstract of some inheritance processes for a specific noun as it is used in morphological processes. So a lexicon is a holistic system and all lexical entries are in dependency of each other. This entails: a lexeme in the lexeme store is always stored underspecified and receives all its information from its mother nodes, but if information from the lexical entry of a lexeme is inserted into the grammar, the different inherited information is combined to a structure as in (3.1.3).

Also, all morphemes with grammatical function only are stored in inheritance networks in the morpheme store. However, an exact description of the design of the morpheme store is out of the scope of this paper. So it must be sufficient to suppose the morpheme store has a structure similar to the lexeme store and to assume that, based on inheritance processes, a lexical structure as in (3.1.3) is inserted into the grammar, which is then immediately connected with its functional morphemes, which have lexical entries similar to the ones of lexemes. The lexical structure of morphemes is the result of inheritance processes in the morpheme store.

3.2 Composition: a semantic perspective

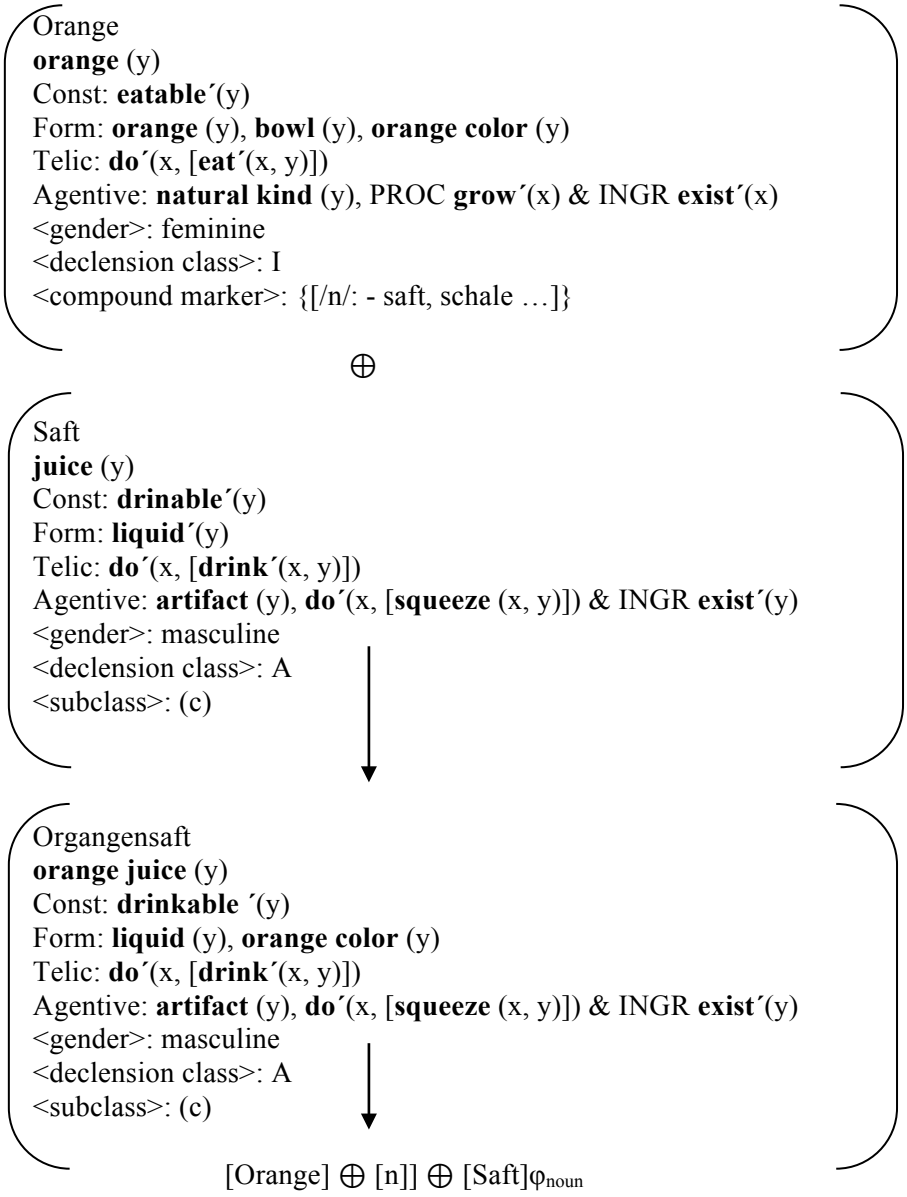
In this paragraph I will show how composition on a semantic level works, based on the description of lexical structures, which are the result of inheritance processes both in the lexeme store and the morpheme store. Example (3.2.1) shows how the German N + N compound *Brotmesser* 'bread knife' is constructed based on qualia structure and the lexical slots I introduced in paragraph 3.1:

(3.2.1) Brotmesser ‘bread knife’



(3.2.1) is an example of a German ATAP compound. This classification is based on Scalise and Bisetto (2009). What can be seen with respect to the semantic representation of the whole N + N compound is that the qualia structure (as developed in Van Valin (2005: 51) contains mostly the semantic features of the compounds’ head. As most German compounds, *Brotmesser* ‘bread knife’ is right headed and most of the features of the modifier *Brot* ‘bread’ are overwritten. So the formal role, which is bread (y) in the qualia structure of *Brot*, is overwritten in the qualia structure of *Brotmesser*. Here, *Brotmesser* has the formal role of *Messer* ‘knife’. Also, the telic role of *Brot* is overwritten in the qualia structure of the compound and the same is true for the agentive role *of Brotmesser*, which is identical to the agentive role of Messer. Such an overwriting can also be recognized with respect to the declension class of the compound. So the resulting N + N compound has the declension class of the compound’s head, which is class D. With regard to the constitutive role, a case of conflation can be detected. Here the modifying element is apparent. To achieve a better view on the domain it might be helpful to have a look on a further example of a German N + N compound. This time I chose a subordinate compound based on Scalise and Bisetto’s classification of compounds (cf. Scalise and Bisetto 2009).

(3.2.2) Orangensaft ‘orange juice’



In this subordinate right-headed compound, similar mechanisms as in (3.2.1) are at work. What can be seen in (3.1.2) is that the constitutive role, the telic role and the agentive role of *Orange* ‘orange’ are overwritten. In case of the formal role of *Orangensaft* ‘orange juice’ a formal element from *Orange* conflates with the formal role of *Saft* ‘juice’. Here, the color feature conflates with the feature liquid (y) and forms a new formal role. Also, *Orangensaft* inherits the gender of Saft, its declension class and also the lexical feature of having a subclass, in this case (c). Also, the lexeme *Orange* ‘orange’ has a compound marker, in this case /n/, which is activated when connected to a lexeme like *Saft* ‘juice’. The resulting N + N compound does not have such a slot in its newly formed lexical entry. This is because the lexeme *Saft* does not have a compound marker. If it had a compound marker, this marker would be part of the resulting lexical entry, since in German it is in principle possible to form compounds with an infinite length.

What can be seen in (3.2.1) and (3.2.2) is that the qualia structure of the head is stable and only some features of the modifying elements conflate with one or more formal role to constitute the qualia structure of the compound. In both example (3.2.1) and (3.2.2) the semantic composition process, which is a generative process that can be described with the use of a linking algorithm, results in a filled CSs. One could figure this process as follows: After a lexical inheritance process, the lexical structures for the two nouns are inserted into the merger, where the semantic structures of the two nouns are fused. In the morphological inventory, the CS is filled with the information from the fused semantic structure and is inserted to the grammar.

4.0 Layered Structure of the German word

After having developed CSs for German N + N compounds, lexical entries for nouns and the semantic description of N + N compounds, I will develop generalized LSWs of German N + N compounds both with and without compound markers in this section. My description of the LSW is based in Nolan (2010).

In figure 4.0.1 I suggest an initial conceptualization of the structural representation of the LSW of a German N + N compound. This generalized LSW describes a compound without interfixes, since I will describe more complex cases of the LSW in the remainder of this section. The LSW is important for both derivation and composition and consists of an argument lexeme and a head lexeme (cf. Nolan 2010: 5). The assumption is that each lexeme has a core and a nucleus, represented by the nodes CORE and NUC. A compound has two cores and two nuclei in its LSW since it consists of two lexemes. In this framework, the term nucleus denotes the root of a lexeme while core denotes the stem of a lexeme, which might be identical with its root, as is normally the case in N + N compounds.

A LSW as in 4.0.1 can be supposed for German N + N compounds which neither contain a compound marker nor a suffix morpheme denoting case or number. Such a LSW could be supposed for simple German N + N compounds in nominative case for example, since I do not assume that syntactic zero markers for suffixes exist in German.

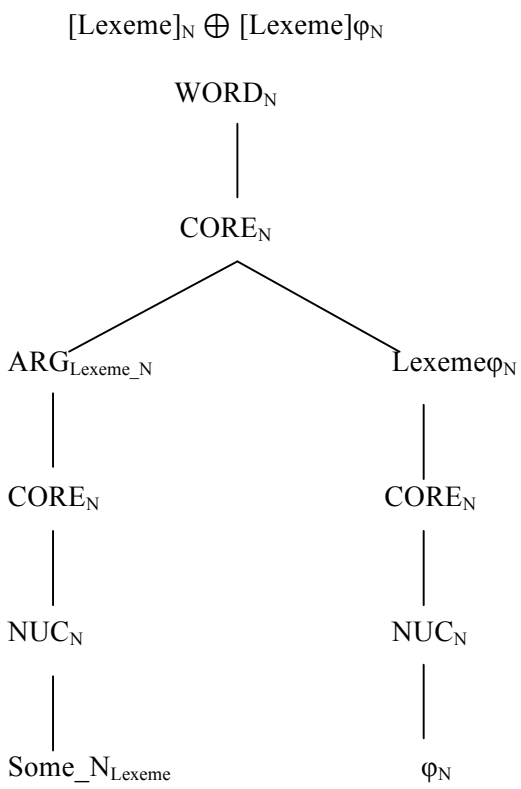


Figure 4.0.1 Generalized LSW of a German N + N compound

4.1 The operator description of German N + N compounds

The use of inflection expresses morphosyntactic information including the abstract syntactic categories tense, number and case in German N + N compounds. In this paragraph I will have a look at these. Figure 4.1.1 gives a schema of a structural representation of the LSW as it might occur in inflection of a German N + N compound. Figure 4.1.2 is a variation of this representation, but this time a circumfix occurs. In these figures, the symbol • denotes some lexeme of a particular type that is the host of the inflectional changes. This lexeme receives a morpheme in the inflectional modification, which could involve a suffix or circumfix as they occur in German (cf. Nolan 2010: 13).

(4.1.1)
$[[\text{lexeme}\varphi_{\text{Type}}] \oplus [\alpha]]$
where: α is a morphological suffix
and φ is a lexeme of some category type from the lexicon.
And ⊕ denotes a process of morphological fusion (in this case of inflection)
(cf. Nolan 2010: 14)

The illustration in (4.1.1) describes the prototype of an inflected German lexeme. In German inflectional suffixes are used. The only exceptions are past participle and perfect tense where circumfixes are used. The schematic illustration of a German past participle looks as follows:

(4.1.2)
$[[\alpha_1] \oplus [\text{lexeme}\varphi_{\text{Type}}] \oplus [\alpha_2]]$
where: α_1 and α_2 form a morphological circumfix
and φ is a lexeme of some category type from the lexicon.
And $\oplus$ denotes a process of morphological fusion (in this case inflection)
(cf. Nolan 2010: 14)

Based on Nolan (2010) I will indicate a constituent projection and an operator projection. Constituent projection is important for derivation and composition and the operator projection as indicated here is a service of syntax. Because of this, operator projection is related to inflectional morphology (cf. Nolan 2010: 13). CSs as in (4.1.1) and (4.2.2) are stored in the morphological inventory of the language in question. Complex CSs as in compounds or derived forms are constructed via inheritance in the morphological inventory. The model of the morphological inventory parallels the conception of the syntactic inventory as proposed in Van Valin (2005: 15). Following Nolan (2010: 14) inflection in morphology relates to the encoding of operators on the lexeme within the LSW. Depending on the type of the lexeme the operators vary. Based on Nolan's framework there are two types of operators which are summarized in

(4.1.3) NP, Core_N and Nuclear_N operators

Nuclear_N operator
- Nominal aspect (count-mass distinction, classifiers in classifier languages)

Core_N operators
- Number
- qualification (quantifiers)
- Negation

NP operators
- Definiteness
- Deixis

(4.1.4) Verbal operators

Nuclear_V operator
- Aspect
- Negation
- Directionals (predicate)

Core_V operators
- Directionals (participant)
- Event quantification
- Root modality
- Negation (internal/narrow-scope=

V operators
- Tense
- Evidantials
- Illocutionary force

(Nolan 2010: 14)

This model of operators, which is proposed by Nolan (2010), is based on the notion of operators in Van Valin (2005). The operations on a noun in a NP include the operators which

are indicated in (4.1.3). The operators which operate on a verb include operations which are indicated in (4.1.4) (cf. Nolan 2010: 14).

As already mentioned in section 2, there are internal and external licensing processes on nouns (cf. Gallmann 1998), so one needs to distinguish between inherent and assigned inflections. Nouns have a particular gender. As explained in section 3, the assignment of gender is stored in the lexical entry of the noun in question (cf. Nolan 2010: 14). However, for any other lexical category, adjectives in case of German, gender is not an inherent category since it is a result of agreement and cannot be an inherent property (cf. Nolan 2010: 14). As also mentioned in section 2, number can either be inherent or externally licensed. In pluralia tantum number is licensed internaly. Therefore, it is a property of the lexical entry of the noun in question, but in general number is externally licensed and hence is not marked in the lexicon. Because of this, it has the status of a $CORE_N$ operator in the Layered Structure of the Noun phrase (LSNP) in RRG.

An example of assigned inflection in German morphology is case. In the lexicon nouns do not have case (only the declension class is assigned in the lexical entry of the noun). Instead, case is assigned within the syntax. This is a consequence of the RRG linking system of syntax (cf. Nolan 2010: 14).

Figure 4.1.1 gives an example of a generalized LSW for a suffixed German noun.

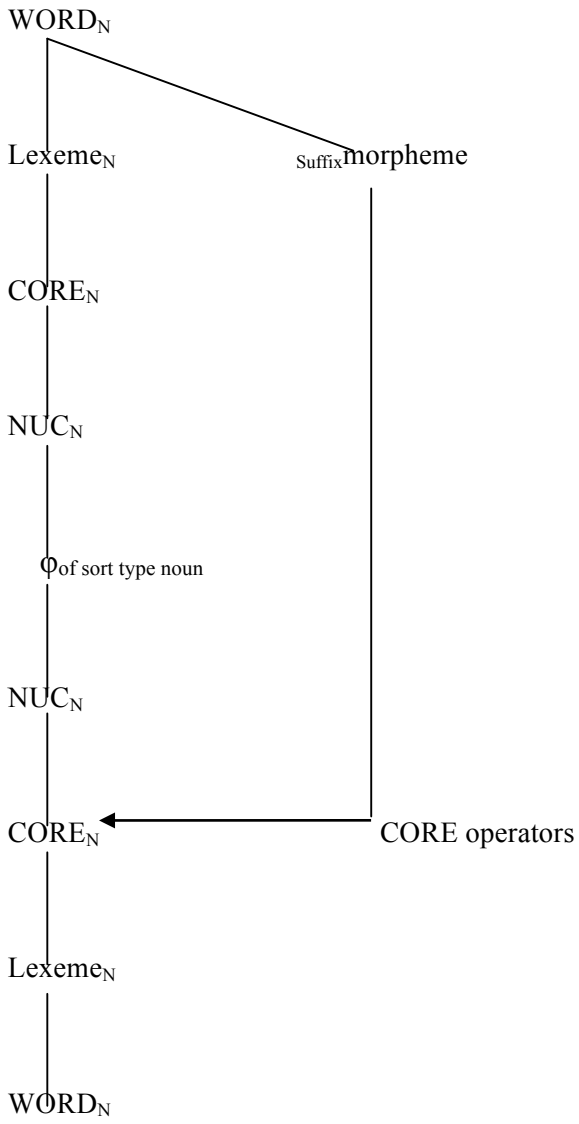


Figure 4.1.1 Generalized LSW of a suffixed German noun

In German, number and case are fused to one single morpheme. Based on (4.1.3), they form a core operator of the operator projection of the LSW. All the other cross-linguistically possible operators of the LSW do not occur in German.

I suppose that compound markers are nuclear operators. This assumption is based on the findings in section 2, where I suppose the argument lexeme of a compound receives a special compound marker when it occurs with specific heads. One might ask of course why compound markers do not belong to the constituent projection of the LSW as they seem not to be in service of syntax. The reason why I suppose compound markers to be part of the operator projection of the LSW is because they do in fact not have any lexical meanings. The constituent projection of the LSW however only contains those elements of a complex word which do have a lexical meaning. This is true for example for all German affixes which are used in derivation, since they have a special lexical meaning which in case of verbs changes the Aktionsart of the specific verb. The question which projection of the LSW those morphemes which just change the syntactic category of the lexeme belong to will be left open

in this context and is a topic for future research. Assignment of compound markers is, as I suppose in section 2, contained in the lexical entry of the lexeme in question. The reason why I suppose that compound markers are nuclear operators is based on the fact that in N + N compounds the argument lexeme is identical with a root which is in this framework identical with the nucleus in the LSW. Figure 4.1.2 shows a generalized LSW of a German N + N compound with a compound marker and a suffix morpheme with a generalized operator projection of the:

$$[[\text{Lexeme}]_N \oplus [\text{compound maker}]] \oplus [[\text{Lexeme}] \oplus [\text{suffix}_{\text{number / case}}]] \varphi N$$

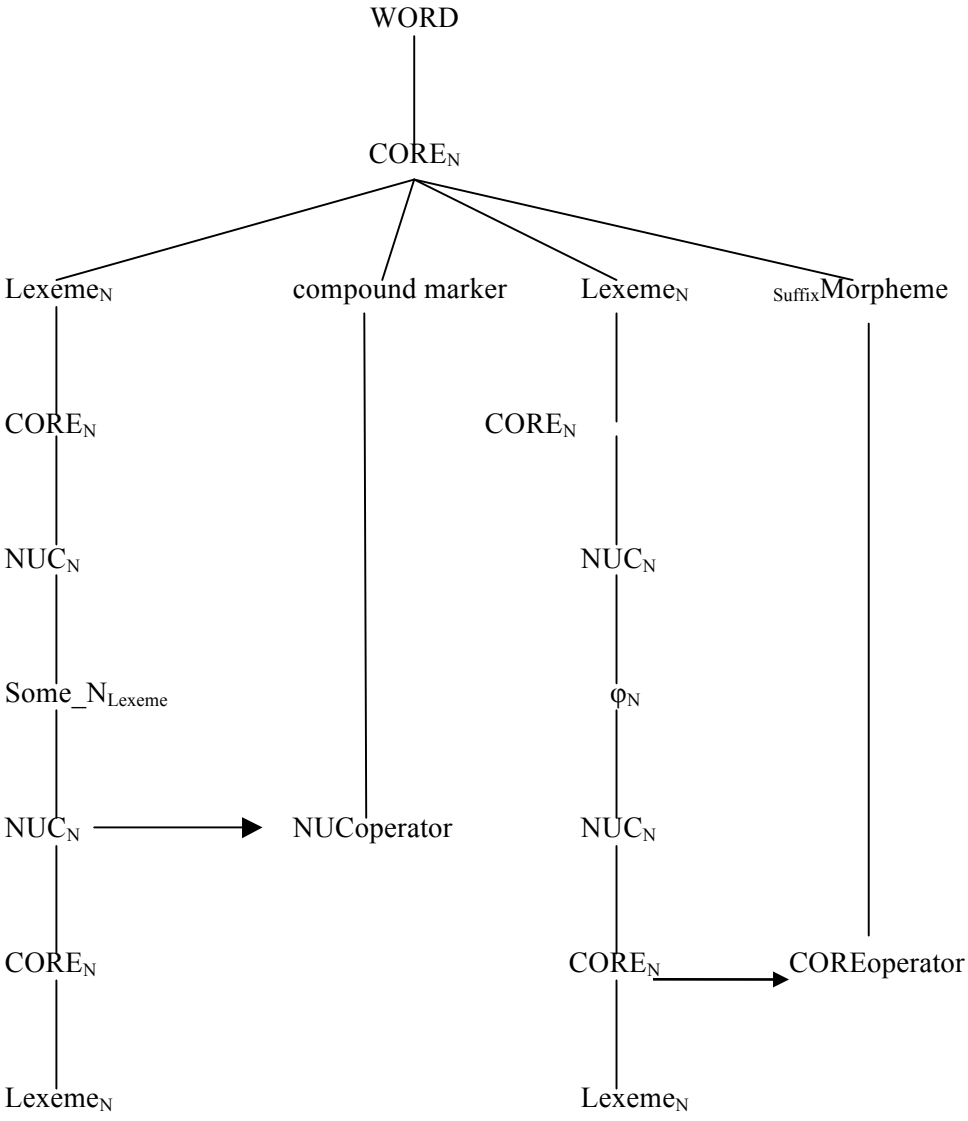


Figure 4.1.2 generalized LSW of a German compound with compound marker and suffixed head

Based on these findings it is now possible to describe the content of the morphological inventory in more detail. As the syntactic inventory in RRG, the morphological inventory contains blueprints, respectively generalized LSWs, of all possible LSWs which can be found in the language under discussion. These LSWs are constructed via inheritance processes. Also, CSs are stored in the morphological inventory and are constructed via inheritance processes. If one takes this perspective on the morphological inventory it shows two parts just

like the lexicon which consists of a lexeme store and a morpheme store. Both the architecture of the lexicon and the architecture of the morphological inventory are topics for further research in this area.

5. Conclusion

In the previous sections I gave a detailed description of German N + N compounds and I have outlined some considerations which are applicable to a characterization of German N + N compounds within the RRG LSW. I considered the use of compound markers in German compounds and described how inflection operates on German N + N compounds. I have constructed four types of CSs for German N + N compounds and explained how the lexicon and the morphological inventory might be constructed within an RRG framework of language I have also touched on the important use of inheritance processes, which operate within the lexicon to construct morphologically complex words. Additionally, I have constructed lexical entries for nouns based on Pustejovsky's qualia theory (Pustejovsky 1995) and extended the way lexical entries for nouns are constructed in RRG (cf. Van Valin 2005: 51) to some further lexical slots, which play a role in inheritance processes which operate in the lexicon. I also introduced the merger as a component of the morphological part of RRG, where the structures of lexical entries of nouns and grammatical morphemes are fused to form an output structure on which the LSW operates before the word is inserted into grammar. Based on Nolan's framework (Nolan 2010) it was thereby possible to develop an account of a morphological part of RRG that is compatible with the syntactic part of RRG.

References

Bloomfield, Leonard. 1933. *Language.* New York: Holdt.

Chomsky, Noam. 1965. *Aspects of the theory of syntax.* Cambridge, M.A.: M I T Press.

Gallmann, Peter. 1998. Fugenmorpheme als Nicht-Kasus-Suffixe. In: Butt. Matthias und Nanna Fuhrhop. *Variation und Stabilität der Wortstruktur*. Hildesheim, Zürich, New York: Olms. 177 – 90.

Gibbon, Dafydd. 1992. ILEX: A Linguistic Approach to Computational Lexica. *Computatio Linguae, Zeitschrift für Dialektologie und Linguistik*, 73:32-53.

Gottschalk, Judith. 2010. Storage of linguistic knowledge in the mental lexicon: An approach within Role and Reference Grammar. In: ITB Journal, Issue 19. http://www.itb.ie/files/journal/issue-19.pdf.

Jackendoff, Ray. 2002. *Foundation of Language (Brain, Meaning, Grammar, Evolution)* Oxford / New York: Oxford University Press.

Nolan, Brian. 2010. *The Layered Structure of the Modern Irish word: An RRG account of derivational and inflectional morphology*.

Ralli, Angela. 2008. Compound Markers and Parametric Variation. In: *STUF (Language Typology and Universals) 61. 19 – 39.*

Pustejovsky, James. 1995. *The Generative Lexicon*. Cambridge, MA: MIT Press.

Scalise, Sergio and Antonietta Bisetto. 2009. Classification of compounds. In: *The Oxford Handbook of Compounding*. Lieber Rochelle and Pavol Šteckauer (Eds.). Oxford: Oxford University Press. 34 – 54.

Simmler, Franz. 1998. *Morphologie des Deutschen*. Berlin: Weidler.

Van Valin, Robert D.,Jr. 2005. *Exploring the Syntax-Semantics Interface*. Cambridge: Cambridge University Press.

Van Valin, Robert D., Jr. und Randy LaPolla (1997). Syntax: Structure, meaning and function. Cambridge: Cambridge University Press.

Using learning styles to optimise lecturer and learner experience and results in an Institute of Education

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Abstract

The past decade of social policy making and legislative change in Ireland has led to a 'broader range of individuals' accessing higher education (ITB, 2006, HEA 2005, Duffin forthcoming). This means that class groups contain a greater range of diversity of learning behaviours than hitherto. The process of accommodating this range of learning behaviours within curriculum development and assessment poses a challenge for lecturers and students alike. This paper suggests how understanding the relationship of learning styles to cognitive processing can provide sound research support to the use of learning styles profiling to create conditions for optimal achievement in terms of student retention, attendance and achievement.

0. Introduction

In order to demonstrate the relevance of learning styles to psychological profiling of cognitive processing, this paper will summarise what is generally understood by the term learning styles and attempt to determine the synergy between types of learning styles tools and the corpus of cognitive processing research. As a result of this exercise it will then be to possible to indicate where their use has validity as a tool in the classroom before describing the type of learning styles analysis developed and used by two EU funded projects, the Partners Collaborating in Training on Specific Learning Difficulties (PACTS) Inter-reg 3a Project 2004-2006 (PACTS, 2006) and the Education for Employment (E4E) Equal 2 Project 2006-2007 (Lawlor, 2007).

The paper will then describe the use of learning styles identification and analysis in the Learning Styles Theme within the HEA Strategic Innovation Funded (SIF) 2007-2009 (Duffin, D and Gray, G, 2007) collaboration between three Institutes of Technology and a specialist service provider. The body of the paper will focus on describing the first year's activities of the SIF Learning styles theme at the Institute of Technology Blanchard town in terms of student and lecturer perspectives before presenting the findings to date in terms of four key areas of concern to third level educational institutions: student retention, student attendance, student achievement and lecturer continuing professional development before drawing conclusions to date and making recommendations for the continuation of the learning styles theme over the remaining two years of the project.

0.1 What are Learning Styles?

'Learning Styles' has become a popular term over the past decade and it is now used ubiquitously. Despite this fact that it is the author's experience that in delivering CPD training to teachers and lecturers since 2003 it has become clear that knowledge of what learning styles are and understanding of the implication of their application to a teaching and learning environment varies enormously.

It will be useful therefore to contextualise the relationship of learning styles within the research domain of cognitive psychology and to describe some of the main approaches taken

by the range of existing learning styles tools available before examining the use of learning styles for individual profiling in the PACTS and E4E Projects which has now been further reviewed and is identified as the best-practise approach that has now been applied to the SIF Learning Styles Theme.

1. Models of Learning Styles

Overall there are five basic approaches to individual learning behaviours found under the category 'learning styles':

a) Channel or Mode of Learning
b) Cognitive Strengths in Learning
c) Personality Type influence on Learning
d) Manner or Style of Learning
e) Types of Learning Behaviour and Strategy

Adapted from (McAnaney, D. Craddock, G. Gordon, D, Duffin. D. O'Leary, C. and Whelan, G., 2007)

This section of the paper will provide a brief description of each of the above types of learning style with examples of the best known models in the five identified headings.

1.1 Channel or Mode of Learning

The idea that we process information through different modalities is the most well known model of learning styles and operates on the principal that there are a finite number of input channels for information to be accessed through and that different channels are 'preferred' In the case of deafness and visual impairment one channel may be only partly useful or else totally inaccessible. This places greater dependence on the remaining input channels but does not automatically mean that greater abilities in the remaining channels will exist. For example a deaf person will be forced to use visual processing in the absence of auditory access but does not necessarily have greater powers in the channel simply because he or she is deaf; similarly with visually impaired individuals and auditory processing.

Typical models here are the Visual, Auditory and Kinaesthetic (VAK) and Visual , Auditory Reading and Writing and Kinaesthetic (VARK) (McAnaney et al 2007) Learning Styles identification models. In general these models identify channels as being auditory, visual and kinaesthetic (Smith, 1996) and some models include linguistic or reading and writing skills as a separate item (Fleming, N.D, 1995)

1.2 Cognitive Strengths in Learning

Models using identification of cognitive strengths as indicators of learning styles accept the existence of information inputted through the sensory channels as described above and add a cognitive dimension to the processing of the information. A typical model of this category is the TRiM (Clark, 2008)model which identifies three representational modes through which the sensory channel input information must pass before it can be utilised. These three modes are: 'linguistic', 'non-linguistic' and 'affective' (McAnaney et al 2007).

1.3 Personality Type Influence on Learning

This category of model identifies personality type as a primary factor in learning; the best known model is the Myers Briggs Type Indicator (MBTI Basics, 2008) which identifies four sets of scales of personality which contain two poles and measures the individual in terms of a score within each field so that predominant tendencies can be identified and an overall

picture of interaction within the four fields can be presented (Keirsey, 1998). The four personality fields chosen are:

1. Extroversion-Introversion,
2. Sensing- Intuition,
3. Thinking-Feeling
4. Judging-Perspective.

1.4 Manner or Style of Learning

As opposed to learning channels models which identify the manner in which individuals 'prefer' to receive and process information, learning styles models attempt to identify the individual's approach to a learning activity. The most well known format here is Kolb's Learning Style Inventory (Kolb, 2005) which is a two part model identifying categories of learning behaviour linked to a learning style as below:

Reflectors (concrete): Watching (introvert-reflection)
Theorists (abstract): Thinking (mind)
Pragmatists (abstract): Feeling (emotion)
Activists (concrete): Doing (extrovert-muscle)
(McAnaney et al 2007, page 70)

Another model, the Adult Returners Key Skills Resource, (ARKS, 2000) identifies learning styles under the following four headings:

- Enthusiastic
- Practical
- Logical
- Imaginative

(ARKS, 2001, p. 40)

1.5 Types of Learning Behaviour and Strategy

Under learning behaviour models, the range of activities included in learning expands the conventional view of intelligence beyond the accepted range of language and mathematical skills and logic and deductive skills to include other 'types' of intelligence. Howard Gardner's Multiple Intelligence model (Gardner, 2006) identifies eight areas of intelligence under which learning strategies can be created:

- Verbal-Linguistic
- Logical-Mathematical
- Musical
- Spatial
- Bodily-Kinaesthetic
- Interpersonal
- Intrapersonal
- Naturalistic

The tenet that intelligence can only be measured in terms of verbal and linguistic abilities, numeracy and logical deduction which has perseverated over many generations of study and can be seen to underpin all conventional educational curricula, teaching methodologies and assessment practices (Duffin, forthcoming) was challenged by Gardiner's notion that the term intelligence could be applied to and measured in terms of skills such as: musical ability, people skills, bodily coordination and spatial awareness and self knowledge. A classic

example of this in practise would be the entry criteria for the study of medicine where doctors are required to score highly in literacy, numeracy and logic but are not required to prove their manual dexterity or inter-personal competencies despite the fact that these are clearly essential to the profession.

1.6 Summary of Learning Styles Models Currently Available.

This brief summary of the range of approaches that can be taken to identifying the learning behaviours of an individual shows that there is a broad and complex range (Eysenck, M. W and Keane, M. T, 2005) of factors that can be taken into consideration. The obvious question posed by such a conclusion centres on the efficacy of the models and in order to determine this it will be necessary to identify to what extent they are in harmony with the corpus of research pertaining to cognitive psychology.

2. Relationship of Learning Styles to the Discipline of Cognitive Psychology

Having reviewed the range of learning styles models currently available this section of the paper will attempt to identify the underlying hypotheses of the learning styles approaches discussed above and relate them to the discipline of cognitive psychology.

2.1 Channels or Mode of Learning

The three elements included in the VAK model are often assumed to be sensory channels as indeed two of them, 'sound' and 'vision' are. 'Kinaesthetic' is not a sensory channel although kinaesthetic activities require touch as well as movement and touch is one of the five senses. Although there are five senses in terms of physical interaction between our internal and external experiences there is controversy around other potential senses, such as intuition, which are more difficult to measure scientifically but do operate based on accumulated personal knowledge and experience.
Auditory, visual and kinaesthetic learning channels are therefore perhaps most correctly defined in psychological terms as 'modalities' or 'manners of operating' rather than as sensory input channels

When we consider the additional element of the VARK model it is clear that 'reading and writing' is a quite different element altogether as it is neither a sensory channel nor a mode of operation. The acts of reading and writing cover a range of literacy skills based on the ability to abstract spoken language performance into an orthographic form and vice versa (Duffin, D, 2004). An extremely simplified description of these skills shows that the orthographic form of a language is an abstraction of the spoken form of language, which itself is an abstraction of a spoken language performance as speech uses groups of sounds to represent concepts in terms of words and sentences (Eysenck and Keene 2005). By including language into the elements of a model we significantly enlarge the factors to be taken into consideration as the language development of individuals varies enormously from native and bilingual acquisition, to second language acquisition and in the case of deafness, acquisition in a different modality where a sign language is available and impaired spoken language acquisition where it is not (Duffin, D., 1999)

Additionally, acquiring the skills of reading and writing actually requires the use of a combination of all the other three channels in performance as well as a range of other cognitive processing skills on language production and perception (Harley 2008).

The term 'linguistic skills' includes verbal, written and reading comprehension abilities all of which also must draw on the previous experiences and knowledge of the individual as well as

relevant motor and interpretative skills. Cognitive science has attempted to model some of these behaviours in isolation but the complexity of processing mechanisms and their interconnected nature makes it impossible to map them overall (Eysenck and Keane 2005) (Harley, 2008).

2.2 Cognitive Strengths in Learning

We have discussed the lack of homogeneity with the VAK and VARK models and the points raised above continue to be relevant in the models that also include cognitive strengths in their operation. In this example the terms 'linguistic' and 'non-linguistic' are ambiguous to say the least, especially now in the light of the past thirty years of sign language psycholinguistic research which has confirmed the presence of visual and spatial modes of language perception and production (Duffin 2004), (Emmorey, 2002), (Brentari 1998). Defining 'language' is fraught with assumptions and misconceptions as the majority of people assume that language means 'spoken language' and that the terms 'language' and 'speech' are synonymous (Duffin, D, 2004).

Additionally, the category 'affective' is also ambiguous in terms of psychological analysis and is said to include 'feelings, emotions and moods' and where the candidate will opt for a pleasant outcome rather than a painful one and that state of mind will influence the learners approach to a task (McAnaney et Al 2007 p 70) is a difficult category to define in terms of cognitive psychology beyond stating that emotional responses are highly subjective and vary enormously from one individual to another.

This means that in models of this nature that although a number of criteria are being considered within the learning performance of an individual, they are not necessarily underpinned by psychological mainstream theories or easy to apply to the individual's task of identifying a quantifiable and consistent method to support his or her learning.

2.3 Personality Type influence on Learning

Whist there is no doubt that the personality traits of any individual will impact on and influence his or her learning behaviours and dispositions, the usefulness of identifying personality, assuming it can be done accurately, also remains highly subjective. The concept of personality itself is one that is not easily measurable especially in younger students and young adults as its emergence is not only part of the process of adult maturation that will potentially continue to change over the entire lifespan but also a product of all the previous experiences of the individual. This means that the lack of common fixed points for measurement and the enormous range of variables make the task of personality identification itself extremely complex under an attempt at cognitive analysis.

This means that personality identification can only provide a guide for trends at a given time and is more useful as a contextualising exercise rather than a set of pragmatic tools to enhance learning performance (Henderson, H. and Wachs, T., 2007) (Nowak, A. And Vallacher, R, 1997).

2.4 Manner or Style of Learning

Manner and style of learning are closely linked to personality and there is much overlap between these two categories as can be seen by the terms chosen to describe personality types and learning approaches. In terms of cognitive processing there is a range of cognitive processes used in the learning process that is common to all learners and these include: perception, attention, memory and language processing. Attempts to identify the learning

behaviour of any given individual without including some assessment of skills in these areas will only give a partial analysis of the individual's learning abilities. Cognitive processing tests such as the Wechsler Intelligence Scale for Children known as the WISC-R (Wechsler 1974) and the Wechsler Adult Intelligence Scale known as the WAIS-IV (MSN Encarta, 2008) provide the most accurate data for individual processing skills but, even so, all Educational Psychologists will always add that this measure is of a performance on a given day and will go to great lengths to demonstrate a sufficient range of information gathering and one to one consultation to confirm the findings of the assessment (McCarthy S. , 2004).

2.5 Types of Learning Behaviour and Strategy

The conventional idea of intelligence includes skills and performance in language, mathematics and logic. Historically, only those possessing these skills at high levels were considered to be 'intelligent'. Assessment of such learning has arisen based on this premise, and written and verbal examinations require both a good memory and good language skills. This means that we are often examining performance in specific modes rather than subject knowledge or understanding.

There is no doubt that 'multiple intelligences' exist and that they occur in a range across society. The task of measuring this range within one assessment tool in an effective manner in any given individual is gargantuan and extends beyond the current frame of our understanding of the supporting cognitive processing profiles to be mapped.

2.6 Summary

The main components of cognitive processing are perception, attention and memory, language production and language perception, all of which operate in at least visual, auditory and kinaesthetic modes. These processes all draw on, and are influenced by, the individual's world experience and knowledge to date. The task of accurately capturing and recording learning behaviours for one individual or for a group of individuals is enormous and cannot be achieved by the application of a single learning styles model.

> What is cognitive psychology? It is concerned with the internal processes of making sense of the environment, and deciding what action might be appropriate. These processes include attention, perception, learning, memory, language, problem solving, reasoning and thinking.
> (Eysenck, M. W and Keane, M. T, 2005, p. 1)

This quote (above) from Eysenck and Keane provides a very useful encapsulation of what needs to be taken into consideration when examine learning behaviours but, although their extremely comprehensive text on progress to date summarises past thinking and current hypotheses, it cannot yet offer us an overview of the inter-connections that must occur between the given areas. This is because the current corpus of research on cognitive psychology has not yet arrived at a position from which a comprehensive overview can be modelled. Trevor Harley has reviewed the psychology of language for over a decade and has reached a similar conclusion in respect of language processing (Harley 2008). As time progresses the corpus increases and the model extends as is shown by the recent changes in the way the literature now presents memory processes (Eysenck, M. W and Keane, M. T, 2005)

The diagram below attempts to show the overlapping nature of the processes identified as being essential to learning:

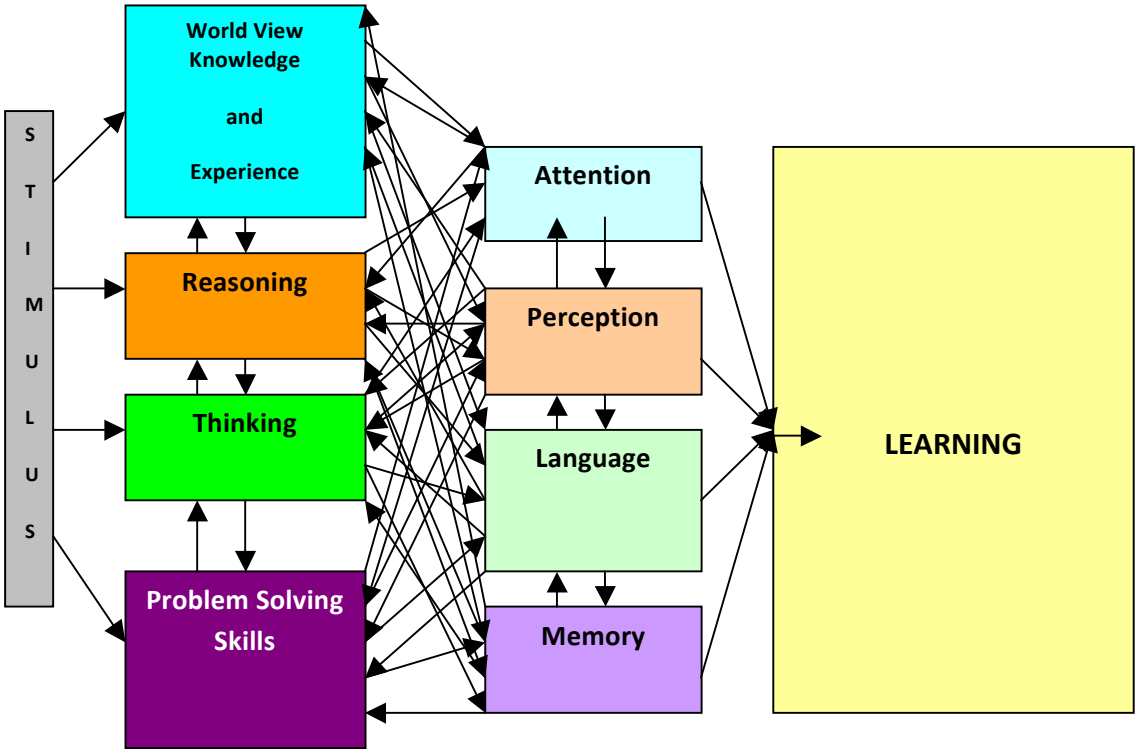

Diagram 1: Representation of the complexity of the inter-connected relationship of processes involved in learning. (Duffin, forthcoming)

2.7 Conclusions on Review of Learning Styles Models under Cognitive Processing Research.

This paper acknowledges that the complexity and interconnected nature of information reception, comprehension and production operations continues to challenge cognitive psychologists in capturing the manner and nature of these processes. Nevertheless, it is still possible to draw some general conclusion on the usefulness of a learning styles approach in maximising the identification of learning trends of individuals and groups in an educational setting.

a) The decision to use a 'Learning Styles' approach must be contextualised within the corpus of psychological research on cognitive processing for its application in educational environments to be effective.
b) Research on cognition primarily concerns the way an individual processes attention, perception, memory and the relationship of these to his or her linguistic functions. This is an important starting point as when we are asking individuals to identify their preferences in learning styles, these elements can be further investigated in normed and standardised psychological tests for confirmation.
c) The chosen approach must provide information that is useful to the individual in creating an understanding of his or her 'learning profile' that is relevant to the learning environment and that can be followed up by an educational psychologist should any specific difficulties requiring individual support be identified.

A clear outcome from the review of learning styles models and the discussion of cognitive processing is that the type of model chosen must contain elements that can be quantified in some manner and that these must be capable of measurement if necessary. Therefore this paper concludes that the choice of learning styles identification must involve the input and output operations in auditory, visual and kinaesthetic channels and must also be mindful of linguistic ability.

Whilst we have stressed the importance of testing of individuals where necessary, in a pragmatic application of the information provided on individuals and groups on learning behaviours through learning styles identification by teacher and student support staff it is more important to understand the diversity that naturally occurs in the presentation of these processes across society than it is to identify individual instances of atypicality. This means that methodologies employed in teaching and learning must reflect awareness and understanding of the range and scope of these differences rather than placing a focus on individuals with 'learning problems'.

3 Developing and Identifying an Appropriate Tool

Having provided a context and rationale for the type of learning styles tool required, Section 3 of this paper will now describe the development and use of the chosen tool in two projects, Partners Collaborating in Training for Individuals with Specific Learning Difficulties (PACTS, 2006) and , (E4E, 2007) before describing its use and progress to date in the current project Strategic Innovation Funding; Learning Styles Theme (Duffin, D and Gray, G, 2007) which is the subject of this paper.

3.1 Application of Learning Styles in the PACTS and E4E Projects

The previous section identified the fact the there is not one definitive accepted view on how learning styles tests and models might be underpinned by cognitive psychological research. It also highlighted the complexity of the task of cognitive scientists in modelling cognition in all its interconnectivity. These two facts combine to raise questions on the validity of adopting a learning styles approach to education without understanding its place within the larger frame of cognitive psychology.

This section of the paper will show how two projects, PACTS and E4E, have informed a SIF theme on the use of a largely modality based learning styles approach for student and lecturer support to optimise achievement across a diverse student body in the Institute of Technology, Blanchardstown.

The main objective of the two projects was to support specifically identified individuals experiencing difficulty and marginalisation and, interestingly, the outcomes of both projects have demonstrated that there is a need for inclusive institutional approaches to learning and teaching in general.

Both projects specifically considered the atypical learning behaviours of their participants, the PACTS project particularly considered the four areas of difficulty most commonly associated with the term Specific Learning Difficulties; dyslexia, dyspraxia, ADHD and Asperger's Syndrome and the E4E project considered access largely in terms of physical mobility and performance, many of the functional difficulties experienced by the individuals presented as being identical whatever its underlying cause.

> Individuals who have a Specific Learning Difficulty (SPLD) have a specific difficulty in the way they process information which impacts on their ability to achieve their true potential. (McCarthy S. , 2004, p. 1)

What is particularly significant about the four discrete areas of SPLD is that there is considerable overlap between them and it is more likely that an individual profile will consist of two or more overlapping difficulties than of one in isolation only (Kirby, A. and Smythe, I, 2008) (Kirby, A. and Kaplan, B, J , 2003) (McCarthy S. , 2004) consequently interventions will only be effective if all areas of overlap have been identified and this means that a holistic approach must be taken with the individual that focuses both weaknesses and strengths and, particular, on the functional difficulties themselves rather than on any diagnostic label.

This paper will now briefly describe the relevant findings of the two projects before providing information on the two partnering institutions and a rationale for the chosen methodology that is now being tested in the SIF Learning Styles Theme.

3.2 PACTS

The PACTS project set out to raise awareness and provide appropriate training and materials to support individuals diagnosed with specific learning difficulties such as Dyslexia, Dyspraxia, AD(H)D and Asperger's Syndrome (PACTS 2006).

One of the most significant findings from this cross border project funded by the EU which drew on expertise from the Ireland and Wales, was that although it is generally accepted that up to ten percent of the population may experience sufficient difficulties in the above areas to warrant a diagnosis (Kirby, A. and Kaplan, B, J , 2003), (McCarthy S. , 2005), it is far less generally known that because individuals affected are average or above average intelligence they often create excellent coping strategies and can remain undiagnosed far into adult life. Usually a diagnosis is only sought when a 'tipping point' is reached which overstretches their coping resources. This could equally be in an education or employment context.

Without identification and support at such a time the individual will not be able to demonstrate potential in the new area of challenge which could be a job promotion or a further level of education (Kirby A, Davies R, and Bryant A , 2005). Equally important to this fact is the fact that although the individual may have progressed through work or education by the development of good 'coping skills' due to his or her intelligence, it is still unlikely that he or she will have been able to demonstrate ability commensurate with his or her intelligence to the optimum (McCarthy, S. and Duffin, D, 2006) (McCarthy, S. and Duffin, D., 2007).

The PACTS Project also identified the fact that even if an individual does not qualify for an actual diagnosis because the cut off point for diagnosis is historically the bottom 10^{th} percentile, if a person demonstrates a number of trends within the four SPLD areas in the bottom 20%, he or she will still need intervention and support to demonstrate an optimal achievement performance.

This group of individuals is considered to include a further 10 percent of society. Overall these findings indicate that up to 20 percent of individuals within society will need support to demonstrate their potential in a given performance context (McCarthy, S. and Duffin, D, 2006).

As identified in its key objectives the PACTS project led to the National Learning Network Assessment Service (www.nln.ie) being set up to provide multi-disciplinary collaborative

assessment, identification and support based on the model in use in the Discovery Centre, University of Wales Newport (http://dyscovery.newport.ac.uk) and this service continues to work closely with Professor Kirby in the provision of its assessment services in Ireland.

Both the National Learning Network Assessment Service and the Dyscovery Centre have continued to research how individuals learn optimally and now proceed from a more generic perspective on learning diversity than one of a medical model of individual diagnosis. It has been conclusively demonstrated that a model of identification of individual learning profiles and behaviours applies to all learners precisely because there is no normal way to learn. The model set up to identify undiagnosed SPLD in Wales and Ireland serves equally as a best practice model to optimise learner performance in general.

> 'No intervention provided to support an individual experiencing SPLD will harm any other learner.'
> (Kirby, 2007).

A major conclusion of the project, therefore, was the fact that the research produced highlighted the need to examine learning in general and within that context in education that both learner and teacher behaviour must be considered.

3.3 Summary of PACTS Project Findings.

The PACTS project identified a number of key facts in the provision of support relevant to education that have been taken up in the SIF Learning Styles Theme:

- Individuals learn differently
- All learners will benefit from identifying how they learn
- Up to 20 percent of learners need support to succeed optimally with learning
- The manner in which a lecturer learns influences his or her teaching
- Screening individual and group learning styles informs both learners and teachers
- Differentiated teaching methodologies reduce the numbers of students requiring individual supports

  Adapted from PACTS 2006

3.4 The Education 4 Employment Project (E4E)

The Education for Employment Project (E4E) 2006-8 had two main objectives;

1. To create pathways through different levels of education through cognitive tools and inclusive methodologies for adults experiencing marginalisation such as those with disabilities or ex-offenders
2. To support students on those pathways and with transition to further education or employment
   (Lawlor, 2007, p. 7)

In achieving its objectives E4E used the development partnership of 6 specialist and mainstream further education and higher education service providers to share research, expertise and resources in the needs identification, assessment, training and support of students and lecturers (Kelly, 2008).

The National Learning Network continued to collaborate with its PACTS partners to refine the profiling and learning styles techniques used in the PACTS project through the continuing development of two tools, the Adult Profiling Tool (APT) (Kirby, A. and Smythe, I, 2008)

and a learning styles questionnaire (Kirby 2004) for the benefit of students and lectures and these two tools provide the foundations for the learning profiling necessary to SIF.

The techniques and tools offered to teachers and lecturers through training and mentoring in E4E included De Bono's Cognitive Research Tools (CORT) and his 6 HATS model (Duffin 2004, McAnaney et al 2007) which had been extensively employed by the Central Remedial Clinic in previous learning projects in its Special School housed on its Clontarf site (Gordon, D, Craddock, G and Lynch, B., 2004)

Another partner, the Dublin Institute of Technology contributed research and established practice on learning styles and differentiated instruction (Gordon, Craddock and Lynch 2004) in use in the Computer Science Department.

The past research of these three partners in particular concentrated on teaching and learning within the project and led to an inclusive approach (Duffin, D. Gordan, D. and Nolan B., 2008) (Duffin D. , 2006) that demonstrated tangible results for both students and lecturers (CRC, 2007).The finding from PACTS that up to 20% of individuals need support to demonstrate optimal potential in the learning environment (McCarthy 2004) is now joined by a complementary finding that strategically planned developments in teaching and lecturing delivery lower the numbers of students requiring individual supports (Duffin 2004).

3.5 Summary of E4E Project Findings

The E4E project identified a number of key findings in the provision of education from both learning and teaching perspectives that have been taken up for further development and implementation in the SIF Learning Styles Theme:

- Group profiling identifies individuals who may have undiagnosed SPLD and those who may not qualify for diagnosis but will need support in this area.
- Raising awareness around 'learning styles' encourages reflection and application of new knowledge in both teaching and learning situations.
- The presentation of learning in individuals is underpinned by that individual's genetic cognitive information processing profile.
- Production and perception of the knowledge required through the access and delivery of educational courses is highly dependent on the way an individual responds through sensory perception, especially visual, auditory and touch, and, by his or her abilities with motor coordination.
- The knowledge gained from profiling the above is capable of being pragmatically applied to selected individuals, class groups and courses.
- Successful application of inclusive methodologies reduces the numbers of individual students requiring supports, and facilitates transfer and progression.
  Adapted from (CRC, 2007)

3.6 Strategic Innovation Funding Learning Styles

Having summarised the findings of two innovative projects, it is the task of this section of this paper to provide the context from which the joint partners of the learning styles theme chose to collaborate under a 2006 Strategic Innovation Funding Application to the Higher Education Authority. The paper will then describe progress made in year one of the project.

3.7 Theme Partners: The Institute of Technology, Blanchardstown

The Institute of Technology, Blanchardstown (ITB) was opened in 1999, and is the Republic of Ireland's newest Institute of Technology with a brief to accommodate student diversity.

As a high profile partner in both of the above described projects ITB acknowledged the natural progression of learning styles based approaches in pursuit of three out of five organisational priorities identified in its Strategic Plan for 2006-11:

- Achieve an economically viable and diverse student population
- Attain teaching excellence and learning flexibility
- Supporting and valuing each other so that we can work together with energy, commitment and creativity
  (ITB, 2006, pp. 14-20)

The SIF funding stream was chosen as the ideal vehicle to progress this line of research and ethos and was granted funds to address learning styles identification across the organization for a three year project from 2008-2010.

As joint lead partner in the learning styles theme in the 2006 round of this strategic innovation funding, the Institute of Technology, Blanchardstown saw itself as being ideally placed as the location for developing and implementing pragmatic outcomes from the research and development on the manner and nature of learning described by the final reports of the PACTS Project (PACTS, 2006) and the E4E Project (E4E, 2007).

3.8 Theme Partners: The National Learning Network

The National Learning Network is the Republic of Ireland's largest specialist provider of training for people with disabilities and for those experiencing marginalisation and has over 50 centers delivering more than 75 FETAC accredited programs nationally. In addition it provides assessment and support services locally and nationally and has an active Continuous Professional Development Training Service.

The mission, vision and values of the National Learning Network reflect 60 years of specialist service provision:

> **Mission**
> A world of equal opportunities through learning
>
> **Vision**
> To promote equality by providing world class training, education and employment access services and by actively influencing the creation of a more inclusive society
>
> **Values**
> Integrity
> Empowerment
> Partnership
> Mutual Respect
> Innovation
> Honesty
> Courage

The inclusive model of individual needs identification and learning supports used in program delivery by the National Learning Network have been conclusively shown to support a diverse learner population through learner outcomes. In 2007 88% of all learners progressed to further training and education or employment (REHAB GROUP, 2007).

Both the Institute of Technology Blanchardstown and the National Learning Network have demonstrated commitment to inclusion by their ethos, strategic objectives and research. As

past partners representing both specialist and mainstream service provision they are ideally suited to combine resources and expertise in bringing some of the research findings of the PACTS and E4E projects into a more pragmatic and sustainable application under the SIF Learning Styles Theme.

3.9 Conclusion

Section 3 of this paper has examined the recent research of the two partner institutions in two EU funded projects and demonstrates that their organisational profiles and ethos' are harmoniously and strategically aligned and that their past collaborative work provides the necessary appropriate research foundation.

This combination of specialist and mainstream education and training expertise places these two Learning Styles theme partners in a unique, and therefore, ideal position from which to move forward. SIF will provide the opportunity for pragmatic implementation of methodologies and the collection and collation of quantitative data to demonstrate if a learning styles approach will meet identified education service provider needs in respect of student recruitment, student retention, student engagement, student achievement and lecturer continuous professional development.

The ultimate aim of this third strand of partnership work is to have created a mechanism by which such practices can be incorporated in the day to day running of the organization and thereby be sustained.

Sections 1 and 2 of this paper examined a range of approaches to learning styles and aligned them with mainstream cognitive psychology research and came to the conclusion that learning styles are a the most useful indicator of learning preferences and that the VAK, VARK type of approach identifying learning channels or modalities is the best model to consider the range and complexity of information processing, planning and coordination skills required in the learning process.

Section 4 of this paper will present an examination of and a rationale for the specific learning styles profiling tools chosen for use in the Learning Styles Theme.

4 The Adoption of Generic Approach to Learning Styles Identification

As stated the SIF learning styles theme gives the opportunity to apply the research outcomes of the PACTS Project and the E4E Project within an overall inclusion methodology in an Institute of Technology. These two projects provided the tools to identify both student and lecturer information processing profiles and this section of the paper examines how and why the methodology is used in the learning styles theme. Before proceeding with this task Section 4 will first address two important elements required in an institution wide approach to successful teaching and learning. These elements are:

1. Identification of specific students likely to need additional supports.
2. Identification of teaching and learning styles from both individual and group perspectives.

4.1 The Identification of Students Likely to Need Additional Supports

Whilst the best model of student needs identification is undoubtedly based on Individual Education Planning (IEP) (NCSE, 2006), the high numbers of students, the short timeframe available at the commencement of courses, the reluctance of students to identify support

needs on application forms, the fact that up to 10% of students may unknowingly have SPLDs and the exceptionally high levels of resourcing required to collect and collate IEP data all conspire to prevent this being a viable option.

The current structure of third level education requires a process that can be completed at the start of the academic year within a short time constraint. Ideally, as an inclusive process, it must be applied to all students so that those who do and do not know where their support needs lie will be included and should also be of benefit to any student participating regardless of support needs. Such a process might be best managed within an induction context where it will need to be capable of self-administration for expediency. It will also need to be capable of being analysed speedily so that findings can be disseminated to both students and lecturers at the start of the semester.

4.2 The Adult Profiling Tool

In the PACTS project a self-administered screening tool designed by Amanda Kirby at The Dyscovery Centre was shown to accurately predict which individuals may be experiencing specific learning difficulties (McCarthy S. , 2004), (Kirby A, Davies R, and Bryant A , 2005), (McCarthy, S. and Duffin, D., 2007).

This screening tool, the Adult Profiling Tool (APT) has subsequently been converted to an online format easily accessible through the college website (Kirby, A. and Smythe, I, 2008)

The tool consists of 60 questions about functional difficulties. The individual's responses, whilst perceptual, provide sufficient valid information to determine whether that individual should be invited to undergo further investigation in the context of psychological testing. The questions cover the four main areas understood within the term specific learning difficulty; dyslexia, dyspraxia, ADHD and Asperger's syndrome. None of these terms is mentioned either in the process of filling out the questions or in the feedback sheet that is immediately available online offering study advice in response to the answers given. This advice which is tailored to each individual's answers, provides ideas on how best to study and raises individual awareness on his or her learning profile and on learning diversity in general.

The table below describes the four areas of functional difficulty:

Table 1:Functional Difficulties Associated with SPLD.

Identified Area of Functional Difficulty:	**Commonly known as:**
Difficulty with reading and writing	Dyslexia
Difficulty with motor planning and organisation	Dyspraxia
Difficulty with social interaction and communication	Asperger's Syndrome
Difficulty with attention and concentration Lack of Impulse control	ADD ADHD

(McCarthy, S. and Duffin, D, 2006)

A major strength of this screening tool is that it not only identifies a specific area of difficulty that could be associated with an SPLD, but it also identifies where overlapping difficulties exist and where similar functional difficulties exist because of a different cause such as physical or sensory disability. Although the range of disabilities and illnesses is vast, there are a finite number of functional difficulties as they are all ultimately defined by the way the individuals physical or mental presentation is translated through his or her cognitive processing and function. Although the APT was designed for SPLD originally it has been shown to be useful for any individual.

In the diagnosis of specific learning difficulty, unless a multidisciplinary team has been involved, it is frequently the case that overlapping difficulties are missed. Within the identification of specific learning difficulty, research has now conclusively demonstrated that overlap of difficulties is the norm and not the exception (McCarthy S. , 2005) and that appropriate diagnosis is best made by collaborative multidisciplinary teams and not by individual professionals with expertise only in one domain.

It is important to stress that the APT is not a diagnostic tool for SPLD but primarily serves as an indicator for those individuals who may need further investigation. It is particularly useful for identifying the learning perceptions of an individual in terms of the above areas and provides data for the production of a report on the learning strengths and weaknesses of any given individual or group in order that supports, interventions and training can be implemented in a given environment (Kirby 2008).

This screening tool has now been trialled in a variety of settings including education, the military, the prison service and employment and was launched by Dr Amanda Kirby in May 2008 and is now available in Ireland on licence.

4.3 Identification of teaching and learning styles from both individual and group perspectives

The screening tool and learning styles questionnaire developed from the PACTS projects have been used together to provide a number of reports on individual and group profiles (McCarthy, S. and Duffin, D, 2006) and can easily be combined to provide a range of information about the way individuals and groups learn. The learning styles questionnaire is described below:

4.4 Kirby Learning Styles Questionnaire

In addition to identifying whether functional difficulties in line with specific learning difficulty identification exist, it is also useful to give the student or the lecturer some reflective insight into his or her individual approach to learning or teaching. We already described some of the models of learning styles identification available and discussed them in terms of current cognitive processing research. The outcome of this discussion demonstrates that no one learning styles model will serve our purpose here.

> There is no such thing as the best model to use. It can be seen that there is a variety of approaches to identify the best ways that individuals learn. Some methods are complex and some are simple. At the start of this section the complexity of the study of cognitive science was mentioned, and, as this is a study which will take some time to uncover the nine-tenths of its iceberg of knowledge still remaining underwater, it is fair to say that none of the models described will fully answer the question.
>
> (McAnaney, D. Craddock, G. Gordon, D, Duffin. D. O'Leary, C. and Whelan, G., 2007, p. 74)

Within the PACTS project, a learning styles identification tool was developed for use in the Institute of Technology Blanchardstown. This model was based on the VAK model with additional questions on past educational experiences and other relevant items such as native language. In the National Learning Network Assessment Service this learning styles tool has been used in conjunction with the adult profiling tool described above and has been shown to provide a significantly broad spectrum of individual information to support the student even when diagnosis was not an outcome.

4.5 Summary

Both these tools, although not diagnostic, are sympathetic to individual analysis under sound psychological research principles. Because they are self administered in an environment where successful achievement is fostered and the students are informed of their purpose as empowering aids to achievement, the data gathered is both pertinent and accurate.

A combination of these two tools has been shown to be of optimal benefit in both empowering students' reflections on their own learning behaviours and in identifying students who may need additional support of diagnosis of specific learning difficulty. As both tools focus on functional difficulties and strengths in learning identified by the individuals the experience of responding to them is accessible and quick and the feedback sheets given offer useful study advice referenced to the responses given

5 SIF: Learning Styles Theme

The research described previously allows this section of the paper to identify the methodology chosen for the Learning Styles Theme and will now describe the format developed to ensure that both lecturer and student learning was appropriately encompassed by the methodology.

5.1 Methodology

In developing an appropriate methodology, the SIF Learning styles theme is mindful that psychological research does now have a considerable corpus of data on perception, attention and memory as key cognitive processes. All these processes operate in auditory, visual and kinesthetic modes and for this reason it is most useful to investigate these processes under a VAK or VARK type of learning styles model as this is the type of model that can be most closely correlated to cognitive measurables within learning in individuals.

The following simplified table shows how perception, attention and memory impact on learning through the three modalities. As can be seen from the 'outcome' column memory plays a key role in learning, not only in being able to recall the information of the curriculum but, most importantly, in being able to access and organise the understanding of the information itself.

The overall methodology of the SIF learning styles theme has been developed through a deconstruction of learning to some of its cognitive components and its channels in order that both students and lecturers gain a better understanding of learning. From the student perspective the individual is encouraged to reflect on his or her own manner of learning by engaging in a learning styles exercise and is simultaneously screened to identify whether there is sufficient atypicality in his or her profile to warrant further investigation and, possibly, individualized supports. The two elements of the methodology are, Information gathering and Continuous professional development and the outcomes sought are inclusive module delivery and student benefit.

Table 2: Learning channels relationship to cognitive processing.

	Perception	Attention	Memory	Outcome
Auditory	Understanding and interpretation of what is heard	Ability to sustain concentration in order to perceive meaning and context of sound input.	Ability to retain and recall information in a range of situations including sentence processing	Music and sounds can support access to memory
Visual	Understanding and perception of what is seen	Ability to sustain concentration in order to perceive meaning and context of visual input	Ability to retain and recall information in a range of situations	Colour, images and symbols can aid and prompt memory
Kinaesthetic	Ability to coordinate motor skills to achieve practical tasks	Ability to complete tasks through practice and achieve automaticity	Supports sequence and organisation in practical tasks	Performing an activity or sequence of movements can prompt memory
Language	Understanding in decoding and encoding utterances	Capturing segments of sufficient length to ensure correct interpretation	Use of articulatory loop to 'hold' linguistic information whilst decoding/encoding	Mental Lexicon contains information needed in language processing

(Duffin, forthcoming)

5.2 Information Gathering

In ITB the APT is completed by all students during induction in an online format so that the data can be collated speedily and so that students receive immediate feedback. The learning styles questionnaire is scored separately and students receive learning styles reports and, where relevant an invitation to investigate their learning further. The Learning styles questionnaire will very shortly also be available online.

Screening for specific learning difficulties, although this term never needs to be mentioned, allows the examination of the cognitive profiles of any students who may warrant a potential diagnosis or may simply present with a more atypical profile by an examination of weaknesses and strengths under the four areas of identified functional difficulty referred to in section 3. Placing this profile examination in the context of learning styles examination provides a user-friendly rationale which allows the individual to identify the best ways to organize his or her learning in line with the degree of analysis that has been undertaken in his or her case. In this way the service offered is not one that seeks out those with difficulties in order to attempt to 'repair' them, but is an inclusive college wide commitment to supporting optimal learning overall within which more atypical learners are seamlessly incorporated.

From the lecturer perspective, engagement in the learning styles exercise and in the screening exercise offers a similar opportunity for self reflection and, more importantly, provides the basis for a continuous professional development program using cognitive processing and learning styles information to develop more inclusive teaching modules.

Their teaching modules will be more inclusive in two ways, their overall delivery will be aimed at the range of different types of learner contained within the terms visual auditory and kinaesthetic and their specific delivery to any one group will be informed by the group learning profile of the group as a means of a report compiled from the information presented by the learning styles questionnaire completion and screening tool completion of the class group. Additionally the lecturers have identified trends in their own delivery and include this information in the preparation of materials for module delivery.

5.3 Continuing Professional Development

CPD development and delivery has been a targeted initiative of the National Learning Network for the past three years (Duffin, D and McCarthy S, 2006) after it was found that awareness raising sessions and theoretical training days did not consistently lead to outcomes within the pragmatic day to day work environment

Within the learning styles theme there has been awareness raising and theoretical information delivery as this is still an essential part of up-skilling. It is the additional element of a series of workshops and continuing one to one support offered within the learning styles theme to tutors and lecturers in small groups and as individuals that makes this project so innovative in being able to secure sustained and growing enhancement of curriculum delivery.

As a result, the development of the continuing professional development sessions offered to participating lecturers which are delivered in weekly workshops and awareness raising sessions offered to the teaching body on a regular basis have been pragmatically rather than theoretically tailored to the contexts within which they are delivered.

5.4 Summary

The methodology selected takes a two pronged approach consisting of information gathering and continuing professional development. Information gathering includes screening for SPLD and for learning styles and identifies ways to organise teaching and learning activities for optimal success. It is equally relevant to individuals with or without specific learning difficulties as it focuses on learning rather than on learning difficulty. The CPD element of the methodology goes beyond awareness raising and theoretical sessions by providing small group and one to one support to lecturers in the context of specific module delivery.

5.5 SIF: Activities Semester 1

In describing the activities of the Learning styles theme it will be necessary to include the following:

- Planning and Development
- Information Gathering
- Workshops
- Dissemination
- Student Perspective
- Lecturer Perspective

This section will conclude by indicating the future intentions of the learning styles theme in years two and three, before offering conclusions and recommendations for this paper overall.

5.6 Planning and Development

A key challenge for this project was to ensure sustainability after the lifetime of the project. The goal was to initiate a process of institutional change, where the learning needs and profiles of students were understood by all, and catered for as common practice in the classroom. Adopting change requires a change in attitude and values, as well as in practise and regardless of the value of that change, it can only happen if the institute is ready for the change, and it has the support of both faculty and management (Heyword, 2006).

The Institute's readiness was evident from the active involvement by both management and faculty in the PACTs and E4 project, the institute's unique relationship with the National Learning Network, and the institute's mission statement:

> *The mission of the Institute is to serve its students and the community by meeting the skills needs in the economy and increasing the level of participation in third-level education and training, particularly in Dublin North-West and its environs. The Institute will do this:*
> - *by achieving consistently high standards of relevance and quality in teaching, research, development and consultancy.*
> - *by offering a welcoming and supportive environment to students from all educational and social backgrounds and to adults wishing to increase or update their level of technical skills.* (ITB, 2008)

The task in the planning stage was to encourage and facilitate the active support of management and faculty. A project review group was established consisting of the registrar, heads of school, heads of department, HR manager, finance manager and head of development. This group is kept abreast of project progress, and in return gives valuable input on ensuring project activities can be accommodated and supported within the operations of each department.

There was encouraging support from members of faculty from the outset of the project. In planning this project, it was agreed that key to its success was to recognise the time commitment required by faculty to change teaching practices. Three members of staff engaged with the project each semester and were allocated timetabled hours to undertake project related research, which incorporated changing teaching practice and monitoring the impact of that change. As the research was directly led by daily practise it was immediately relevant to the individual lecturer as well as providing a valuable resource for peers.

Weekly workshops and advice session for the three participants, hosted by trainers from the National Learning Network, delivered formal instruction on inclusive teaching practices, and informal discussions between participants and trainers. Workshops were tailored to the group's requirements with respect to the learning profile of their student groups, and the nature of the material being delivered. The first semester focused on first year modules only, and subsequent semesters included second to fourth year modules.

5.7 Information gathering

First year students, and students of participating lecturers, were profiled using both the Adult Profiler and the Learning Styles questionnaire. Students received an individual report outlining their learning preferences. Where the profiler identified significant areas of

weakness, a follow on assessment was offered to students. Each lecturer received a summary report outlining the group's range of learning preferences and the prevalence of learning difficulties in their group. 55% percent of students profiled were visual or a combination of visual and other learning channels. Diagram 2 gives a more detailed breakdown of their learning preferences. Throughout the semester, students completed rubric style feedback sheets evaluating the teaching methods used. These require students to tick which one of a range of options most closely matched their experience in the lecture or tutorial. Besides give immediate and relevant feedback of the learning experience of the whole group these can be completed very speedily.

This proved both beneficial in terms of giving students a say in what happened in the classroom, and also informative as results were not always as expected based on the learning profile of the class. For example, one group of predominantly visual learners gave very positive feedback on the use of transformation methods to convert textual data into a graphical representation. A second group, again of predominantly visual learners, did not find this approach as useful, although did like information presented in a graphical format.

This could be explained by the requirement for logical, sequential processing required to transform textual data in a spider map, as was being used in this instance.

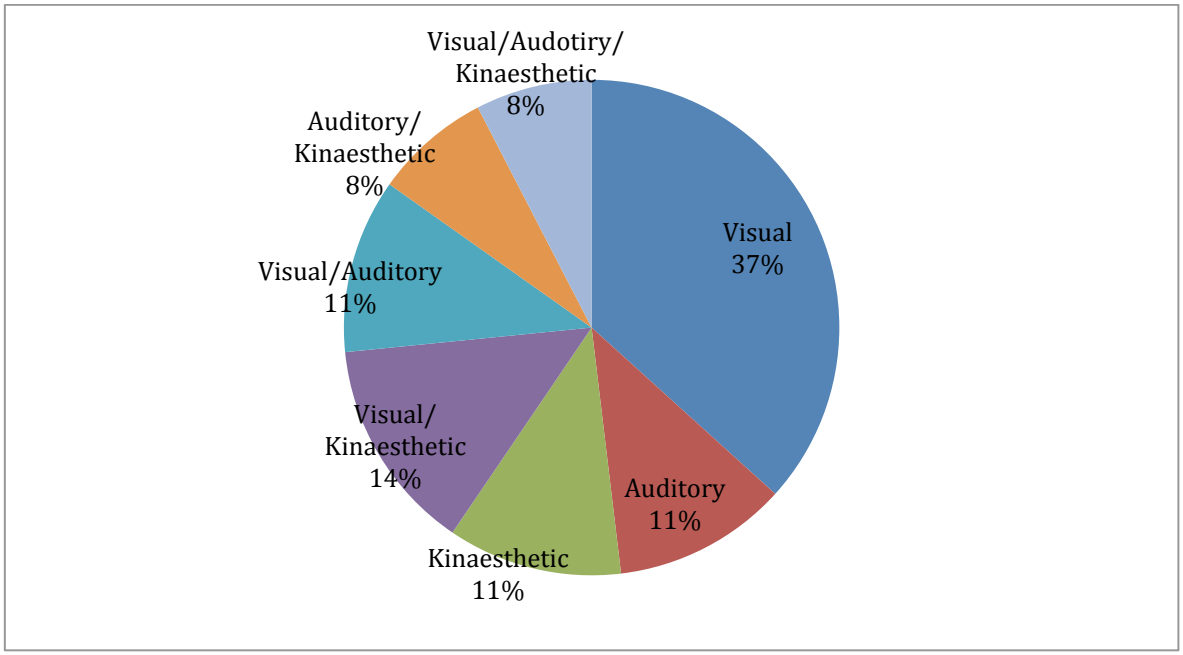

Diagram 2. A breakdown of the learning preferences of 161 students profiled in year 1

A formal questionnaire completed by students at the end of semester 1 and 2 (academic year 2007-8) has provided the project with encouraging qualitative feedback on the work done to date. The purpose of the questionnaire was to record the student's opinion on a variety of teaching methods, and their evaluation of the impact of those methods on continuous assessment results and preparation for the final exam. We also recorded the extent to which a student understood his/her own learning preferences (Duffin, D. and Gray, G, 2007)

The following results emerged:

- 97% stated that differential teaching techniques improved their understanding of course material.
- 93% attributed improved continuous assessment grades to the teaching methods used in class.
- 94% said the techniques used made classes more enjoyable.
- 98% stated that the techniques helped when studying course notes.

(Duffin and Gray 2008, page 47)

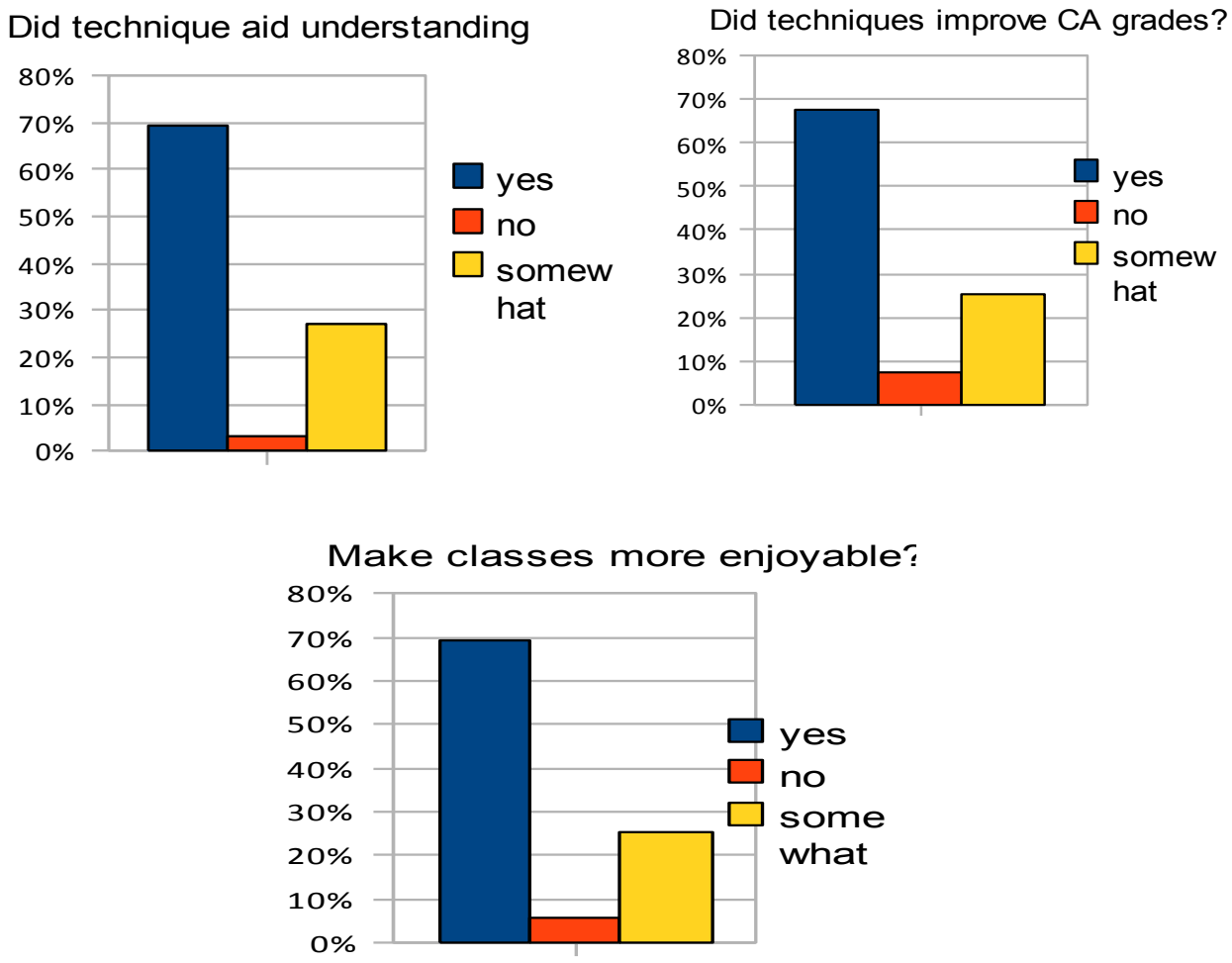

Diagram 3: Student Survey Results

Interestingly, the one classroom technique that appeared in top ranking methods of all groups, regardless of the predominant learning style in the group, was in-class discussions. Initial surveys showed over 40% of students did not have a good understanding of their learning preferences at the time of profiling. Follow on tutorials on learning channels and study tips for each channel improved this figure to over 75% of students understanding their learning preferences, and, consequently, what study techniques best suit them.

This finding suggests that is it not sufficient to merely inform students of their learning styles. To maximise the benefit of student profiling, awareness of learning styles needs to be re-enforced by subsequent information sessions and explicit practical examples in lectures and tutorials.

5.7 Workshops

The second strand of the project was to provide continuing professional development for academic staff. Experience on previous projects (E4E, 2007) (PACTS, 2006) suggested that no one teaching approach suits all, but rather academic staff should be equipped with a tool box of approaches which can be adapted to suit the module content and learning styles present in a particular class group. Formal training covering a number of teaching approaches including active learning techniques, visualisation techniques, the use of technology in education and aiding concentration and memory. In addition, weekly, informal conversation with NLN staff and peers was reported to be as beneficial as the formal training sessions. All faculty participants to date have stated that involvement in the project resulted in the standard of their delivery improving; job satisfaction increasing, awareness of the needs of learners had improved and student engagement in class work had also improved. 80% of participants attributed improvement in attendance rates and assessment results to their involvement in the project. At this early stage in the project, review of the impact of the work done can only be qualitative. It is hoped a longer study will be able to demonstrate a quantifiable improvement in performance as a result of change in teaching practice (Duffin, D. and Gray, G, 2007, p. 42)

5.8 Dissemination

Dissemination of the work done was facilitated by an end of semester 'Show and Tell' session. Presentations by project participants covered the learning profile of their group, problems encountered with their module in previous years, new approaches adopted, examples of materials developed, and feedback from students on the effectiveness of approaches tried. At the time of writing, two such events have taken place. Feedback from these sessions has been exceptionally positive and encouraging.

5.9 Student Perspective

Initial data collected suggests that the project is achieving increased student engagement in course work, increased attendance levels, and a reduction in the numbers of students failing. Students profiled have greater self awareness of their own learning style and preferences, and have been exposed to a greater range of learning techniques to better equip the learner and extend critical thinking. 84% of students stated this learning experience is better than any previous educational experience they have had. Lecturers also reported an improvement in student engagement (Duffin, D. and Gray, G, 2007, p. 42 and 47)

5.10 Lecturer Perspective

The biggest challenge for any lecturer or teacher is coming to understand why one student will understand material that has been presented and another will not. In a comprehensive study of teacher awareness across four levels of education in Ireland McCarthy 2005 found that there was an overall lack of awareness of SPLD:

> There has never been a study of specific learning on this scale carried out in an Irish population before now. The results are of huge significance to the Irish Education System, as they portray a significant lack of awareness and knowledge of SPLDs……
> (McCarthy S. , 2005, p. 92)

Lecturers involved in the project reported a shift in mindset with respect to their understanding of diversity of cognitive processing, and how best to present module content to optimise learning in the classroom.

5.11 Learning Styles Theme 2008 and 2009

The goal for the next two years is to continue screening and profiling individuals and groups whilst making the workshops available to as many lecturers as possible as well as the chosen participant lecturers for any one semester. Qualitative data to date suggests overall and individual benefits under a learning styles approach; the task of the future is to demonstrate these early findings in a quantative manner.

6 Conclusions and recommendation

Although this project is still in its infancy it is possible to draw a range of conclusions on its findings to date:

I. The recognition that diversity of cognitive processing across society is the norm is more important than attaching weight to any particular model of learning styles identification.
II. It is pointless to identify individual or group learning styles without examining the relevance and relationship to teaching and lecturing practice. If learners are encouraged to be aware of their learning styles they will need support in applying them to study practices and teachers will similarly need to become aware of their 'teaching styles' so that synergy can be achieved within the teaching and learning partnership.
III. Inclusive projects of this nature aim to change and sustain approaches to institutional practise and programme delivery overall and must have buy in and engagement from all levels of the institution.
IV. Theoretical and awareness raising CPD is far more effective with additional pragmatic follow up in group and individual settings.
V. All the participating lecturers found the process of benefit, they reported a change of mindset in respect of their roles and practise and engaged in research that demonstrated this was the case.
VI. Student involvement and feedback has been shown to be essential to their engagement in the learning process and was noted by all participating lecturers.
VII. This project is impacting on students' retention, attendance, performance and achievement.

The single most important recommendation is that initiatives using learning style identification must use the knowledge gained from individual or group screening in a pragmatic manner that will positively impact on learning and teaching outcomes. The knowledge gained must be applied within an organisational structure that includes macro and micro outcomes related to its overall mission, vision, values and strategic planning.

Bibliography

ARKS. (2001). *Arks keys to learning: what is effective learning?* Retrieved July 28, 2008, from homepages.ed.ac.uk: http://homepages.ed.ac.uk/calarks/arks/Materials/ktl2001/KTL_Chapter1.pdf

ARKS. (2000). *Adult Education project funded under the European Union Socrates Programme.* . Retrieved July 28, 2008, from http://homepages.ed.ac.uk: http://homepages.ed.ac.uk/calarks/arks/indexe.html

Clark, D. R. (2008). *The Three Representational Modes (TRiM).* Retrieved September 20, 2008, from www.nwlink.com: http://www.nwlink.com/~Donclark/hrd/learning/theories

CRC. (2007). *Education 4 Employment: Final Report.* Dublin: Central Remedial Clinic.

Duffin, D and Gray, G. (2007). *SIF: Learning styles Theme. End of Year Report.* Available on request from authors: Unpublished.

Duffin, D and McCarthy S. (2006). *The Principal's Manual.* Dublin: City of Dublin VEC.

Duffin, D. (2004). *Language processing in speech or sign: similar or different?* (P. McDonnell, Ed.) Coleford, England: Douglas McLean.

Duffin, D. and Gray, G. (2007). *2008 SIF: Learning Styles Theme: End of Year Report.* Dublin: ITB/NLN.

Duffin, D. (1999). Deafness and Language Acquisition. *Teanga: Irish Association of Applied Linguistics , 18*, 93-105.

Duffin, D. Gordan, D. and Nolan B. (2008). *Publications/INTED Conference Proceedings*. Retrieved from *www.iated.org: www.iated.org/icer12008/index.php?section=21*

Duffin, D. (forthcoming). Lecturers and Lecturing / Learners and Learning: A Collaborative Model of Inclusivity to Maximise Potential in Higher Education. *Unpublished PhD Research (in progress)*. Dublin: ITB.

Duffin, D. (2006). Working Towards An Inclusive Model Of Practice: E4 Project Training In An Institute Of Technology. *ITB Journal* , 131-174.

E4E. (2007). *Education for Employment Project Annual Report 2007.* Dublin: Central Remedial Clinic.

Emmorey, K. (2002). *Language, cognition, and the brain: Insights from sign language research.* Mahwah, N.J.: Lawrence Erlbaum Associates.

Eysenck, M. W and Keane, M. T. (2005). *Cognitive Psychology: A Students Handbook.* New York and Hove: Psychology Press.

Eysenck, M. W and Keane, M. T. (2001) *Cognitive Psychology: A Students Handbook (4th Edition) England: Ps* (5th ed.). New York and Hove: Psychology Press.

Fleming, N.D. (1995). I'm different; not dumb. Modes of presentation (VARK) in the tertiary classroom,. In A. Zelmer (Ed.), *Proceedings of the Annual Conference of the Higher Education and Research Development Society of Australasia. Volume 18*, pp. 308 - 313. Australia: HERDSA.

Gardner, H. (2006). *Multiple Intelligences: New Horizons in Theory and Practice.* New York: Basic Books.

Gordon, D, Craddock, G and Lynch, B. (2004). Using the De Bono 6 HATS Techniques as a Learning Styles Model. . *ELSIN Seminar* . University of Durham: UK.

Harley, T. (2008). *The Psychology of Language: From Data to Theory.* (3rd ed.). New York and Hove: Psychology Press.

HEA. (2005). *Progressing the Action Plan: Funding to Achieve Equity of Access Report.* Dublin: HEA.

Henderson, H. and Wachs, T. (2007). Temperament theory and the study of cognition–emotion interactions across development. *Developmental Review , 27 no. 3*, 396-427.

Heyword, J. (2006). Factors in Adopting of Change; Identity, Plausibility and Power in Promoting Educational Change. . *36th ASEE/IEEE Frontiers in Eduction Conference.*

ITB. (2006). *Making Education Accessible: Priorities for the next five years. Strategic Plan 2006-2011.* Dublin: ITB.

ITB. (2006). *Making Education Accessible: Priorities for the next five years. Strategic Plan 2006-2011.* Retrieved November 9, 2008, from www.itb.ie: *http://www.itb.ie/site/itbinformation/documents/StrategicPlan.pdf*

ITB. (2008). *Mission Statement*. Retrieved September 29, 2008, from ITB: http://www.itb.ie/site/itbinformation/mission.htm

Keirsey, D. (1998). .*Please Understand Me II: Temperament, Character, Intelligence.* Del Mar, CA: Prometheus Nemesis Book Company.

Kelly, E. (2008). *Education for Employment Report on Partner Organisations Experiences.* Dublin (available on request): Central Remedial Clinic.

Kirby A, Davies R, and Bryant A . (2005). Do Teachers know more about specific Learning Difficulties than General Practitioners? *British Journal of Special Education* (32.3), 122-126.

Kirby, A. and Kaplan, B, J . (2003). *Specific Learning Difficulties.* Oxford: Health Press.

Kirby, A. and Smythe, I. (2008). Do-It Tool Manual (Manual for Adult Profiling Tool Licence). Avaialble as part of Training.

Kirby, A. (2007 , November). VEC Principals and Assistant Principals Annual Conference. *Keynote Address.* Ireland: Johnstown House.

Kolb, D. (2005). *The Learning Style Inventory* (Version 3.1 ed.). Boston, MA.: Hay Resources Direct.

Lawlor, G. (2007, November 29). *E4 Project Annual Report 2006.* Retrieved November 19, 2008, from The E4 Project: *www.e4project.ie/content//assests/pdf/e4_2006.pdf*

MBTI Basics. (2008). Retrieved September 20, 2008, from Myers&Briggs Foundation: http://www.myersbriggs.org/my-mbti-personality-type/mbti-basics/

McAnaney, D. Craddock, G. Gordon, D, Duffin. D. O'Leary, C. and Whelan, G. (2007). *Teaching and Learning in Further and Higher Education: A Handbook by the Education for Employment Project.* Dublin: Central Remedial Clinic.

McCarthy, S. (2004). A Collaborative Model of Service Delivery for Individuals with Specific Learning Difficulties. *ITB Journal, 10*, 85-103.

McCarthy, S. (2005). An Investigation into the Level of Awareness and Understanding of Specific Learning Difficulties among Education Professionals from Pre-school Level to Third Level education. Dublin: Unpublished dissertation submitted in partial fulfillment of the of the requirements for the Higher Diploma in Professional Psychology (Educational).

McCarthy, S. and Duffin, D. (2006). Empowering The Teacher, Equipping The Learner. *IATSE Conference Proceedings.* http://www.iatse.ie/Conference.aspx.

McCarthy, S. and Duffin, D. (2007). Specific learning difficulties from the Student's Perspective: The challenge of understanding the experiences of individuals with specific learning difficulties. *IATSE Conference Proceedings* . Dublin: http://www.iatse.ie/Conference.aspx.

MSN Encarta. (2008). *Intelligence.* Retrieved November 8, 2008, from Microsoft® Encarta® Online Encyclopedia: *http://encarta.msn.com/encyclopedia_761570026_6/Intelligence.html*

NCSE. (2006). *Guidelines on the Individual Action Plan Process.* Retrieved November 10, 2008, from National Council for Special Education: *http://www.ncse.ie/publications/final_report/pdf*

Nowak, A. And Vallacher, R. (1997). The Emergence of Dynamical Social Psychology. (Robin, Ed.) *Psychological Inquiry* (8 No. 2), 73-99.

PACTS. (2006). *Partners Collaborating in Training on Specific Learning Difficulties Final Report.* Available on request from *dawn.duffin@nln.ie*: Unpublished report.

REHAB GROUP. (2007). *REHAB Group Annual Report 2007.* Retrieved November 9, 2008, *from www.rehab.ie: http://www.rehab.ie/about/PDFS/RehabAnnualReport2007.pdf*

Smith, A. (1996). *Accelerated learning in the classroom.* Stafford: Network Press.

Wechsler, D. (2003). *Wechsler Adult Intelligence Scale downloaded*. Retrieved September 27, 2008

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